

Flood Damaged Vehicle Inspection and Handling

Service Category Power Source/Network

Section Battery/Charging

Market USA

Toyota Supports
 ASE Certification 

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2000 - 2018	4Runner, 86, Avalon, Avalon HV, C-HR, Camry, Camry HV, Celica, Corolla, Echo, FJ Cruiser, Highlander, Highlander HV, iA, iM, Land Cruiser, Matrix, Mirai, MR2 Spyder, Prius, Prius C, Prius PHV, Prius Prime, Prius V, RAV4, RAV4 EV, Sequoia, Sienna, Solara, Tacoma, Tundra, Venza, Yaris	

REVISION NOTICE

November 22, 2017 Rev1:

- **Applicability has been updated to include 2014 – 2018 model year vehicles. Any previous printed versions of this bulletin should be discarded.**

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 and to 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 District Service and Parts Manager (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 and Handling

Service Bulletin Overview

This bulletin contains three sections:

1. **Vehicle Safing** – Make 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** – Assess the level of damage and determine 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	OFF	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required Tools & Equipment

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Electrical Insulating Gloves*	01413-00072 (Medium)	1
	01413-00073 (Large)	
	01413-00074 (Extra Large)	

*Essential SST.

CAUTION

ALWAYS inspect electrical insulating gloves **BEFORE** use for cracks, ruptures, tears, pinholes, or damage. Do **NOT** wear if damaged.

NOTE

Additional SSTs may be ordered by calling 1-800-933-8335.

Flood Damaged Vehicle Inspection and Handling

Required Tools & Equipment

REQUIRED TOOLS & MATERIAL	QUANTITY
GoJak® or Equivalent	4
Particulate Mask (Respirator)	1

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream 2.0*	ADE	TS2UNIT	1
Techstream Lite		TSLITEPDLR01	
Techstream Lite (Green Cable)		TSLP2DLR01	

*Essential SST.

NOTE

- Only ONE of the Techstream units listed above is required.
- Software version 12.20.024 or later is required.
- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

Vehicle Safing

The most important aspect of handling flooded vehicles is to make 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 fire.
- 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 if the carpet is found wet, DO NOT attempt to start the vehicle until AFTER the inspection and potentially 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 the vehicle.
- Keep ignition sources away from the vehicle due to potential battery outgassing.
- If the auxiliary (12V) battery is found disconnected in a potential flood vehicle, DO NOT connect the battery until a complete inspection is performed and a course of action is determined.

Flood Damaged Vehicle Inspection and Handling

Vehicle Safing (Continued)

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.

Has the vehicle flooded with water above the rocker panels into the floor of the vehicle?

- **YES** — Continue to step 2.
 - **NO** — Go to the Vehicle Inspection section.
2. Open the doors and trunk/hatch to release trapped water, ventilate the cabin, and allow the interior to air dry.
 3. Locate and remove the body drain plugs at the rear corners of the cabin floor and/or in the spare tire well (if available) to assist with draining the vehicle.
 4. Disconnect the auxiliary 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 auxiliary battery is disconnected**).

CAUTION

If the battery area contains standing water, drain **BEFORE** removing the HV battery service plug connector.

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

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 focuses primarily on salt water flooding. If the vehicle was driven in flood waters, additional inspections may be necessary.

Flood Damaged Vehicle Inspection and Handling

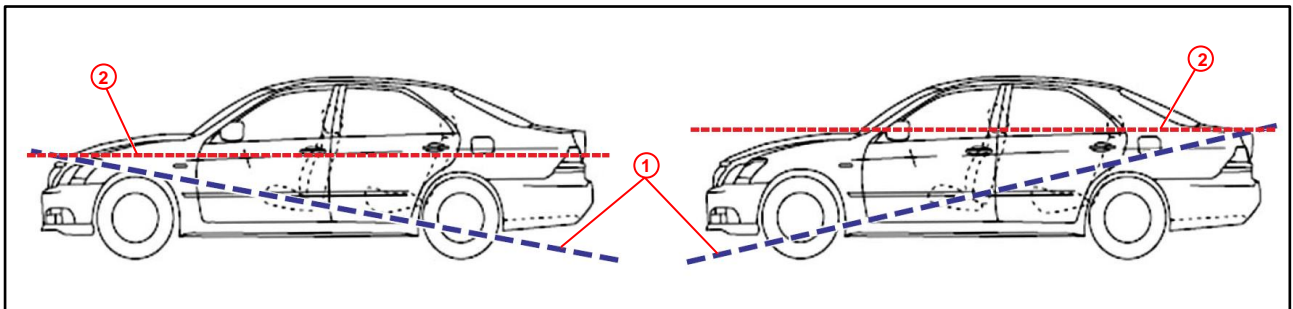
Vehicle Inspection (Continued)

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

HINT

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 for the appropriate key inspection areas identified on the following pages.

Figure 1.



1 Water Line

2 Inspection Level

NOTE

- Key inspection areas are cumulative from Levels 1 – 5 as water level increases. For example, Level 4 includes ALL inspection areas from Levels 1 – 4.
- ANY vehicle that was driven through flood waters will require BOTH the Parked Vehicle Inspection and the Driven Vehicle Inspection.

Table 1. Parked Vehicle Inspection – Salt Water

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Level 1	Up to Lower Edge of Rim/Wheel	<ul style="list-style-type: none"> • Steel or Alloy Wheel Surfaces • Schrader Valve/TPMS Sensor • Check for Splashing on Undercarriage Surfaces 	<ul style="list-style-type: none"> • Clean or Replace (As Needed) • Rinse With Fresh Water and/or Salt Water Neutralizer*
Level 2	Up to Axle Centerline	Brake Components: <ul style="list-style-type: none"> • Brake Rotors or Drums • Caliper Pistons, Slides, Pads, and Mounting Hardware • Drum Cylinders, Shoes, Parking Brake Components • Wheel Speed Sensors • Sensor Connectors 	<ul style="list-style-type: none"> • Clean, Lube, or Replace (As Needed) • Rinse With Fresh Water and/or Salt Water Neutralizer*

*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 Material Safety Data Sheet (MSDS) and instructions carefully for safe handling and application.

Flood Damaged Vehicle Inspection and Handling

Vehicle Inspection (Continued)

Table 1. Parked Vehicle Inspection – Salt Water (Continued)

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Level 2	Up to Axle Centerline	Suspension: <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Clean, Lube, or Replace (As Needed) • Rinse With Fresh Water and/or Salt Water Neutralizer*
		Electrical: <ul style="list-style-type: none"> • Wheel Speed Sensors • Sensor Connectors • Starter and Solenoid • ATM Neutral Start Switch • ATM Solenoid Connector 	Replace ANY Electrical Components That Have Been Submerged in Salt Water
		Exhaust: <ul style="list-style-type: none"> • Pipe(s) • Muffler(s) • Catalyst(s) • O₂ / A/F Sensor(s) Connector and Harness 	
Level 3 (Continued on Next Page)	Up to Lower Edge of Door/Top of Rocker Panel	Driveline: <ul style="list-style-type: none"> • Driveshaft/Axle Shaft • ATM Fluid Level/Contamination • Differential Oil Level/Contamination • Transfer Oil Level/Contamination 	Drain and Refill (As Needed)
		Electrical (Continued on Next Page): <ul style="list-style-type: none"> • Electronic Control Unit (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 	<ul style="list-style-type: none"> • Replace ANY Electrical Components That Have Been Submerged in Salt Water • ONLY a Hybrid Certified Technician Should Inspect and/or Replace Components

*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 and Handling

Vehicle Inspection (Continued)

Table 1. 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	Electrical (Continued): <ul style="list-style-type: none"> • ALL Electrical Components Indirectly Affected (Inspect ALL Interior Systems for Proper Operation) • HV Battery, Harnesses, Battery ECU, A/C Compressor With Inverter • Evaporative Emissions Control System Components/Harness 	<ul style="list-style-type: none"> • Replace ANY Electrical Components That Have Been Submerged in Salt Water • ONLY a Hybrid Certified Technician Should Inspect and/or Replace Components
		Body and Chassis: <ul style="list-style-type: none"> • Frames Channels • Body Panel Lower Edges 	Remove Salt Residue With Cleaning Agent
		Interior Components: <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 and Handling

Vehicle Inspection (Continued)

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.

Table 2. Driven Vehicle Inspection – Salt Water

TYPE	WATER LEVEL	KEY INSPECTION AREAS	REPLACEMENT GUIDELINES
Driven	Dynamic	Engine Abnormal Knock/Rattle Engine Live Data Health Check: <ul style="list-style-type: none"> Diagnostic Trouble Codes (DTCs) Misfire and Fuel Trim Status AFRS B1 and B2 Sub O₂ Signal and Impedance Spark Advance VG (AFM) HV Battery/Charging 	<ul style="list-style-type: none"> Engine Mechanical Repair (As Needed) Replace Electrical Components That Have Been Submerged in Salt Water
		<ul style="list-style-type: none"> Engine Oil Level/Contamination Engine Intake Air Filter, Box, Piping 	<ul style="list-style-type: none"> Drain and Refill (As Needed) Clean Out Water and Residue
		<ul style="list-style-type: none"> Exhaust Sensor Connections ALL Under Hood Electrical Components Transmission/Transaxle NSW Harness/Terminals 	Replace Electrical Components That Have Been Submerged in Salt Water
		<ul style="list-style-type: none"> Transmission/Transaxle Abnormal Noises/Shift Quality Transmission/Transaxle/Differential/Transfer Case Oil Level/Contamination Transmission/Transaxle Lockup ON/OFF Shudder 	Drain and Refill (As Needed)
		<ul style="list-style-type: none"> Fender Wells Above Plastic Liners Speed Sensor Harness Connectors 	Rinse With Fresh Water and/or Salt Neutralizer*

*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 and Handling

Vehicle Inspection (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.

Vehicle Repair

AFTER identifying affected components and when making repair decisions, 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.

Flood Damaged Vehicle Inspection and Handling

Vehicle Repair (Continued)

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.

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.