COLLISIONADVICE

RESEARCHING OEM REPAIR PROCEDURES

Presented By: **MIKE ANDERSON**
Version: **1.0 January 2021**

INTRODUCTION

Antitrust Guidelines

It is understood that in today's webinar we will not discuss any issues that would violate antitrust guidelines. Avoiding violations of the antitrust laws is the responsibility and legal obligation of the business owner. Any discussion of current prices or discounts with a competitor should be avoided. In our industry, this includes discounts, time hourly rates, charges to insurance companies, individuals, fleet owner, dealers or other shops that repair vehicles.

Surveys of prices, discounts and costs are permissible, but only under strict guidelines and only if they are not part of a conspiracy to fix prices or to otherwise restrain trade.

Cost studies that lead to price-fixing or price-stabilizing agreements violate United States and Canadian antitrust laws. Remember, the prices charged must be calculated and determined by the business owner alone. These prices should take into account the costs of doing business and include allowances for reasonable profit.

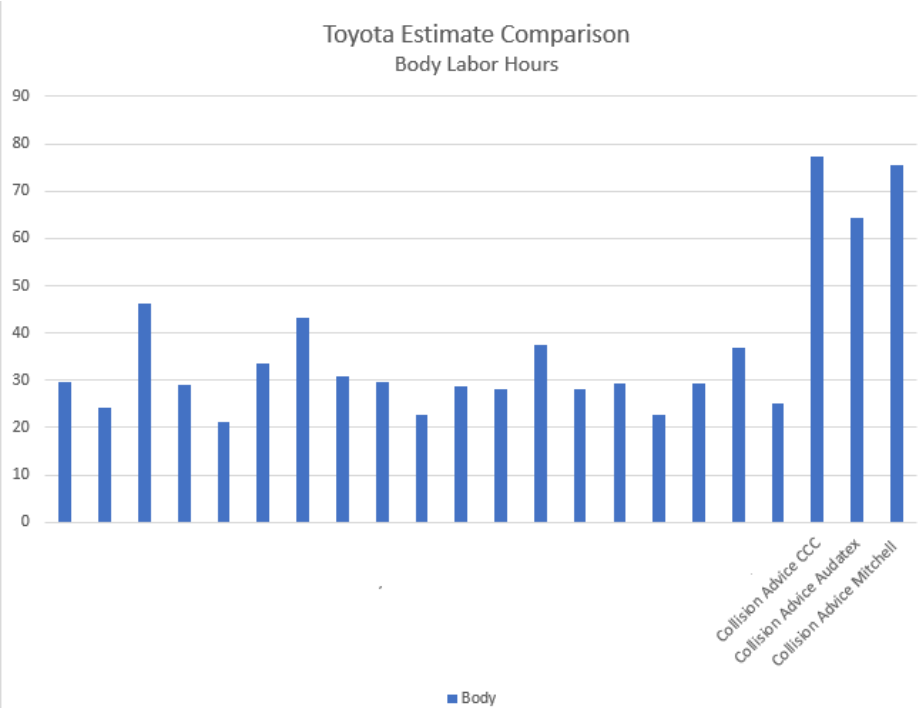
All content of this webinar is based on standard economic and management principles. Profit margins, labor rates, etc., used in this presentation are to be taken as examples only. The intent of this workshop is to provide attendees with basic management skills, leaving them free to determine their own individual rates, profit percentages and other operating/management aspects of their businesses on a strictly independent basis using generally accepted management principles.

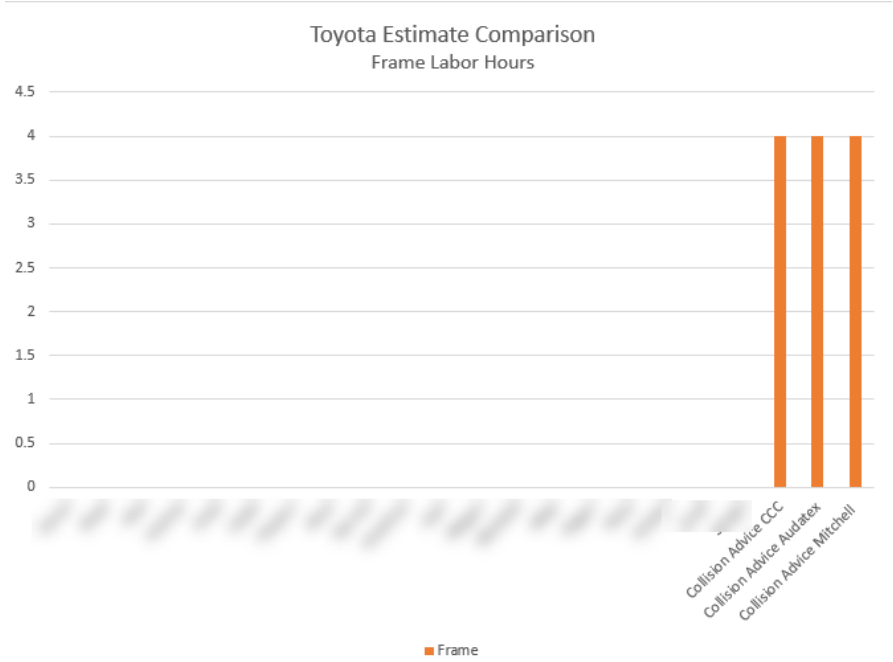
NEWS FLASH:
WE ARE FACING ANOTHER GLOBAL PANDEMIC


ESTIMATES
ALL PARTIES ARE UNEDUCATED
ABOUT WHAT IS NEEDED FOR
A SAFE AND PROPER REPAIR

ANOTHER GLOBAL PANDEMIC

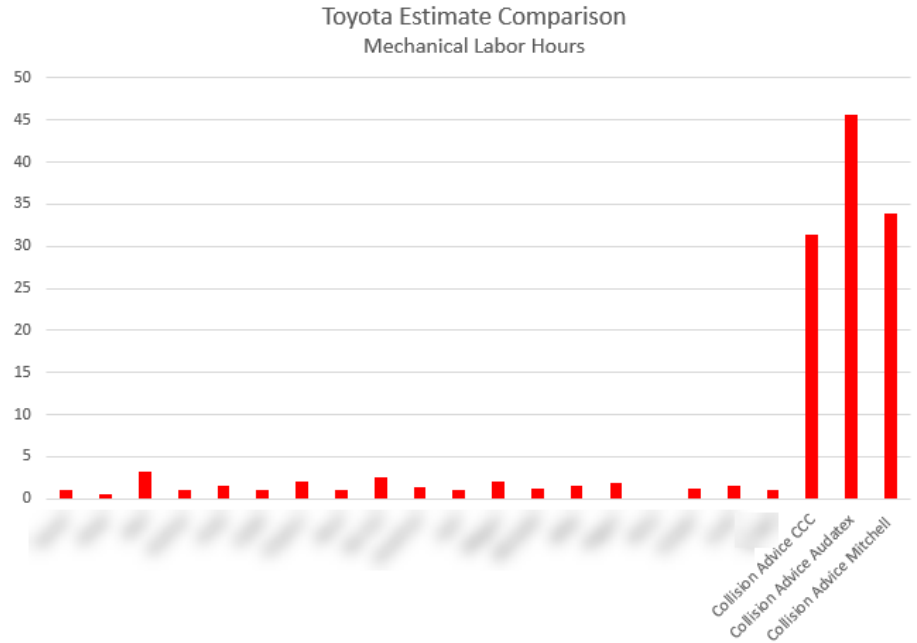
Original Estimate

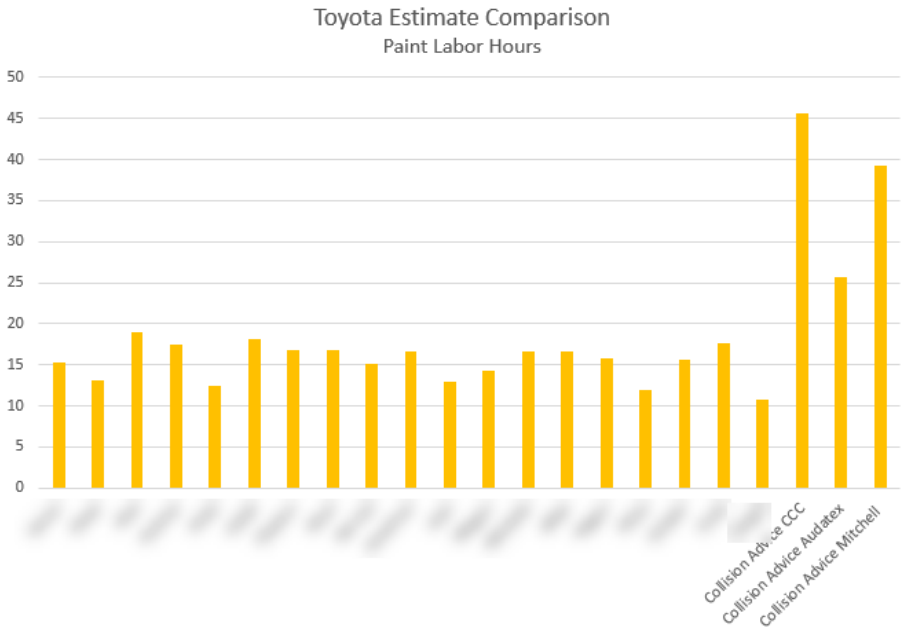




ANOTHER GLOBAL PANDEMIC

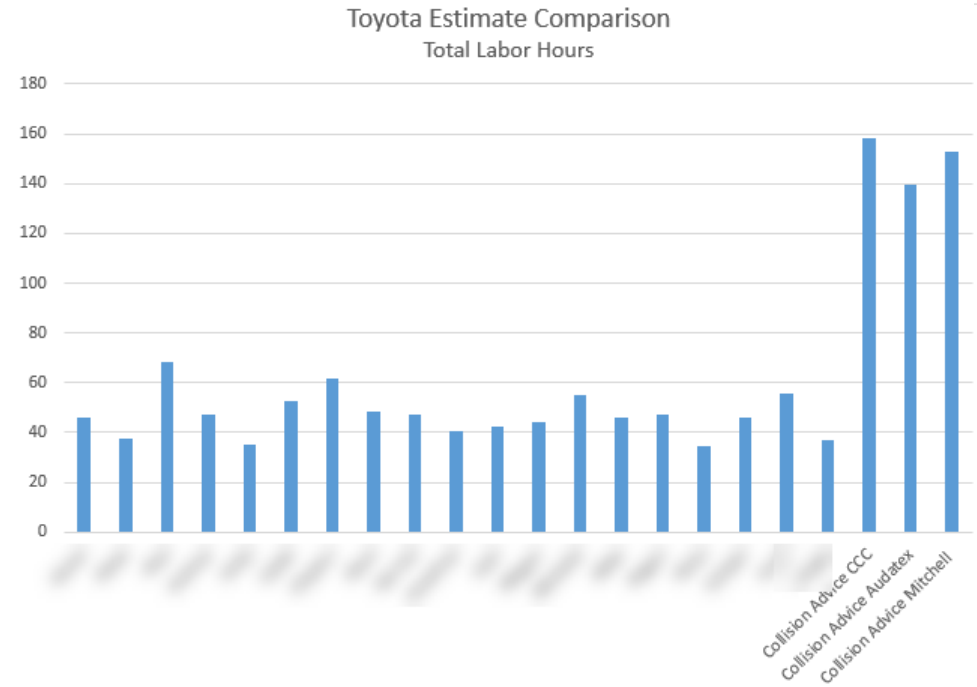
Original Estimate

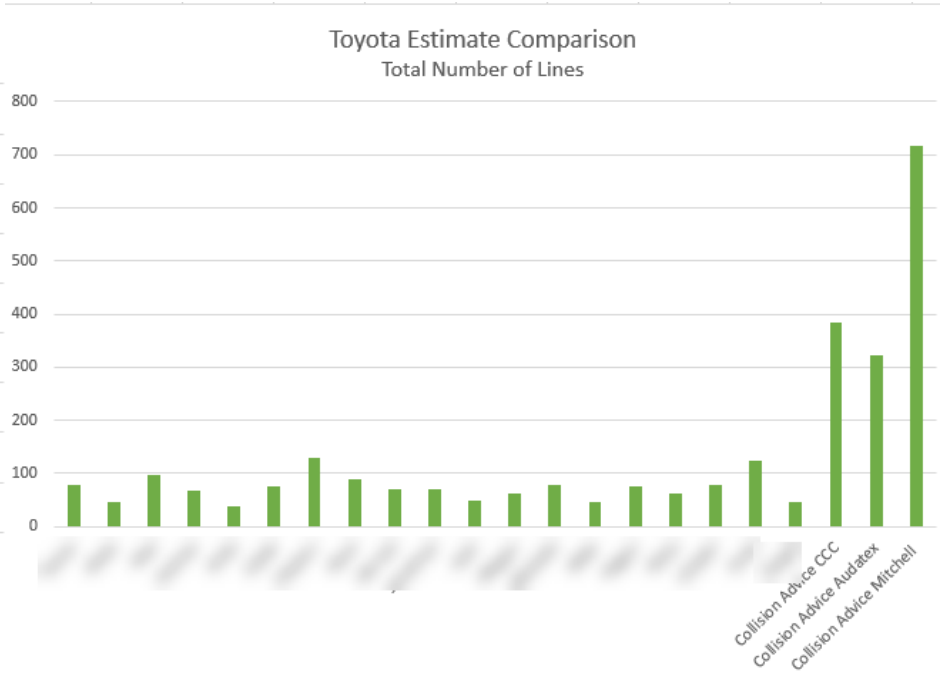




ANOTHER GLOBAL PANDEMIC

Original Estimate





Josh Kuehn ��� Collision Advice
3616 Phinney Ave N, Seattle, WA 98103-8523
Office: (763) 442-2972
josh@collisionadvice.com

Estimate ID
4934766
Original

Claim Number
11111111-ABC-11

Insured
Qtr Panel Repl Example Toyota Cam
ry
6715 Oak Drive
Alexandria, VA 22306
(763) 442-2972 (Mobile)
josh@collisionadvice.com

Appraiser
Josh Kuehn
josh@collisionadvice.com

Classification
None

ABC Insurance Company

Payer	Loss Type	Claim Number	Policy Number
Insurance	Collision	11111111-ABC-11	2222222 ABC

Adjuster	Deductible	Reported Date	Loss Date
Jane Doe (222) 333-4444+5 (Work) janedoe@collisionadvice.com	500.00 - Not Waived	01/01/2020	01/01/2020

Inspection Site	Inspection Date
Collision Advice 6715 Oak Drive Alexandria, VA 22306 (763) 442-2972 (Work)	1/2/2020

2019 Toyota Camry XSE 4 Door Sedan 2.5L 4 Cyl Gas Injected 8 Speed Auto Trans FWD

Exterior Color	Interior Color	Trim Color	License
089 (Wind Chill)	Black	Black	VA-ABC123

VIN	Condition	Drivable	Odometer

ANOTHER GLOBAL PANDEMIC

Polling Question

How many repair *procedure documents* were researched to write that estimate?

0-25

26-50

51-75

76-100

101-125

ANOTHER GLOBAL PANDEMIC

Numbers of Procedure Pages

98 PROCEDURES

5 AVERAGE PAGES

490 TOTAL PAGES

ANOTHER GLOBAL PANDEMIC

Polling Question

How long does it take someone to read a one-page technical document?

1-2 minutes

3-4 minutes

5-6 minutes

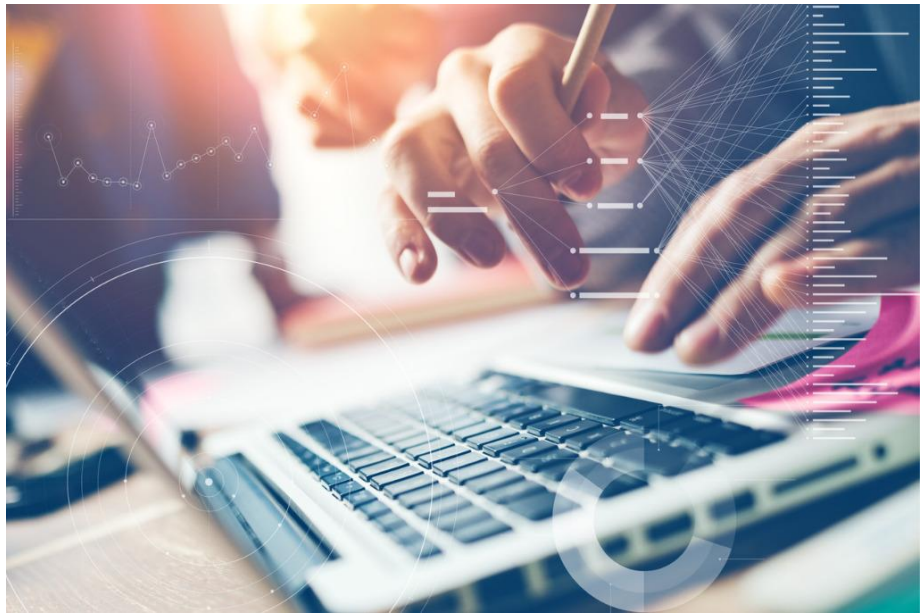
7-8 minutes

9+ minutes

ANOTHER GLOBAL PANDEMIC

Reading a One-Page Technical Document

- In **technical** material, **the** average **reading** rate **is** approximately 50 to 75 words a minute roughly 5 to 6 minutes per **page**.



Source: Execuread.com/facts

ANOTHER GLOBAL PANDEMIC

Time to Read the Technical Documentation

490 TOTAL PAGES

5 MINUTES/PAGE

2,450 MINUTES

ANOTHER GLOBAL PANDEMIC

Time to Read the Technical Documentation

40 HOURS

50 MINUTES

FOR THIS ONE REPAIR PLAN

WHY SHOULD YOU RESEARCH OEM REPAIR PROCEDURES?

WHY SHOULD YOU RESEARCH?

Learn to Research; Research to Learn

YOU DON'T KNOW WHAT YOU DON'T KNOW

WHY SHOULD YOU RESEARCH?

Battery Disconnects

- It is not uncommon to have to disconnect a battery in order to repair or replace a component on a vehicle
- It is important to use the appropriate terminology on your estimate, such as:
  - D&R for disconnect and reconnect vs R&I of a battery
- **Many OEMs require the battery to be disconnected prior to disconnected an electrical component or ground wire.**
- **ANY TIME A BATTERY IS DISCONNECTED, YOU MUST RESEARCH THE PROCEDURES REQUIRED AFTER A BATTERY IS DISCONNECTED AND RECONNECTED!**
- The procedures required will vary based on vehicle make, model and options

AUDI
BATTERY DISCONNECT

BATTERY DISCONNECT

Audi

1.2 Battery, Disconnecting and Connecting

⇒ "1.2.1 Battery, Disconnecting and Connecting, Vehicles without High-Voltage System", page 13

⇒ "1.2.2 Battery A and Auxiliary Battery A1 , Disconnecting and Connecting, Vehicles with High-Voltage System - Hybrid", page 14

⇒ "1.2.3 Battery A and Auxiliary Battery A1 , Disconnecting and Connecting, Vehicles with High-Voltage System - e-tron", page 15

1.2.1 Battery, Disconnecting and Connecting, Vehicles without High-Voltage System

Caution

There is a risk of an accident.

- *When working on pyrotechnic components (such as airbags and belt tensioners), the battery must be disconnected when the ignition is switched on, contrary to the following description.*

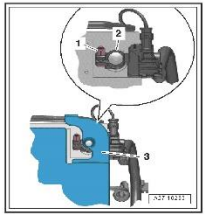
TDI (SCR) vehicles

- *After the ignition is switched off, the reducing agent goes from the metering line to the Reducing Agent Injector - N474- and back into the reducing agent active chamber.*
- *Wait until all the reducing agent has been returned before working in this area. This could take up to 10 minutes after switching off the ignition.*
- *Only after this is complete can the battery be disconnected. Again, this could take up to 10 minutes after switching off the ignition.*

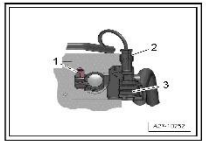
Disconnecting

- Turn off the ignition.
- Lift the luggage compartment floor covering by the handle and fold it forward.
- Open the cover -3- over the battery negative terminal.
- Loosen the nut -1- several turns and remove the battery ground cable clamp -2- from the battery terminal.

Connecting



- Disconnect the connector -2- from the Battery Monitoring Control Module - J367- -3-.
- To connect the battery ground cable terminal clamp to the battery negative terminal "-" by hand tighten the nut -1-.
- Reconnect the connector to the Battery Monitoring Control Module - J367- .



When the battery is reconnected, the following steps must be performed:

- Activate the one-touch up/down function for the power window regulators. Refer to the Owner's Manual.
- Check DTC memories of all control modules and delete the displayed entry "Undervoltage" using the Vehicle Diagnostic Tester .

Note

After reconnecting the power supply, the ESP warning lamp can only go out after the vehicle has been driven a few meters.

Tightening Specifications

- Refer to
⇒ "1.1.1 Overview - Battery, Vehicles without High-Voltage System", page 7

1.2.2 Battery - A- and Auxiliary Battery - A1- , Disconnecting and Connecting, Vehicles with High-Voltage System - Hybrid

WARNING

- *Both the Battery - A- and the Auxiliary Battery - A1- must always be disconnected at the same time to de-energize the 12 volt system.*

When the battery is reconnected, the following steps must be performed:

- Activate the one-touch up/down function for the power window regulators. Refer to the Owner's Manual.
- Check DTC memories of all control modules and delete the displayed entry "Undervoltage" using the Vehicle Diagnostic Tester .

GENERAL MOTORS
BATTERY DISCONNECTS

BATTERY DISCONNECTS

2018 Chevrolet Cruze

2.3. Install the battery negative cable to rear floor panel nut (2) and tighten to **22N•m (16 lb ft)**.

2.4. Close the battery negative cable terminal cover (1).

3. Close the rear compartment floor panel trim.
4. Close the rear compartment lid.
5. Ignition » On / Vehicle » In Service Mode & Engine » Off
6. Program the volatile memory. Volatile Memory Programming
7. Program all of the customer's radio station presets and set the radio clock to the current time.

   Note: Inform customer that the Stop/Start feature will not be available until the vehicle is allowed to sit for at least 3 hours undisturbed.

8. If diagnosing a stop/start complaint, conduct the battery sensor module learn procedure Control Module References to verify repair.

BATTERY DISCONNECTS

2018 Chevrolet Equinox

Callout	Component Name
1	**Warning:** Unless directed otherwise, the ignition must be OFF with the key removed, and all electrical loads must be OFF before servicing any electrical component. Disconnect the negative battery cable to prevent an electrical spark should a tool or equipment come in contact with an exposed electrical terminal. Failure to follow these precautions may result in personal injury and/or damage to the vehicle or its components. For Vehicles equipped with OnStar® (UE1) with Back Up Battery:The Back Up Battery is a redundant power supply to allow limited OnStar® functionality in the event of a main vehicle battery power disruption to the VCIM (OnStar®module). Do not disconnect the main vehicle battery or remove the OnStar® fuse with the ignition key in any position other than OFF. Retained accessory power should be allowed to time out or be disabled (simply opening the driver door should disable retained accessory power) before disconnecting power. Disconnecting power to the OnStar® module in any way while the ignition is On or with retained accessory power activated may cause activation of the OnStar® Back-Up Battery system and will discharge and permanently damage the back-up battery. Once the Back-Up Battery is activated it will stay on until it has completely discharged. The back-up battery is not rechargeable and once activated the back-up battery must be replaced. **Caution:** Refer to Fastener Caution. Battery Negative Post Clamp Nut **Tighten** 4.5 N•m (40 lb in)
2	Battery Sensor Module

SUBARU
BATTERY DISCONNECT

7. BATTERY

- **ACTIONS TO TAKE AFTER REMOVING BATTERY OR DISCONNECTING GROUND TERMINAL**

When removing the battery or disconnecting the battery terminal, always be sure to turn the ignition switch to OFF and disconnect the battery ground terminal first.

When removing the battery or disconnecting the battery terminal, power supply is cut off and the information stored in the computer memory is volatilized. Therefore, setting information of some devices is initialized to the fac

No.	Item	Job contents when connecting battery
1	Clock	Set the clock to the current time.
2	MFD	Set to the contents checked before disconnecting the battery.
3	Audio (settings that the customer set)	Set to the contents checked before disconnecting the battery.
4	Navigation system (settings that the customer set)	• Time setting is not necessary because the time information is received via GPS. • Set the sound and other settings (items that were set in the selection) to the contents checked before disconnecting the battery.
5	Temperature setting of fully automatic air conditioner (settings that the customer set)	Set to the contents checked before disconnecting the battery.
6	Power window system	Initialize automatic full open/close of driver's and passenger's windows (power window system). For the initialization procedure, refer to "POWER WINDOW (DIAGNOSTICS)" section. Ref. to POWER WINDOW (DIAGNOSTICS) >Work Support>OPERATION.
7	Steering lock system (model with keyless access with push button start)	If the engine does not start, initialize the steering lock system. For the initialization procedure, refer to "KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)" section. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START (DIAGNOSTICS)>Diagnostics with Phenomenon>INSPECTION > ENGINE DOES NOT START.
8	EyeSight (model with EyeSight)	Set to the contents checked before disconnecting the battery.

TOYOTA/LEXUS
BATTERY DISCONNECTS

SAFETY INSPECTIONS

2017 Prius Prime

Last Modified: 07-20-2018	6.8:8.0.48	**Doc ID:** RM100000000Z23Q
Model Year Start: 2017	**Model:** Prius Prime	**Prod Date Range:** [09/2016 -]
Title: INTRODUCTION: REPAIR INSTRUCTION: INITIALIZATION; 2017 - 2018 MY Prius Prime [09/2016 -]		

INITIALIZATION

PROCEDURES NECESSARY WHEN AUXILIARY BATTERY TERMINAL IS DISCONNECTED/RECONNECTED

NECESSARY PROCEDURES	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURES NOT PERFORMED	LINK
Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	INFO
	Intelligent clearance sonar system*1	
	Simple advanced parking guidance system*1	
	Pre-collision system	
Initialize back door lock	Power door lock control system	INFO

*1: When performing learning using the Techstream.

WHY SHOULD YOU RESEARCH?

Building Codes

Purpose of building codes is to:

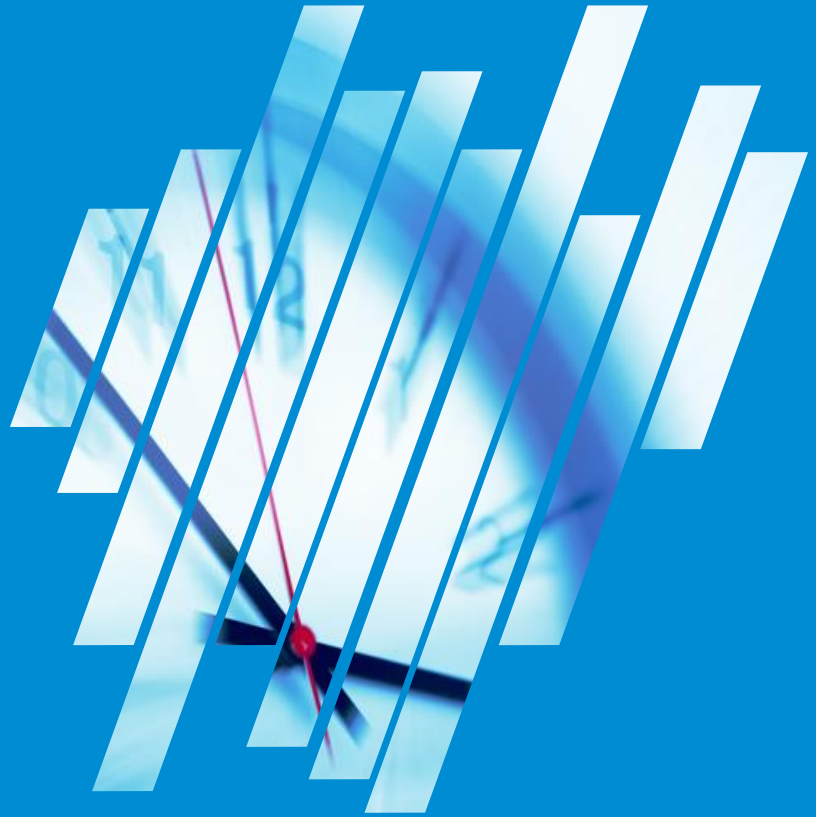
- Provide minimum standards to protect buildings, people and property from fire, earthquakes, windstorms and other extreme events
- Ensure structural integrity
- Ensure electrical, plumbing and mechanical system safety

WHY SHOULD YOU RESEARCH?

What Repair Procedures Teach Us

- Where to look for damage
- How to make repair decisions
  - Repair vs replace
  - Sectioning locations
  - Attachment method – rivet bonding, adhesive, etc.
  - Repair Restrictions or Precautions
- The conditions required for the system to operate or set DTC's
- How to troubleshoot potential problems within a system
- Refinish precautions
- And so much more

WHEN ARE YOU RESEARCHING OEM REPAIR PROCEDURES?



WHEN ARE YOU RESEARCHING?

Every Vehicle, Every Time

You should research Procedures on EVERY Single Vehicle -

Every Year, Make and Model -

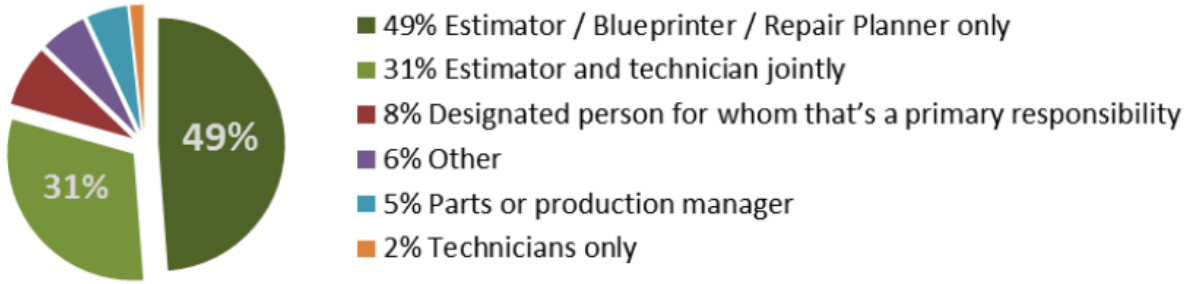
Every Single Time!

WHO IS RESEARCHING OEM REPAIR PROCEDURES?

WHO IS RESEARCHING OEM REPAIR PROCEDURES?

"Who Pays for What" Survey

Who is primarily responsible for researching OEM repair procedures?



While not yet a common practice, 8% of shops reported that researching OEM repair procedure is done by "another designated person" for whom that's a primary responsibility. That is up from 5% in 2019.

Source: Who Pays for What Survey 2020 Scanning Report

WHO IS RESEARCHING OEM REPAIR PROCEDURES?

A Designated Person

Advantages

- Get familiar with OEM procedures and know where to find the information
- Speed
- Cost – Your production employees aren't stopping to research

Disadvantages

- Need to communicate and share this information with estimates, technicians, etc.
- May not always know what needs to be researched
- Additional Admin Expense

HOW ARE YOU RESEARCHING OEM REPAIR PROCEDURES?

HOW ARE YOU RESEARCHING?

"Who Pays for What" Survey

Researching OEM Repair Information

How frequently do you research OEM repair procedures at the time you write an estimate?

	2020	2019	2018	2017	2016	2015
All the time	19.9%	21.5%	24.8%	17.4%	17.7%	16.3%
Most of the time	32.6%	32.7%	35.7%	31.4%	30.5%	26.4%
Some of the time	27.4%	26.5%	24.8%	33.0%	30.7%	31.9%
Only occasionally	15.4%	14.7%	12.7%	15.8%	18.0%	21.8%
Never	4.7%	4.6%	2.0%	2.4%	3.1%	3.6%

2020

The percentage of repair facilities that said they research OEM procedures "most" or "all of the time" has decreased slightly, but well within the survey's margin of error. Over the past five years, more shops are researching procedures at the time of estimate, but the change has been less than dramatic. From survey participant comments, however, it appears that a higher percentage of shops are researching OEM procedures regularly, just not always doing all of it "at the time of the estimate." They may be doing so only once they have secured the job or while doing a complete tear-down.

Source: Who Pays for What Survey 2020 Frame and Mechanical Report

HOW ARE YOU RESEARCHING?

Polling Question

What is your Primary Source to research OEM Repair Procedures?

ALLDATA

OEM Websites

Mitchell's Tech Advisor

Sun

AudaExplore's TechFocus

Other

HOW ARE YOU RESEARCHING?

"Who Pays for What" Survey

Which systems do you use to research OEM repair information?

ALLDATA continues to be the most popular source of OEM information with 72% of shops reporting its use. The automaker websites and I-CAR's "Repairability Technical Support Portal" are in use by approximately half of shops surveyed.

OEM Information Sources	2020	2019	2018	2017	2016	2015
ALLDATA	72.4%	62.8%	72.4%	68.2%	68.8%	66.6%
Automaker information websites	51.5%	59.4%	52.6%	45.4%	36.2%	32.4%
I-CAR's "Repairability Technical Support	49.8%	55.4%	54.2%	46.6%	40.7%	36.5%
CCC's "Repair Methods"	44.3%	49.2%	45.8%	32.7%	37.6%	36.1%
Mitchell's "Tech Advisor"	15.7%	14.4%	12.5%	11.5%	10.5%	9.9%
Sun	1.7%					
AudaExplore's "TechFocus"	0.5%	1.6%	3.0%	1.9%	3.3%	3.7%

**totals more than 100% because mutiple selections were allowed*

2020

Source: Who Pays for What Survey 2020 Frame and Mechanical Report

HOW ARE YOU RESEARCHING?

"Who Pays for What" Survey

- Encouraging to see the percentage of shops using the OEM websites increase
- Concerned that the percentage researching OEM procedures all the time hasn't increased more
- Some shops think if they fix the same type of vehicle frequently, they don't need to check those procedures every single time
  - Things change!
  - Sectioning Procedures
  - MPA of Steel
  - One time use parts
  - and more!

Source: Who Pays for What Survey 2020 Frame and Mechanical Report

HOW ARE YOU RESEARCHING?

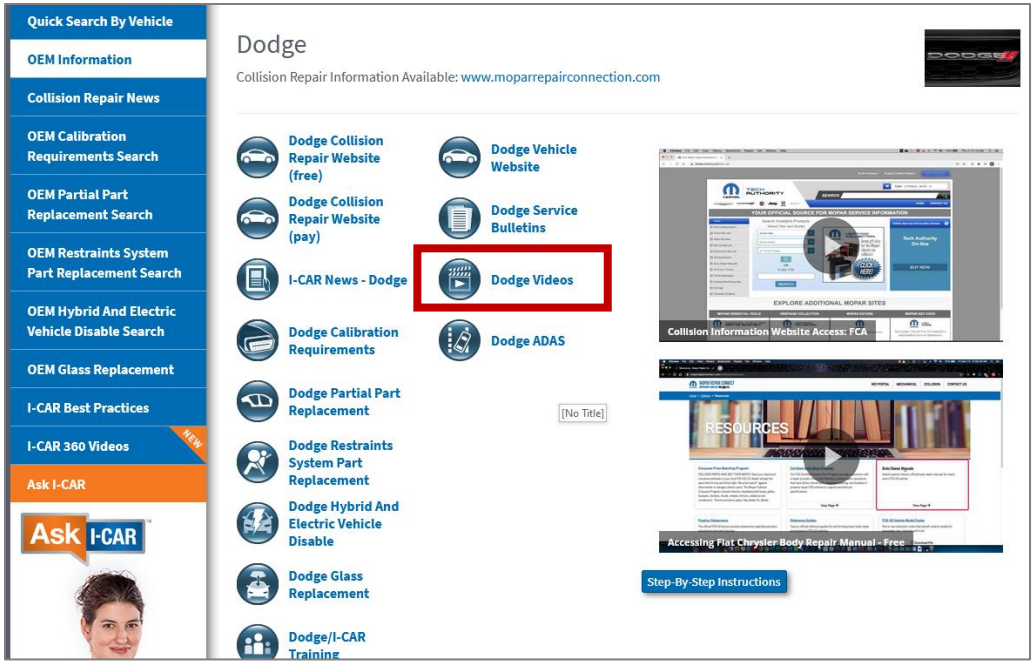
"OEM ESM Versus Third-party Software

OEM Electronic Service Manuals		Third-party Software	
PROS	CONS	PROS	CONS
Always current			Not always current. Lags behind OEM ESM
Access to the build data			No access to build data
May integrate with OEM scan tool		May integrate with after-market scan tool	Will not integrate with OEM scan tools
Ability to submit inquiries		Ability to submit inquiries; quick response times	
	Doesn't integrate with estimating systems	Integrates with estimating systems	Still requires the term to be on the estimate to search
	Not standardized across all OEMs	Attempt to standardize	Things often get lost in the attempt to standardize
Some OEMs identify telematics subscriptions			Can't identify telematics subscriptions
Identifies one-time use parts			May not identify ALL one-time use parts

HOW ARE YOU RESEARCHING?

How Can You Learn to Use the Software?

- Practice/Experience
  - When to look
  - Where to look
  - What to look for
  - How to look
- I-CAR Video Tips
- Collision Advice
  - Learn to Research; Research to Learn Webinars
- OEMs
  - Offer eLearning or in-person training for Certified Shops



RESEARCHING OEM REPAIR PROCEDURES

Learn to Research; Research to Learn

HOW TO RESEARCH

Getting Familiar with the Platform

The Basics

- What is the url?
- Does it require a specific browser, security keys, pop-ups disabled, etc.?
- Do you get a free subscription with your OEM certification?
- What information can be found in each tab/section of the website?
- Where can you find information about vehicle recalls?
- Does the OEM have a body repair manual?
  - This is the basic information about how the OEM expects repairs to be performed
  - Assumption is you will know this information
  - Not always covered in the actual repair procedures

HOW TO RESEARCH

Getting Familiar with the Platform

Searching

- What does the site search?
  - Just document titles
  - The entire document
- Are there any search tips?
  - AND
  - OR
  - NOT
  - “”
- Does the OEM use different terminology for vehicle components?

I-CAR REPAIRABILITY TECHNICAL SUPPORT

OEM Terminology Matrix

REV 08/2020

USA ONLY	Upper Rail	Front Lower Rail	A-Pillar	B-Pillar	Outer Rocker Panel	Quarter Panel	Rear Body Panel	Trunk Floor	Rear Rail
Alfa Romeo	Load Path Beam	Front Frame Rail	A-Pillar	B-Pillar	Rocker Panel	Quarter Panel	Rear Closure Panel	Rear Floor	Rear Rail
Audi	Upper Wheel Housing Longitudinal Member	Front Longitudinal Member	A-Pillar, Roof Pillar	B-Pillar	Sill Panel	Side Panel	Cross Panel	Rear Luggage Compartment Floor	Rear Longitudinal Member
BMW / Mini	–	Engine Support	A-Pillar	B-Pillar	Sill Panel	Rear Side Panel	Tail Panel	Luggage Compartment Floor	Side Member
Chevrolet / Buick / Cadillac / GMC	Front Compartment Front Rail	Front Compartment Upper Side Rail	Front Hinge Pillar	Center Pillar	Rocker Panel	Quarter Panel	Body Rear End Panel	Rear Floor Panel	Rear Side Rail
Chrysler / Dodge /Jeep / RAM	Fender Support, Fender Rail, Shotgun	Front Lower Rail	A-Pillar	B-Pillar	Sill	Quarter Panel	Rear Body Panel	Trunk Floor	Rear Floor Pan Side Rail, Rear Rail
Fiat	Upper Load Path Beam	Front Lower Rail	A-Pillar	B-Pillar	Rocker Panel	Quarter Panel	Rear Panel	Rear Floor	Rear Rail
Ford / Lincoln	Fender Apron	Front Side Member	A-Pillar	B-Pillar	Rocker Panel	Quarter Panel	Back Panel	Rear Floor Panel	Rear Side Member
Genesis	–	–	–	–	–	–	–	–	–
Honda / Acura	Front Bulkhead	Front Side Frame/ Outrigger	Front Pillar Outer	Center Pillar Outer	Side Sill Outer Panel	Rear Side Outer Panel	Rear Panel	Rear Floor	Rear Frame
Hyundai	Front Apron Panel	Front Side Member	Front Pillar	–	Side Sill	Quarter Panel	Back Panel	Rear Floor Panel	Rear Floor Side Member
INFINITI	Hoodledge	Front Side Member	Front Pillar, Dash Side	Center Pillar	Outer Sill	Rear Fender	Rear Panel	Rear Floor Rear	Rear Side Member Extension
Jaguar	Fender Apron Panel	Front Side Member	A-Pillar Outer	B-Pillar	Rocker Panel	Quarter Panel	Back Panel	Spare Wheel Well	Rear Side Member
Kia	Fender Apron Upper Panel	Front Side Member	Front Pillar	Center Pillar	Side Sill	Quarter Outer	Back Panel	–	Rear Floor Side Member
Land Rover	Fender Apron Panel	Front Side Member	A-Pillar Outer	B-Pillar	Rocker Panel	Quarter Panel	Back Panel	Spare Wheel Well	Rear Side Member
Lexus	Front Fender Apron	Front Side Member	Front Body Pillar	Center Body Pillar	Rocker Panel	Quarter Panel	Body Lower Back Panel	Rear Floor Pan	Rear Floor Side Member
Lincoln	Fender Apron	Front Side Member	A-Pillar	B-Pillar	Rocker Panel	Quarter Panel	Back Panel	Rear Floor Panel	Rear Side Member
Maserati	Upper Strut	Front Lug	Front Pillar	Central Pillar	Longitudinal Member	External Body Side Rear Cover	Lower Rear Guard	Rear Floor	Rear Longitudinal Member
Mazda	–	Front Side Frame	Front Pillar	Center Pillar	Side Sill Panel	Rear Fender Panel	Rear End Panel	Trunk Floor Panel	Rear Side Frame
Mercedes-Benz	Upper Front Longitudinal Member	Longitudinal Member	A-Pillar	B-Pillar	Outer Side Longitudinal Member	Rear Fender	Bottom Rear Center Section	Spare Tire Well	Rear Longitudinal Member
Mitsubishi	–	Front Side Member	Front Pillar	Center Pillar	Side Sill	Quarter Outer	Rear End Crossmember	Rear Floor	Rear Floor (may include rear rail)
Nissan	Hoodledge	Front Side Member	Front Pillar Dash Side	Center Pillar	Outer Sill	Rear Fender	Rear Panel	Rear Floor Rear	Rear Side Member Extension
Porsche	Longitudinal Member for Wheel Housing Upper Section	Front Side Member	A-Pillar	B-Pillar	Outer Side Member	Rear Side Panel	Rear Closing Panel	Rear End Wall	Rear Side Member
Subaru	Front Wheel Apron	Front Side Frame	Front Pillar	Center Pillar	Side Sill	Rear Quarter	Rear Skirt	Rear Floor Pan	Rear Side Frame Lower Rear
Tesla	Shotgun	Front Frame Rail	A-Pillar, Hinge Pillar	B-Pillar	Sill Panel	Quarter Panel	Rear Panel	Rear Trunk Floor	Rear Member Rail
Toyota	Front Fender Apron	Front Side Member	Front Body Pillar	Center Body Pillar	Rocker Panel	Quarter Panel	Body Lower Back Panel	Rear Floor Pan	Rear Floor Side Member
Volkswagen	Upper Wheel Housing Longitudinal Member	Front Longitudinal Member	A-Pillar, Roof Pillar	B-Pillar	Sill Panel	Side Panel	End Crossmember	Rear Luggage Compartment Floor	Rear Longitudinal Member

WHAT TO RESEARCH IN THE OEM REPAIR PROCEDURES?

WHAT TO RESEARCH

Critical Areas

- There is no simple solution. There is too much to cover in this session.
- However, some **KEY CRITICAL AREAS** are as follows:
  - Battery Disconnect and Reconnect Procedures
  - Damage Diagnosis Document – Where to look for Damage
  - What is the substrate made of? Can it be repaired or replaced? Sectioning Procedures?
  - Seat Belt Inspections
  - Steering Column Inspections
  - SRS Inspections
  - EV Vehicle Refinish Cure Times and Temps
  - Structural Adhesive Cure Times

STRUCTURAL REPAIRS

WHAT TO RESEARCH

Getting Familiar with the Platform

Structural Repairs

- How is that vehicle designed to divert the inertia forces?
- What is the Substrate made of?
- Can the component be repaired, or does it need to be replaced?
- Where can a shop find information about anchoring a vehicle?
  - Are there any specific do's, and don'ts?
  - Are there any specifics on the removal of coatings on pinchwelds?
- Where can a shop find welding precautions, such as "no welding within XXX inches of an electrical component"?
- Are there any requirements for structural adhesives such as product type and cure times?
- Are there any requirements regarding weld through primer?

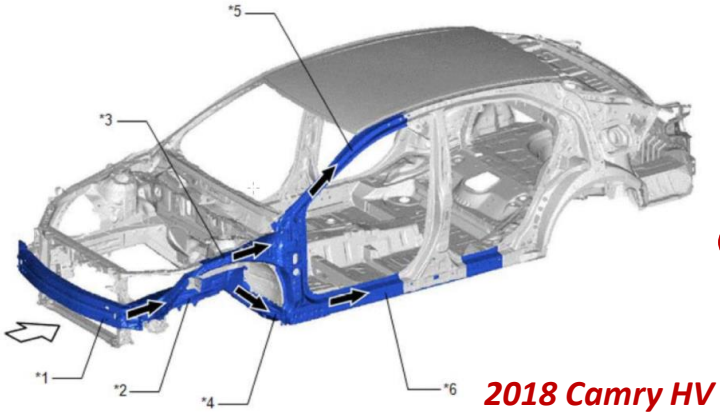
WHAT THIS MEANS TO YOU AS AN ESTIMATOR

DETERMINE WHERE TO INSPECT FOR DAMAGE

WHAT THIS MEANS TO YOU AS AN ESTIMATOR

Determine Where to Inspect for Damage

- Many OEMs have a document that shows where to inspect for possible hidden damage to structural components based on how the vehicle is designed to divert inertia forces
- In order to inspect these areas, there may be ***components that will have to be removed*** for the inspection process.
- It is critical to document with line notes **WHY** you removed the panels, such as "to inspect for potential hidden damage."



*1	Front Bumper Reinforcement	*2	Front Side Member
*3	Front Apron to Cowl Side Lower Front Member	*4	Torque Front Box
*5	Roof Side Upper Rail	*6	Rocker Outer Panel
*7	Front Suspension Upper Center Brace	*8	Cowl Top Inner Reinforcement
*9	Instrument Panel Reinforcement	-	-
⇨	Collision Direction	➡	Collision Force Absorption Direction

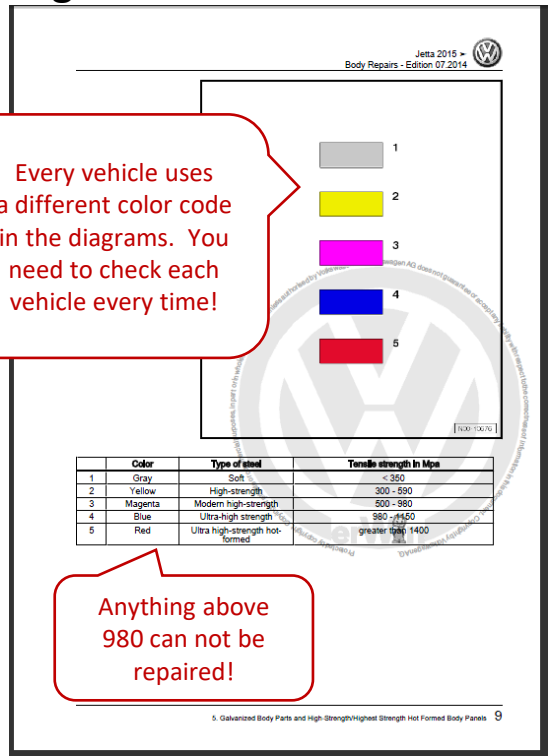
2018 Camry HV – Damage Diagnosis

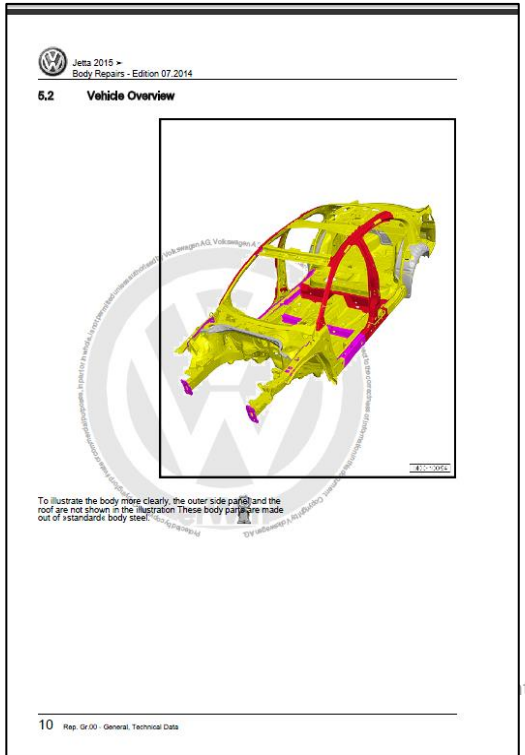
DETERMINE SUBSTRATE

WHAT THIS MEANS TO YOU AS AN ESTIMATOR

Determine the Substrate

Volkswagen Structural Identification



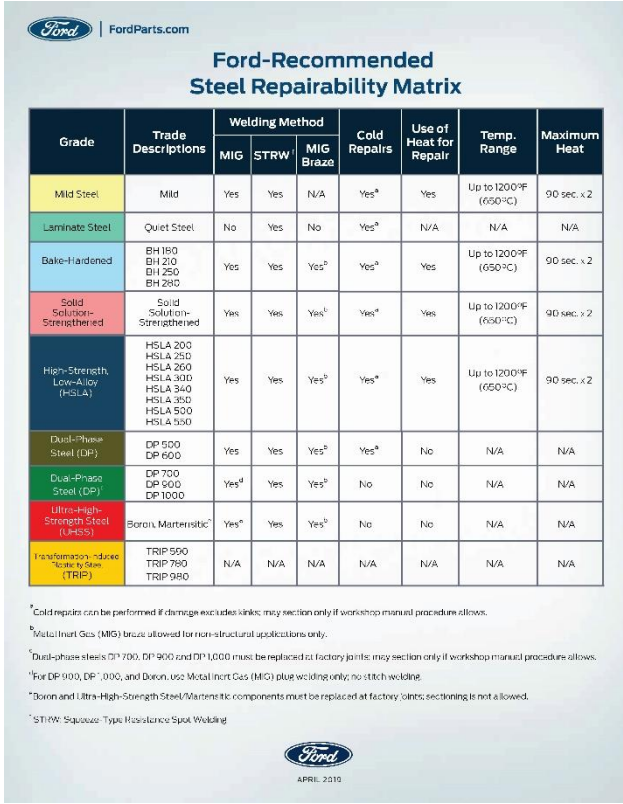


REPAIRABILITY

STRUCTURAL DESIGN

Repairability

- Each OE labels steels slightly differently from mild to Ultra-High-Strength Steel
- The higher the Mpa or tensile strength; the stronger the steel
  - 1500 MPa ultra-high strength steel is commonly used to help reinforce the cabin at the rocker, center pillar and roof reinforcements
  - 980 Mpa ultra-high strength steel at various locations in the floor structure and rocker reinforcements
- Each type of steel has different considerations for:
  - If it is repairable
  - The type of welder required
  - The type of welder wire required
  - The heat limitations during repair
  - The specific tools, rivets, fasteners or adhesives required



FordParts.com

Ford-Recommended Steel Repairability Matrix

Grade	Trade Descriptions	Welding Method			Cold Repairs	Use of Heat for Repair	Temp. Range	Maximum Heat
		MIG	STRW[f]	MIG Braze				
Mild Steel	Mild	Yes	Yes	N/A	Yes[a]	Yes	Up to 1200°F (650°C)	90 sec. x 2
Laminate Steel	Quiet Steel	No	Yes	No	Yes[a]	N/A	N/A	N/A
Bake-Hardened	BH 180 BH 210 BH 250 BH 280	Yes	Yes	Yes[b]	Yes[a]	Yes	Up to 1200°F (650°C)	90 sec. x 2
Solid Solution-Strengthened	Solid Solution-Strengthened	Yes	Yes	Yes[b]	Yes[a]	Yes	Up to 1200°F (650°C)	90 sec. x 2
High-Strength, Low-Alloy (HSLA)	HSLA 200 HSLA 250 HSLA 260 HSLA 300 HSLA 340 HSLA 350 HSLA 500 HSLA 550	Yes	Yes	Yes[b]	Yes[a]	Yes	Up to 1200°F (650°C)	90 sec. x 2
Dual-Phase Steel (DP)	DP 500 DP 600	Yes	Yes	Yes[b]	Yes[a]	No	N/A	N/A
Dual-Phase Steel (DP)	DP 700 DP 900 DP 1000	Yes[d]	Yes	Yes[b]	No	No	N/A	N/A
Ultra-High-Strength Steel (UHSS)	Boron, Martensitic[e]	Yes[e]	Yes	Yes[b]	No	No	N/A	N/A
Transformation-Induced Plasticity Steel (TRIP)	TRIP 590 TRIP 780 TRIP 980	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a] Cold repairs can be performed if damage excludes kinks; may section only if workshop manual procedure allows.

[b] Metal Inert Gas (MIG) braze allowed for non-structural applications only.

[c] Dual-phase steels DP 700, DP 900 and DP 1,000 must be replaced at factory joints; may section only if workshop manual procedure allows.

[d] For DP 900, DP 1,000, and Boron, use Metal Inert Gas (MIG) plug welding only; no stitch welding.

[e] Boron and Ultra-High-Strength Steel/Martensitic components must be replaced at factory joints; sectioning is not allowed.

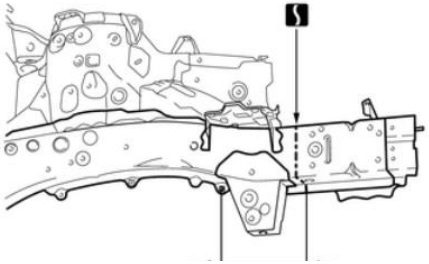
[f] STRW: Squeeze-Type Resistance Spot Welding

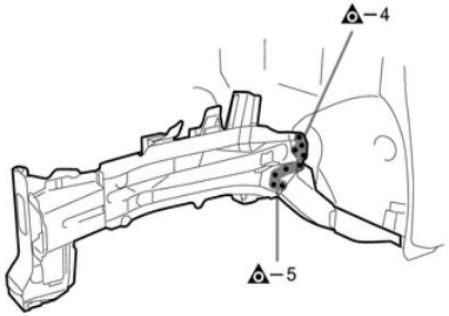
APRIL 2010

INSTALLATION

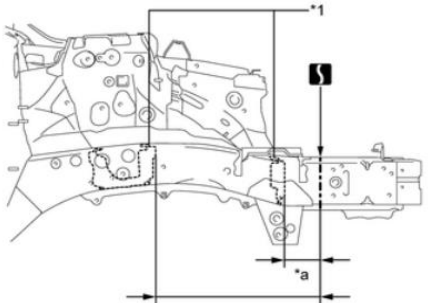
WHAT THIS MEANS TO YOU AS AN ESTIMATOR

If It Must Be Replaced, Are There Any Sectioning Procedures?

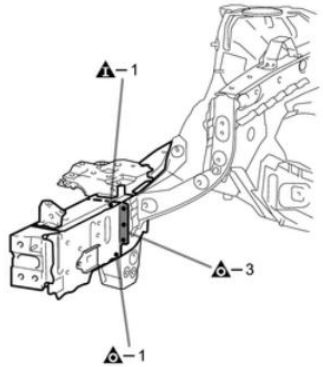


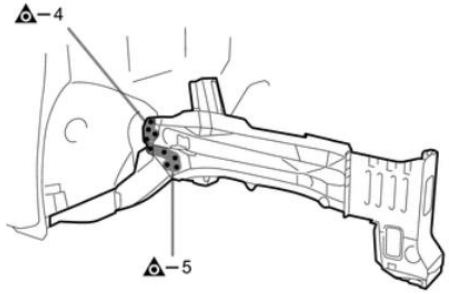


LH:

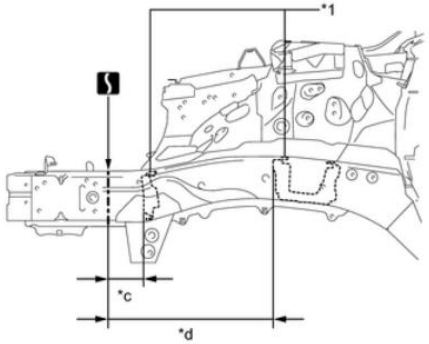


FULL REPLACEMENT AT OEM LOCATION

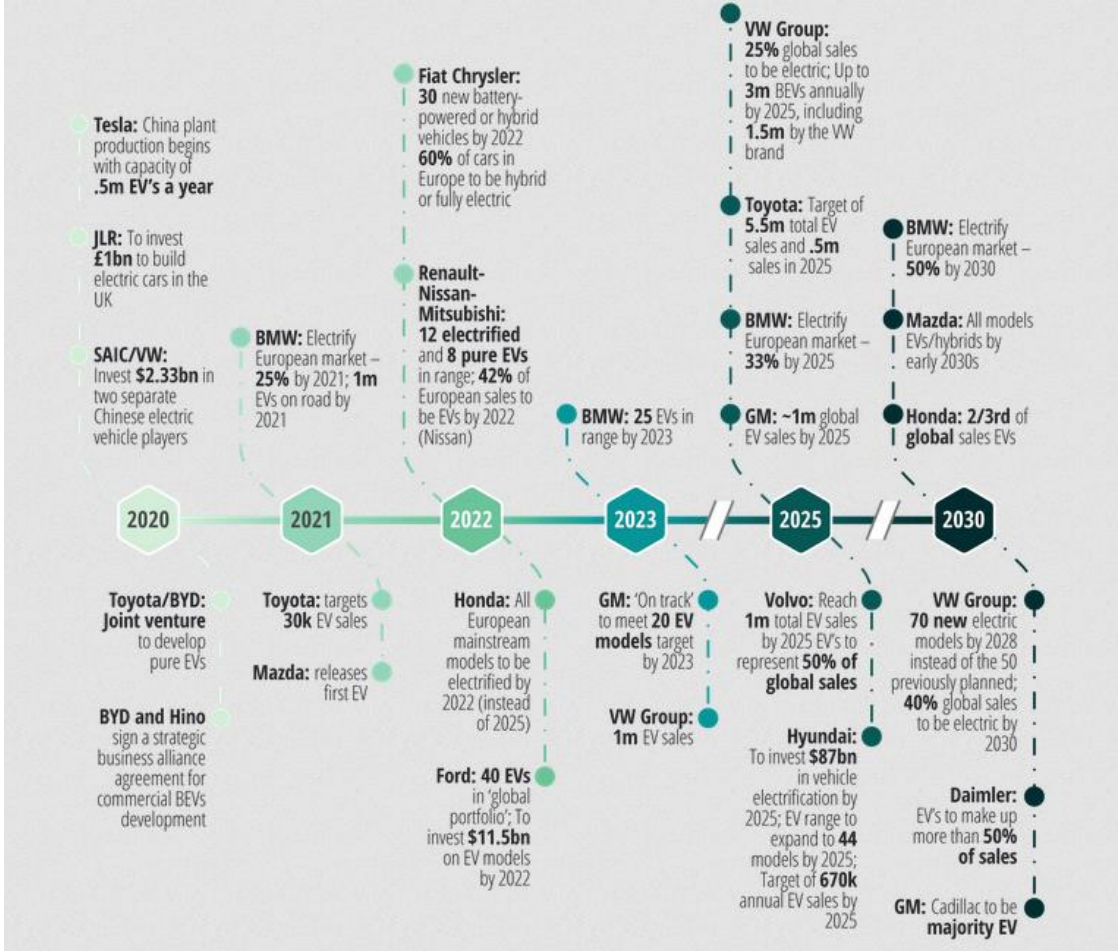




RH:



Timeline of strategic OEM targets for EVs

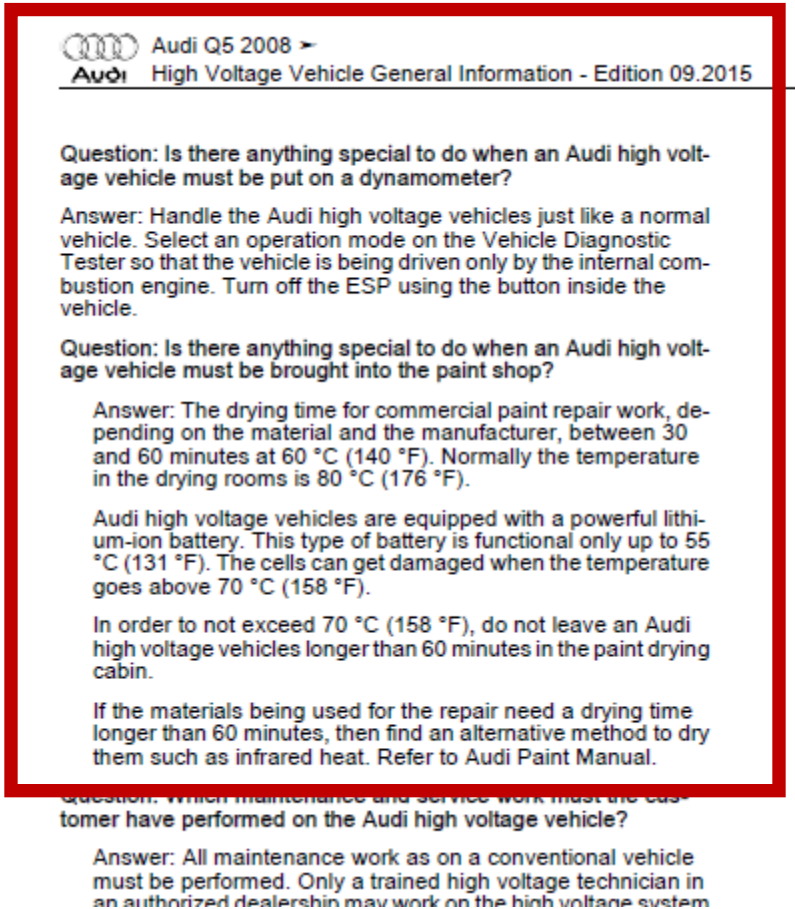


Source: Deloitte analysis[28]

HIGH VOLTAGE BATTERY HEAT LIMITATION

PAINT RESEARCH

2017 Audi Q5 Quattro Hybrid



Audi Q5 2008 ➢
Audi High Voltage Vehicle General Information - Edition 09.2015

Question: Is there anything special to do when an Audi high voltage vehicle must be put on a dynamometer?

Answer: Handle the Audi high voltage vehicles just like a normal vehicle. Select an operation mode on the Vehicle Diagnostic Tester so that the vehicle is being driven only by the internal combustion engine. Turn off the ESP using the button inside the vehicle.

Question: Is there anything special to do when an Audi high voltage vehicle must be brought into the paint shop?

Answer: The drying time for commercial paint repair work, depending on the material and the manufacturer, between 30 and 60 minutes at 60 °C (140 °F). Normally the temperature in the drying rooms is 80 °C (176 °F).

Audi high voltage vehicles are equipped with a powerful lithium-ion battery. This type of battery is functional only up to 55 °C (131 °F). The cells can get damaged when the temperature goes above 70 °C (158 °F).

In order to not exceed 70 °C (158 °F), do not leave an Audi high voltage vehicles longer than 60 minutes in the paint drying cabin.

If the materials being used for the repair need a drying time longer than 60 minutes, then find an alternative method to dry them such as infrared heat. Refer to Audi Paint Manual.

Question: Which maintenance and service work must the customer have performed on the Audi high voltage vehicle?

Answer: All maintenance work as on a conventional vehicle must be performed. Only a trained high voltage technician in an authorized dealership may work on the high voltage system

PAINT RESEARCH

2016 Acura RLX AWD Hybrid

2016 Acura RLX AWD V6-3.5L (JNB1) Hybrid

Electric Powertrain Service Precautions

General Information

Other Precautions

- When the vehicle is stored for an extended period of time, the expected life cycle of the high voltage battery may be affected. To reduce this possibility, the no-load charging procedure should be conducted at least once every 12 months of vehicle storage. The no-load charging should be conducted under the following conditions:

  Enter the maintenance mode, then start the engine, and hold the engine speed between 3,500-4,000 rpm without load (in P or N) until the SOC analog meter reaches a minimum of 50%.

  NOTE: Because it is necessary to call the customers attention to maintain the vehicle with the certain methods about the high voltage battery, compared to the service manual, the shorter maintenance period and another method are announced to them. In detail, see the high voltage battery caution label attached to the vehicle.

- High temperature may damage the battery module. When drying paint in a heated paint booth, make sure the temperature does not exceed 149°F (65°C).

PAINT RESEARCH

2016 BMW 330e Sedan Hybrid

BMW Group - AIR: 2017-11-14 / 10:50
Dealer: 32711/06
Model: 330E IPE A
Development code: F30
Model code: 8E23
Lead type: 8E23
Order number: -

Repair instruction

Notes on paintwork of hybrid cars

Procedure when drying after painting:

Important:
Danger of damage to battery!

Vehicle may not be kept in dryer for more than 2 hours at 60°C.

60℃= 140℉

PAINT RESEARCH

2017 Chevy Volt

GM Service Technical College

Chevrolet Volt

Collision Awareness Guide

GM Service Technical College provides Collision Repair Guides *free of charge*. Collision Repair Guides can be displayed in a classroom as long as they are represented as GM information and are not modified in any way.

GM Service Technical College

Paint Baking

General Motors does not recommend baking the Volt vehicle for more then 60 minutes at 160° Fahrenheit or 71 ° Celsius. Damage to the high voltage battery may occur.

PAINT RESEARCH

2016 Fiat 500e Electric

2016 Fiat 500e ELE-Electric Engine | Save Article | Select Print Option

6 SAVED ARTICLES

STANDARD PROCEDURE, COLLISION REPAIR - BATTERY ELECTRIC VEHICLES

To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions, including instructions to power down the system. The high-voltage system utilizes approximately 400 volts DC, provided through high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death.

Battery Electric Vehicles (BEV) contain a High Voltage Battery (HVB) system. Before cutting or welding within 30 cm. (12 in.) of the HVB or any high voltage components o wiring the HVB or components must be removed to avoid heat damage.

During welding current flow may occur through the cradle ground strap to the chassis. Therefore, caution must be used when electrical welding by making certain the ground is connected to the cradle when cradle welding and the ground is connected to the chassis when welding on the chassis.

A BEV requiring battery removal or high voltage system service must be transported to an authorized BEV studio for service.

For spot welding and Gas Metal Arc Welding (GMAW) High-voltage parts are not connected to ground, and therefore, are not affected by spot welding or GMAW. Removal of high-voltage parts is therefore not necessary. It is highly recommended that a non-conductive heat shield is placed on the battery pack to protect against potential heat, structural integrity or electrical damage.

Always wear appropriate personal protective equipment when working on or around the BEV.

BATTERY ELECTRIC VEHICLE PAINT BAKE CYCLE

NOTE: To prevent Li-ion Battery (High Voltage Battery) deterioration the following guidelines must be strictly followed-

The vehicles Li-ion Battery must be at a 20% State of Charge (SOC) or lower prior to the vehicle being subjected to a paint bake cycle. If the Li-ion Battery is above 20% SOC, the SOC can be reduced by driving the vehicle or by turning on various loads (ie. headlights, radio etc.).

When a paint booth bake cycle is used at the body shop, be certain the maximum temperature of the bake cycle does not exceed 74 °C (165 °F) and must be for no longer than a 1 hour maximum. If the paint booth temperature is more than 74 °C (165 °F) have the Li-ion Battery removed from the vehicle by the certified Electric Vehicle dealer and then deliver the vehicle to body shop. Failure to remove the Li-ion Battery prior to subjecting it to temperatures above 74 °C (165 °F) could result in Li-ion Battery damage and shorter life. It is highly recommended that a non-conductive heat shield is placed on the battery pack to protect against potential heat, structural integrity or electrical damage.

Before driving the vehicle out of the paint booth be certain to cool the battery down thoroughly. Either run the booth on the cool down cycle for a minimum of a 30 minutes or with the paint booth completely turned off including the lights, open all paint booth doors fully and let the vehicle set for a minimum of 1 hour.

If an additional paint-bake cycle is necessary, wait a minimum of 4 hours before doing so.

PAINT RESEARCH

2017 Ford Fusion Hybrid

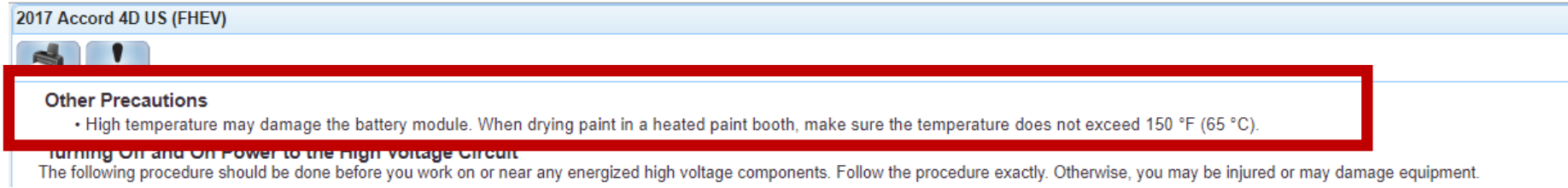
2017 Ford Fusion FWD Hybrid L4-2.0L Hybrid

Roof Panel

NOTICE: The HVTB (High Voltage Traction Battery) in electric vehicles can be affected and damaged by excessively high temperatures. The temperature in some body shop paint booths can exceed 60°C (140°F). Therefore, during refinishing operations, the paint booth temperature must set at or below 60°C (140°F) with a bake time of 45 minutes or less. Temperatures in excess of 60°C (140°F) or bake durations longer than 45 minutes will require the HVTB (High Voltage Traction Battery) be removed from the vehicle prior to placing in the paint booth.

PAINT RESEARCH

2017 Honda Acura Hybrid



2017 Accord 4D US (FHEV)

Other Precautions

- High temperature may damage the battery module. When drying paint in a heated paint booth, make sure the temperature does not exceed 150 °F (65 °C).

Turning On and On Power to the High Voltage Circuit

The following procedure should be done before you work on or near any energized high voltage components. Follow the procedure exactly. Otherwise, you may be injured or may damage equipment.

PAINT RESEARCH

2017 Hyundai IONIQ Hybrid

IONIQ Hybrid(AE HEV) > 2017 > G 1.6 GDI HEV > Hybrid Motor System

Precautions to take when handling high voltage battery

- When transporting high voltage battery, be sure to keep it flat and leveled. Failure to do so may decrease the battery performance and/or its life-span.
- High voltage battery"s performance may decrease if it is exposed to high temperature for a lengthy period. As a result, heat-treatment after painting must not exceed 70°C/ 30 minutes, or 80°C/ 20 minutes.

70°C= 158°F
80°C= 176°F

PAINT RESEARCH

2016 Kia Soul EV ELE-Electric Engine

2016 Kia Soul EV ELE-Electric Engine Save Article Select Print Option

General Safety Information and Caution

Safety Precaution

Danger: Since electric vehicles contain high voltage batteries, mishandling the high voltage system or vehicle may lead to a serious accident, including electric sho and electric leakage.

Warning:

- Be sure to shut off the high voltage by removing the safety plug before inspecting or repairing the high voltage system.
- A responsible worker should keep removed safety plugs to prevent it from being connected by mistake.
- Keep away from any metal objects (watch, ring etc.) while working on the high voltage system, as they may cause serious accidents like electric shock.
- Before beginning to work on the high voltage system, workers should wear personal protective equipment to prevent safety accidents.

insulation sheet to prevent safety accidents.

- Do not take over 70°C(158°F)/30min or 80°C(176°F)/20min when painting because exposing a high voltage battery to intense heat may cause deterioration.
- Use insulation tools when working on the high voltage system.
- Place removed high voltage components on an insulation mat.
- Check that voltage between the high voltage terminals is below 30V after removing the safety plug.

Information:

- All the high voltage wiring and connectors are in orange.
- A caution label for high voltage is attached to the high voltage components
- High voltage components : High Voltage Battery, Power Relay Assembly (PRA), Quick Charge Relay Assembly (QRA), Motor, Power Cable, BMS ECU, Inverter, LDC, On-Board Charger (OBC), Main Relay, Pre-charge Relay, Pre-charge resistor, Battery Current Sensor, Safety Plug, Main Fuse, Battery Temperature Sensor, Bus Bar, Charge Port, A/C Compressor, Electric Power Control Unit (EPCU), High Voltage Heater, High Voltage Heater Relay etc.

PAINT RESEARCH

2017 Nissan LEAF ELE- Electric Engine

2017 Nissan-Datsun Leaf ELE-Electric Engine | Save Article | Select Print Option

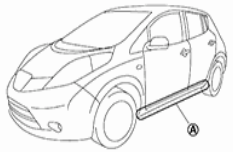
PAINTING BOOTH

Criteria for Battery Removal When Drying Painting

To use painting booth, maintain outer sill (A) temperature at 60°C (140°F) or less to prevent deterioration in liion battery.
NOTE:
- Measure the temperature with a noncontact thermometer.
- If a sill cover (resin) is included, remove the sill cover to measure the temperature.

If outer sill (A) temperature is more than 60°C (140°F), remove li-ion battery beforehand and place in the painting booth. Refe to "Inspection" (TYPE 1), "Inspection" {[EVB-758, "Inspection"]LINK_TO:[0000000000000000]} (TYPE 2), "Inspection" {[EVB-1164, "Inspection"]LINK_TO:[0000000000000000]} (TYPE 3) or "Inspection" (TYPE 4).

Zoom and Print Options



A. Outer sill temperature measurement part

PAINT RESEARCH

2016 Porsche Panamera S Hybrid

2016 Porsche Panamera S (970) V6-3.0L SC Hybrid

CAUTION

Danger of injury! Bursting of the filled air-conditioning system during welding and brazing work!
- **Danger of injury due to the filled air-conditioning system bursting during welding and brazing work.**

-> While drying after painting work, the temperature burden on the vehicle must not exceed two hours at a maximum temperature of 80 °C!

-> In the case of extreme heating of filled air-conditioning systems, a very strong overpressure may be caused in the system which may lead to an explosion.

PAINT RESEARCH

Tesla

Body Repair Tech Note: Parameters for Baking Tesla Vehicles After Painting

Body Repair Tech Notes provide information about Tesla-approved methods and practices for body repair. These instructions assume knowledge of motor vehicle and high voltage electrical component repairs, and should only be executed by trained professionals. Tesla assumes no liability for injury or property damage due to a failure to properly follow these instructions or for repairs attempted by unqualified individuals.

This Body Repair Tech Note supersedes BR-14-10-006 R2, dated 20-Nov-15. Each content change is marked by a vertical line in the left margin. Discard the previous version and replace it with this one.

⚠ **CAUTION:** Before baking, the vehicle must remain indoors at a temperature less than 95° F (35° C) for at least 6 hours.

⚠ **CAUTION:** Before baking, if any repairs to the thermal system (cooling and HVAC) have not been completed, disconnect 12v and high voltage power to prevent these systems from turning on during baking.

After painting Model S, Model X, or Model 3, it is acceptable to "bake" (force dry) the vehicle in a paint booth with the HV battery installed as long as neither of the following parameters are exceeded:

- **Maximum baking time:** 45 minutes.
- **Maximum baking temperature**: 165° F (74° C).

If these parameters must be exceeded for any reason, contact the Tesla Body Repair team before baking Model S, Model X, or Model 3.

For feedback on the accuracy of this document, email BodyRepair@tesla.com.

PAINT RESEARCH

Toyota Hybrid Statement

TOYOTA HYBRID Q&A
(Source: Winter 2008 edition of Toyota Collision Pros newsletter)

Some answers to questions previously unaddressed in Toyota resources:

Q: Should the high-voltage battery be removed before a hybrid is placed in a heated paint drying booth?
A: No. However, the HV battery temperature should not exceed 140* F.

Q: Should the high-voltage battery be removed when welding on a hybrid?
A: No, but before welding, put the ignition key in the off position, and gloves (sic), disconnect the negative terminal 12 volt battery and remove the service plug.

Q: If you're welding close enough to the high-voltage battery where sparks could potentially land on it, does it need to be removed?
A: Yes, absolutely.

Q: During frame straightening or frame member replacement, in areas close to a hybrid's high-voltage battery, does the battery need to be removed?
A: Yes. If not, you run the risk of damaging the battery or its casing.

140°F= 60°C

WHAT TO RESEARCH

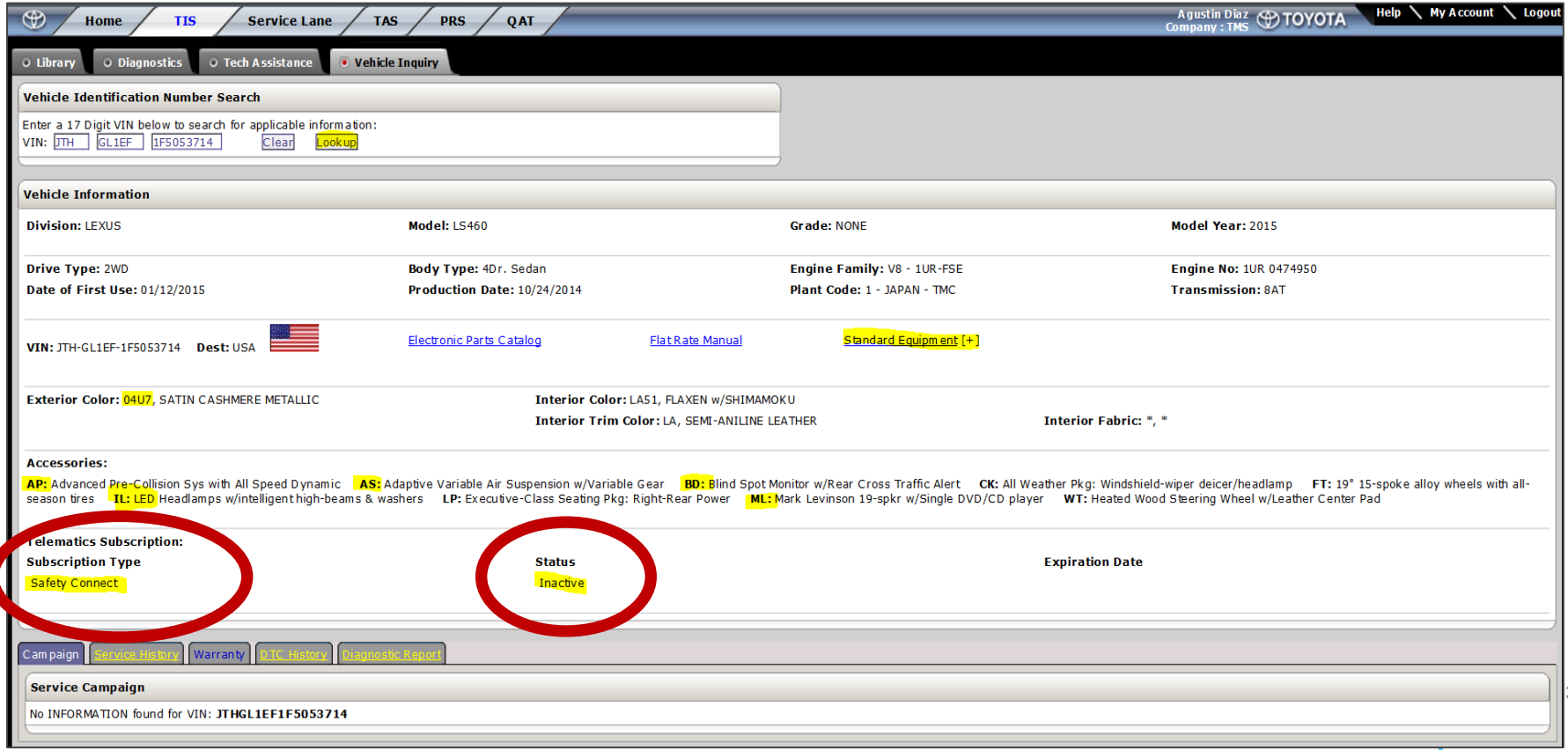
Getting Familiar with the Platform

Telematics

- Does the OEM have any telematics built into their vehicles?
- Is there any way for a repairer to tell if the telematic system is active or inactive?
- How can a shop disable the system?
- Are there any other precautions when working with this system?

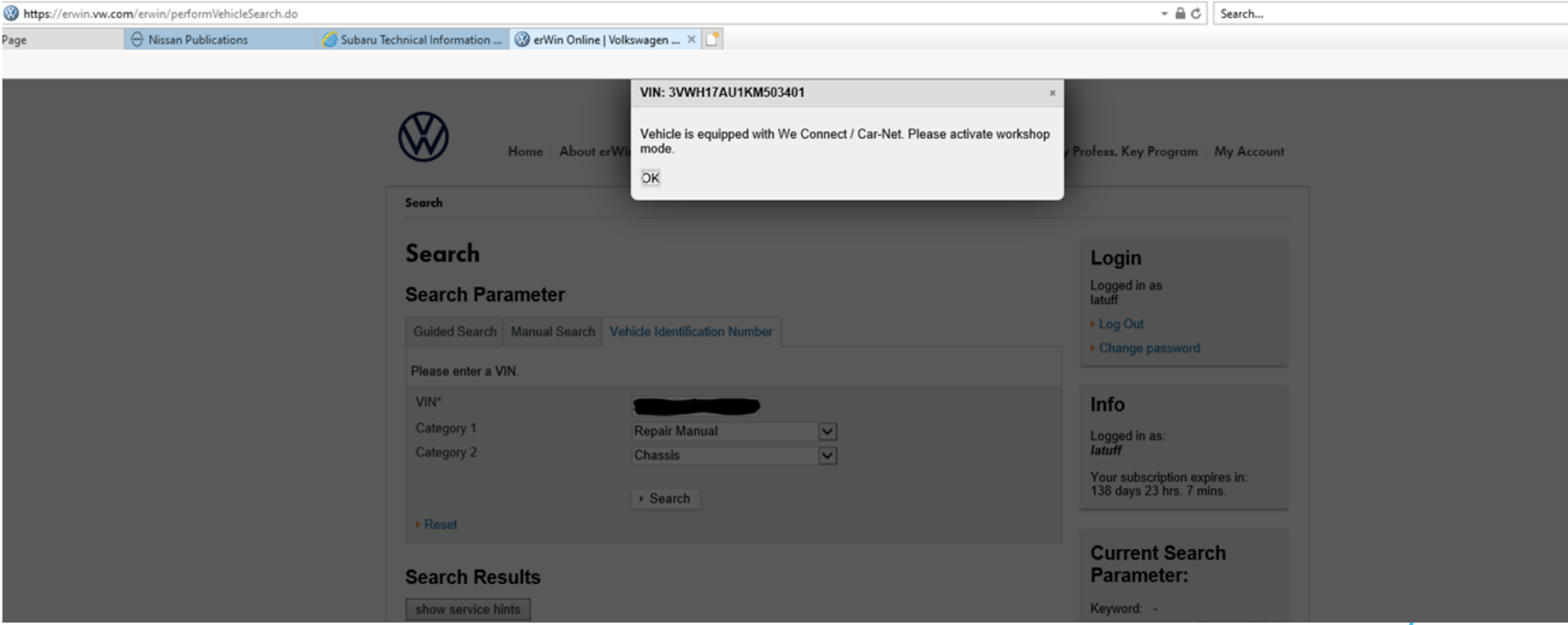
WHAT TO RESEARCH

Toyota Safety Connect



WHAT TO RESEARCH

Volkswagen erWIN



SAFETY INSPECTIONS


BUCKLE UP!

SAFETY INSPECTIONS

General Information

- Most OEM manufacturers, if not all, will have a variety of **safety inspections** for vehicles that have been involved in a collision
- These **inspections** would include (but are not limited to):
  - Seat belts
  - Steering columns
  - Steering gear assembly
  - SRS connectors
  - Trim panels
  - Dash components, such as supporting braces, knee bolsters, etc.
  - Pedals
  - Seat Components

Raise your hand if you know what we are talking about and what OEM's/Items you have seen?

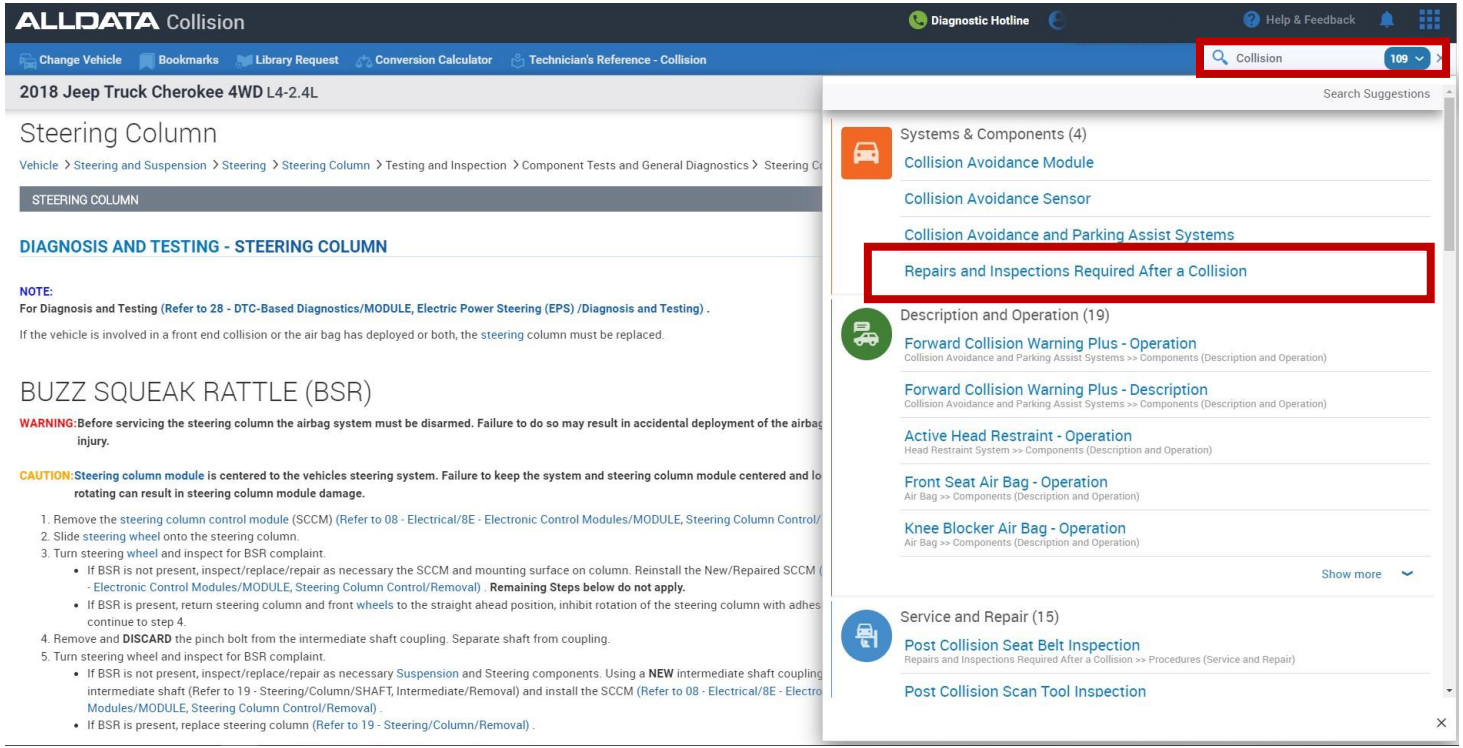
SAFETY INSPECTIONS

General Information

- These OEM procedures vary based on OEM year, make and model
- OEM manufacturers will often have inspections when the air bag deploys, but also when it doesn't deploy
- ALLDATA attempts to standardize all of these under **"Repairs & Inspections Required After a Collision"**

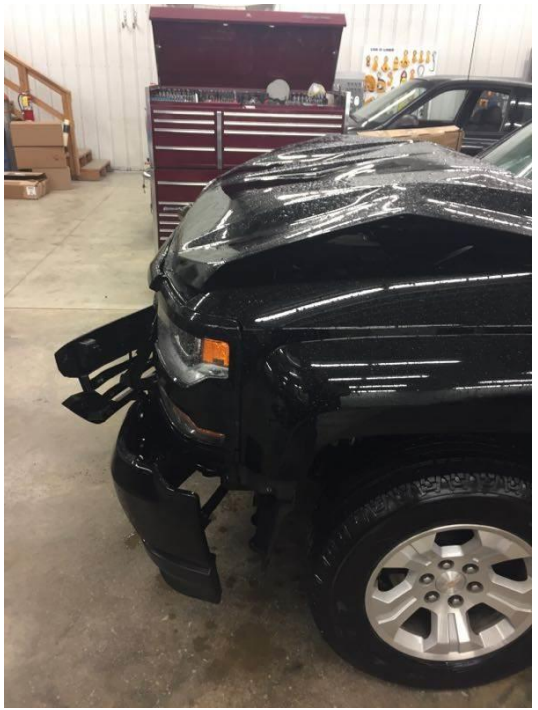
SAFETY INSPECTIONS

ALLDATA – Repairs and Inspections Required After a Collision



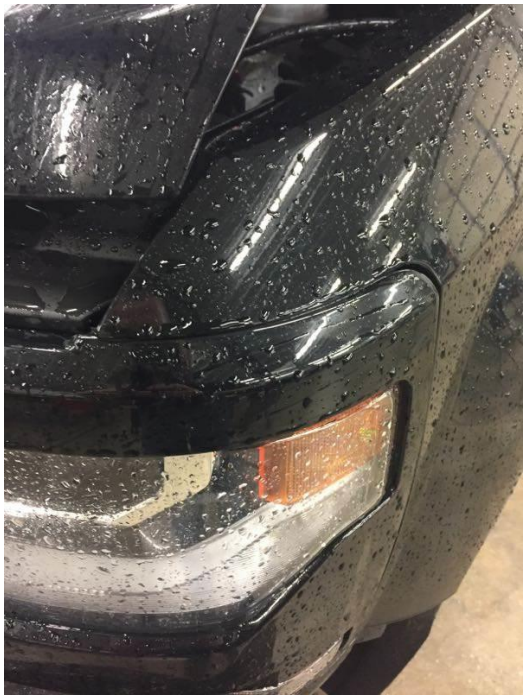
SAFETY INSPECTIONS

2018 Chev Silverado



SAFETY INSPECTIONS

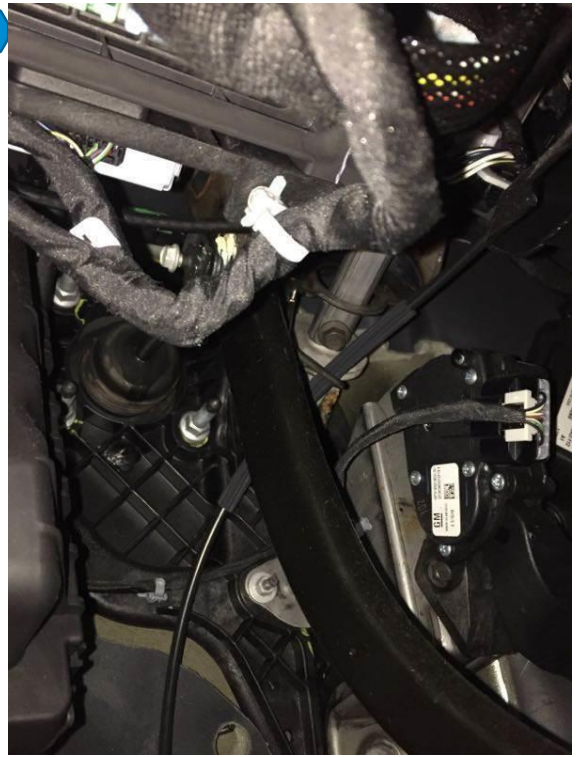
2018 Chev Silverado



SAFETY INSPECTIONS

2018 Chev Silverado

1



Check Steering column for bending or collapse

Accident With or Without Air Bag Deployment - Component Inspections

Warning: Proper operation of the Supplemental Inflatable Restraint (SIR) sensing system requires that any repairs to the vehicle structure return the vehicle structure to the original production configuration. Not properly repairing the vehicle structure could cause non-deployment of the air bag(s) in a frontal collision or deployment of the air bag(s) for conditions less severe than intended.

After any collision, inspect the following components as indicated. If you detect any damage, replace the component. If you detect any damage to the mounting points or mounting hardware, repair the component or replace the hardware as needed.
Note: Hybrid Vehicles Only - Perform an inspection of the high voltage system for damage. Refer to High Voltage System Inspection under the Hybrid/EV Energy Storage repair section.
See: Battery System, Hybrid Drive > Component Tests and General Diagnostics > High Voltage System Inspection - Hybrid/EV Energy Storage High Voltage System Inspection

1

- The steering column-Inspect the steering column for bending, twisting, buckling or any type of damage.

- The instrument panel knee bolsters and mounting points-Inspect the knee bolsters for bending, twisting, buckling, or any other type of damage.

- The instrument panel brackets, braces, etc.-Inspect for bending, twisting, buckling, or any other type of damage.

- The seat belts-Perform the seat belt operational and functional checks. Refer to See: Repairs and Inspections Required After a Collision > Procedures > Seat Belts Repairs and Inspections Required After a Collision.

- The instrument panel cross car beam-Inspect for bending, twisting, buckling, or any other type of damage.

- The instrument panel mounting points and brackets-Inspect for bending, twisting, buckling, or any other type of damage.

- The seats and seat mounting points-Inspect for bending, twisting, buckling, or any other type of damage.

- The roof and headliner mounting points.

- The brake pedal --Inspect the brake pedal for bending, twisting, buckling or any type of damage.

Accident With Frontal Air Bag Deployment - Component Replacement and Inspections

Accident With or Without Air Bag Deployment - Component Inspections

Warning: Proper operation of the Supplemental Inflatable Restraint (SIR) sensing system requires that any repairs to the vehicle structure return the vehicle structure to the original production configuration. Not properly repairing the vehicle structure could cause non-deployment of the air bag(s) in a frontal collision or deployment of the air bag(s) for conditions less severe than intended.

After any collision, inspect the following components as indicated. If you detect any damage, replace the component. If you detect any damage to the mounting points or mounting hardware, repair the component or replace the hardware as needed.
Note: Hybrid Vehicles Only - Perform an inspection of the high voltage system for damage. Refer to High Voltage System Inspection under the Hybrid/EV Energy Storage repair section.
See: Battery System, Hybrid Drive > Component Tests and General Diagnostics > High Voltage System Inspection - Hybrid/EV Energy Storage High Voltage System Inspection

- The steering column-Inspect the steering column for bending, twisting, buckling or any type of damage.

- The instrument panel knee bolsters and mounting points-Inspect the knee bolsters for bending, twisting, buckling, or any other type of damage.

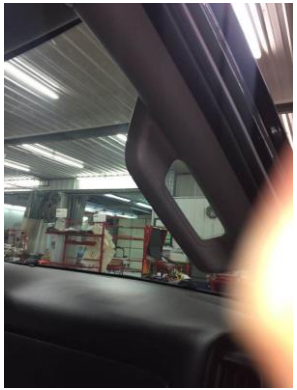
- The instrument panel brackets, braces, etc.-Inspect for bending, twisting, buckling, or any other type of damage.

- The seat belts-Perform the seat belt operational and functional checks. Refer to See: Repairs and Inspections Required After a Collision > Procedures > Seat Belts Repairs and Inspections Required After a Collision.

SAFETY INSPECTIONS

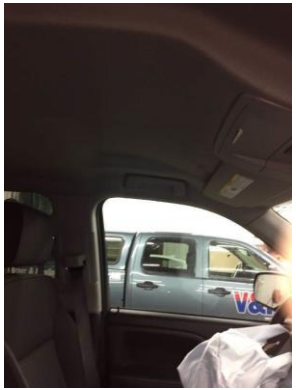
2018 Chev Silverado

Check Brake pedal for bend or twist



Check A pillar grab handle mounting

Check headliner mounting for separation

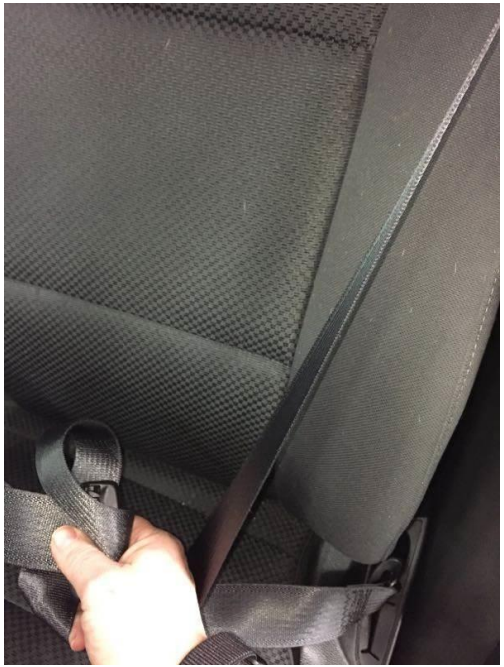


Check Seat mounting points for bend or separation

SAFETY INSPECTIONS

2018 Chev Silverado

Right seat belt locked and plastic pulled out



Seat belt locked

SAFETY INSPECTIONS

Broken Dash Carrier from GM Inspection

- In this instance, shop discovered broken dash carrier by conducting the GM safety inspection
- However, just as many examples where no additional damage is found

FORD
SAFETY INSPECTIONS

SAFETY INSPECTIONS

2019 Ford Focus

Inspection and Repair after a Supplemental Restraint System (SRS) Deployment

Inspection

NOTE: Deployable devices such as airbags, pretensioners and inflatable belt inflators, may deploy alone or in various combinations depending on the impact event.

NOTE: Always refer to the appropriate workshop manual procedures prior to carying out vehicle repairs affecting the SRS and safety belt system.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

1. **NOTE:** Refer to the correct removal and installation procedure for all SRS components being installed.

When any deployable device or combination of devices have deployed and/or the RCM has DTC B1193:00 (event threshold exceeded) in memory, the repair of the vehicle SRS is to include the removal of all deployed devices and the installation of new deployable devices, the removal of all impact sensors and installation of new impact sensors and the removal and installation of a new RCM. Diagnostic Trouble Codes (DTCs) must be cleared from all required modules after repairs are carried out.

2. **NOTE:** After installation of new OCS components, use a diagnostic scan tool to cary out the OCS Reset procedure as instructed in the workshop manual.

When a vehicle has been involved in a collision and the OCSM has DTC B1193:00 stored in memory, the repair of the OCS is to include the following procedures for the specified system:

3.

- For a weight sensor bolt-type OCS , inspect the passenger side floorpan for damage and repair as necessary. Install a new seat track with OCS weight sensor bolts. The DTC must be cleared from the OCSM before carying out OCS Reset. Do not install a new OCSM unless DTC B1193:00 cannot be cleared.

- For a bladder-type OCS , inspect for damage and repair as necessary. If installation of an OCS component is required, an OCS service kit must be installed.

4. When any damage to the impact sensor mounting points or mounting hardware has occurred, repair or install new mounting points and mounting hardware as needed.

5. When the driver airbag has deployed, install a new clockspring.

6. New driver and/or front passenger safety belt systems (including retractors, buckles and height adjusters) must be installed if the vehicle is involved in a collision that results in deployment of the driver and/or front passenger safety belt pretensioners.

7. New second row safety belt systems (including retractors, buckles and inflators) must be installed if the vehicle is involved in a collision that results in deployment of the rear inflatable safety belt system.

8. Inspect the entire vehicle for damage, including the following components:

9.

- Steering column (deployable column if equipped)
- Instrument panel knee bolsters and mounting points
- Safety Canopy(R) and mounting points
- Instrument panel braces and brackets
- Instrument panel and mounting points
- Seats and seat mounting points
- Safety belts, safety belt buckles, safety belt retractors and safety belt anchors.
- SRS wiring, wiring harnesses and connectors

10. After carying out the review and inspection of the entire vehicle for damage, repair or install new components as needed.

11. Inspect the fuel system for damage or leaks. Repair the system and install new components as necessary.

12.

- Connect a diagnostic scan tool and view the BCM CRASH PID.

- If the BCM CRASH PID is present and reads 'Yes', use the diagnostic scan tool to cary out the BCM Crash Status Reset under "Electrical - Service Functions".

- If the BCM CRASH PID reads 'No' or is not present, complete any necessary repairs before returning the vehicle to the customer.

MERCEDES BENZ
SAFETY INSPECTIONS

SAFETY INSPECTIONS

Mercedes Benz

Following an accident
The airbags and emergency tensioning retractors should be checked for external damage, defects and triggering. Replace defective or damaged components immediately; repair of such components is not permissible.

The emergency tensioning retractor control module with airbag should always be replaced when:
- The housing is deformed or damaged
- The mount is deformed even if the control module itself is at damaged externally
- An electrical defect is present and
- After the airbag has been triggered three times.

NOTE: Program and set parameters for new emergency tensioning retractor control module with airbag after installation according to diagnostic literature

Always replace airbags or emergency tensioning retractors:
- If triggered,
- If external damage is present; even if not triggered and
- An electrical defect is present.

NOTE: When the driver airbag is triggered it is always necessary to replace the steering wheel, when the sidebag is triggered, it is necessary to replace the sidebag cover in the door liner and when the passenger airbag is triggered it is necessary to replace the instrument panel.

SUBARU
SAFETY INSPECTIONS

SAFETY INSPECTIONS

2018 Subaru Forester

AIRBAG SYSTEM > Inspection Locations after a Collision

INSPECTION

If the vehicle is involved in a collision, even if it is a slight collision, be sure to check the following systems.

1. DRIVER'S AIRBAG MODULE ASSEMBLY

1. Frontal collision (driver's airbag module assembly activated)
   1. Replace the following parts with new ones.
      - Airbag control module
      - Driver's airbag module
      - Knee airbag module
      - Passenger's airbag module (if deployed)
      - Side airbag module (right and left / if deployed)
      - Curtain airbag module (right and left / if deployed)
      - Seat belt pretensioner (right and left)
      - Lap seat belt pretensioner (passenger's side only)
      - Front sub sensor (right and left)
      - Instrument panel assembly (because it is integrated with passenger's airbag module) (if passenger's airbag module is deployed)
      - Steering wheel
      - Column assembly - steering
      - Roll connector
      - Pad assembly - front seat backrest (if the side airbag is deployed)
      - Frame assembly - front seat cushion (if the side airbag is deployed)
      - Frame assembly - front seat backrest (if the side airbag is deployed)
      - Cover COMPL - front backrest (if the side airbag is deployed)
      - Trim panel - roof assembly (if the curtain airbag is deployed)
      - Trim panel of each pillar (if the curtain airbag is deployed)
   2. Visually inspect the following items and replace any damaged part with a new one.
      - Universal joint assembly - steering:
      - Steering gearbox
      - Beam COMPL - steering
      - Harnesses and connectors on body side that are linked to the replaced parts
2. Frontal collision (driver's airbag module not activated)
   Visually inspect the following items and replace any damaged or cracked part with a new one.
   Specially inspect the damage of airbag module body, mounting bracket and harness connector.
   - Driver's airbag module
   - Knee airbag module
   - Passenger's airbag module
   - Seat belt pretensioner (right and left)
   - Lap seat belt pretensioner (passenger's side only)
   - Front sub sensor (right and left)
   - Instrument panel assembly (because it is integrated with passenger's airbag module)
3. No frontal collision

Visually inspect the airbag modules for damage or contamination and replace any faulty part with a new one.

2. KNEE AIRBAG MODULE

1. Frontal collision (knee airbag module activated)
   1. Replace the following parts with new ones.
      - Airbag control module
      - Driver's airbag module
      - Knee airbag module
      - Passenger's airbag module (if deployed)
      - Side airbag module (right and left / if deployed)
      - Curtain airbag module (right and left / if deployed)
      - Seat belt pretensioner (right and left)
      - Lap seat belt pretensioner (passenger's side only)
      - Front sub sensor (right and left)
      - Instrument panel assembly (because it is integrated with passenger's airbag module) (if passenger's airbag module is deployed)
      - Steering wheel
      - Column assembly - steering
      - Roll connector
      - Pad assembly - front seat backrest (if the side airbag is deployed)
      - Frame assembly - front seat cushion (if the side airbag is deployed)
      - Frame assembly - front seat backrest (if the side airbag is deployed)
      - Cover COMPL - front backrest (if the side airbag is deployed)
      - Trim panel - roof assembly (if the curtain airbag is deployed)
      - Trim panel of each pillar (if the curtain airbag is deployed)
   2. Visually inspect the following items and replace any damaged part with a new one.
      - Universal joint assembly - steering:
      - Steering gearbox
      - Beam COMPL - steering
      - Harnesses and connectors on body side that are linked to the replaced parts
2. Frontal collision (knee airbag module not activated)
   Visually inspect the following items and replace any damaged or cracked part with a new one.
   Specially inspect the damage of airbag module body, mounting bracket and harness connector.
   - Driver's airbag module
   - Knee airbag module
   - Passenger's airbag module
   - Seat belt pretensioner (right and left)
   - Lap seat belt pretensioner (passenger's side only)
   - Front sub sensor (right and left)
   - Instrument panel assembly (because it is integrated with passenger's airbag module)
3. No frontal collision
   Visually inspect the airbag modules for damage or contamination and replace any faulty part with a new one.

3. PASSENGER'S AIRBAG MODULE

SAFETY INSPECTIONS

2018 Subaru Forester

1. Frontal collision (passenger's airbag module activated)
   1. Replace the following parts with new ones.
      - Airbag control module
      - Driver's airbag module
      - Knee airbag module
      - Passenger's airbag module
      - Seat belt pretensioner (right and left)
      - Lap seat belt pretensioner (passenger's side only)
      - Side airbag module (right and left / if deployed)
      - Curtain airbag module (right and left / if deployed)
      - Front sub sensor (right and left)
      - Steering wheel
      - Column assembly - steering
      - Instrument panel assembly (because it is integrated with passenger's airbag module)
      - Roll connector
      - Pad assembly - front seat backrest (if the side airbag is deployed)
      - Frame assembly - front seat cushion (if the side airbag is deployed)
      - Frame assembly - front seat backrest (if the side airbag is deployed)
      - Cover COMPL - front backrest (if the side airbag is deployed)
      - Trim panel - roof assembly (if the curtain airbag is deployed)
      - Trim panel of each pillar (if the curtain airbag is deployed)
   2. Visually inspect the following items and replace any damaged part with a new one.
      - Beam COMPL - steering
      - Harnesses and connectors on body side that are linked to the replaced parts
2. Frontal collision (passenger's airbag module not activated)
   Visually inspect the following items and replace any damaged or cracked part with a new one.
   Specially inspect the damage of airbag module body, mounting bracket and harness connector.
   - Driver's airbag module
   - Knee airbag module
   - Passenger's airbag module
   - Seat belt pretensioner (right and left)
   - Lap seat belt pretensioner (passenger's side only)
   - Front sub sensor (right and left)
   - Instrument panel assembly (because it is integrated with passenger's airbag module)
3. No frontal collision
   Visually inspect the airbag modules for damage or contamination and replace any faulty part with a new one.

4. SIDE AIRBAG MODULE

1. Side impact (side airbag module activated)
   1. Replace the following parts with new ones.
      - Airbag control module
      - Satellite safing sensor
      - Cover - satellite safing
      - Front door impact sensor (collision side)
      - Seat belt pretensioner (collision side / if deployed)

      - Side airbag module (operating side)
      - Side airbag sensor (collision side)
      - Curtain airbag module (operating side)
      - Curtain airbag sensor (collision side)
      - Pad assembly - front seat backrest (collision side)
      - Frame assembly - front backrest (collision side)
      - Cover COMPL - front backrest (collision side)
      - Frame assembly - front seat cushion (collision side)
      - Trim panel - roof assembly
      - Trim panel for each pillar
   2. Visually inspect the following items and replace any damaged part with a new one.
      - Headrest assembly
      - Bushing - lock headrest
      - Slide rail assembly - OUT
      - Slide rail assembly - INN
      - Cover - hinge front seat
      - Knob - lifter
      - Lever - reclining
      - Harnesses and connectors on body side that are linked to the replaced parts
2. Side impact (side airbag module not activated)
   Visually inspect the following items and replace any damaged or cracked part with a new one.
   Specially inspect the damage of airbag module body, mounting bracket and harness connector.
   - Pad assembly - front seat backrest
   - Frame assembly - front backrest
   - Cover COMPL - front backrest
   - Satellite safing sensor
   - Cover - satellite safing
   - Front door impact sensor
   - Side airbag module
   - Side airbag sensor
   - Curtain airbag module
   - Curtain airbag sensor
3. No side impact
   Visually inspect the airbag modules for contamination and replace any faulty part with a new one.

5. CURTAIN AIRBAG MODULE

1. Side impact or roll over (curtain airbag module activated)
   1. Replace the following parts with new ones.
      - Airbag control module
      - Satellite safing sensor
      - Cover - satellite safing
      - Side airbag module (operating side)
      - Side airbag sensor (collision side)
      - Curtain airbag module (operating side)
      - Curtain airbag sensor (collision side)
      - Seat belt pretensioner (operating side)

SAFETY INSPECTIONS

2018 Subaru Forester

- Front door impact sensor (collision side)
- Pad assembly - front seat backrest (collision side)
- Frame assembly - front backrest (collision side)
- Cover COMPL - front backrest (collision side)
- Frame assembly - front seat cushion (collision side)
- Trim panel - roof assembly
- Trim panel for each pillar
- Airbag bracket (model with sunroof) (collision side)

2. Visually inspect the following items and replace any damaged part with a new one.
   - Assist rail - front and rear
   - Bracket - assist rail front and rear
   - Harnesses and connectors on body side that are linked to the replaced parts

2. Side impact (curtain airbag module not activated)
Visually inspect the following items and replace any damaged or cracked part with a new one.
Specially inspect the damage of airbag module body, mounting bracket and harness connector.

- Trim panel - roof assembly
- Trim panel for each pillar
- Curtain airbag module
- Satellite safing sensor
- Cover - satellite safing
- Front door impact sensor
- Side airbag sensor
- Curtain airbag sensor

3. No side impact or roll over
Visually inspect the airbag modules for damage or contamination and replace any faulty part with a new one.

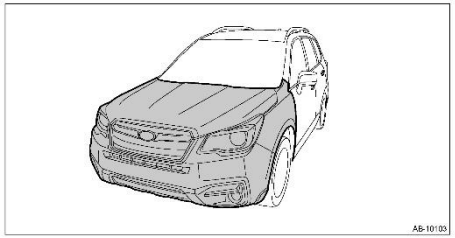
6. AIRBAG CONTROL MODULE

Check for the following, and replace the damaged parts with new parts.

- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Driver's airbag module has been activated.
- Knee airbag module has been activated.
- Passenger's airbag module has been activated.
- Side airbag module has been activated.
- Curtain airbag module has been activated.
- Seat belt pretensioner has been activated.
- Lap seat belt pretensioner has been activated.

7. FRONT SUB SENSOR

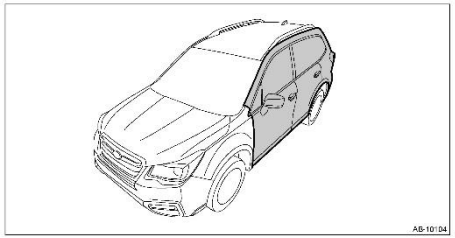
If the section of vehicle as shown in the figure is damaged, check the following items and replace the damaged parts with new parts.



- Front sub sensor is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Driver's airbag module, knee airbag module or passenger's airbag module has been activated.

8. FRONT DOOR IMPACT SENSOR, SATELLITE SAFING SENSOR, SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR

If the section of vehicle as shown in the figure is damaged, check the following items and replace the damaged parts with new parts.



- Sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Side airbag module or curtain airbag module has been activated. (Operating side)

9. ROLL CONNECTOR

SAFETY INSPECTIONS

2018 Subaru Forester

Check for the following, and replace the damaged parts such as cracks, deformation, etc. with new parts.
- Combination switch
- Steering roll connector

10. CHECK STEERING SYSTEM

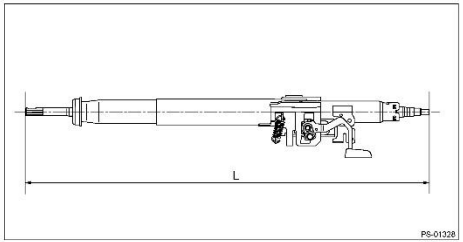
Check the following items, and if there is anything out of standard value, it is considered to be damaged. If so, replace it with a new part.
- Steering wheel
- Column assembly - steering
- Universal joint assembly - steering
- Steering gearbox

- Deflection of front and rear, upward and downward directions, and mounting condition to vehicle body of the column assembly - steering. (After a collision, absorbing part of the column assembly - steering may have been operated.)
  - Measure the whole length of the column assembly - steering.

    Standard: Overall length L

    Tilt and telescopic column (measure while minimized)

    $819.7^{+1.5}_{-1.5}$ mm ($32.27^{+0.059}_{-0.059}$ in)



- Mounting conditions and deflection of front and rear, upward and downward directions of the steering wheel and column assembly - steering.
  - Check the steering wheel deflection in axial and vertical directions.

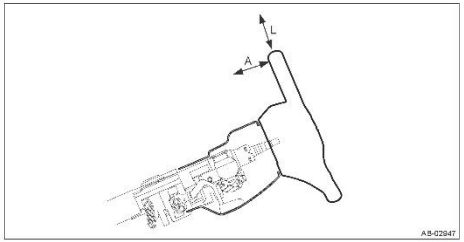
    Specification:

    Axial deflection A (deflection of steering wheel)

    Less than 6 mm (0.24 in)

    Vertical deflection L (runout of steering wheel)

    Less than 17 mm (0.68 in)



- Check for deflection and the swing load of the universal joint assembly - steering. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Universal Joint>INSPECTION.
- Check the following items for the steering gearbox. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Electric Power Steering Gearbox>INSPECTION.
  - Rack sliding resistance and deflection
  - Input shaft play
  - Rotational resistance of gearbox

11. PASSENGER'S SEAT

Caution:

If any of the following applies, replace the pad assembly - front seat cushion & frame assembly - front cushion as a unit. Do not disassemble.
- **The frame assembly - front cushion or the pad assembly - front seat cushion is cracked or deformed.**
- **Scratches, cracks, or deformation found on the occupant detection system sensor mat or occupant detection control module, or attachment brackets of the control module.**
- **Harness and/or connector is cracked, deformed or open. Harness wire is exposed.**

Check for the following, and replace the damaged parts with new parts.
- Body or bracket of the seat belt inner - front is scratched, cracked or deformed.
- Frame assembly - front backrest is cracked or deformed.
- Headrest assembly for deformation or play
- If the cover - front cushion and the cover COMPL - front backrest is damaged or frayed, replace the cover with a new part.
- If the cover - front cushion and the seat heater are replaced, replace the cover hang wire with a new part.

12. INSPECTION OF OTHER PARTS

Check for the following parts, and replace the damaged parts with new parts.

1. Steering wheel and column assembly - steering

Check the column assembly - steering for mounting conditions, and deflection of front and rear direction with tilt lever released. (After a collision, absorbing part of the column assembly - steering may have been operated.)

2. Check the direct type connector of driver's airbag module, knee airbag module, curtain airbag module, and pretensioner for damage, and also check each harness for pinching and connector damage. Replace the main harness as an assembly if damage is found.
3. Check the seat cushion, backrest, slide rail and headrest for installation condition and looseness.
4. If any break or fray is found in the cover COMPL - front backrest of the driver's seat or passenger's seat, the side airbag system may not operate normally. In this case, replace the cover COMPL - front backrest with a new part.
5. For the passenger's seat, replace the frame assembly - front cushion with a new part if the frame assembly - front cushion is deformed or cracked.
6. If there are tears or loosening in the seat cover - front cushion on the passenger's side, it may interfere with the proper operation of the occupant detection system. Replace the cover - front cushion with a new part.
7. When the passenger seat cushion cover has been removed or replaced, make sure that the occupant detection system operates normally.
8. Use the Subaru Select Monitor to check whether the passenger's seat belt buckle switch is operating normally.

TOYOTA/LEXUS
SAFETY INSPECTIONS

SAFETY INSPECTIONS

2005 Lexus ES 330

2005 Lexus ES 330 V6-3.3L (3MZ-FE)
Vehicle > Restraints and Safety Systems > Repairs and Inspections Required After a Collision > Service and Repair > Procedures > Component Inspections

IMPACT SENSOR

AIRBAG SENSOR FRONT (VEHICLE NOT INVOLVED IN COLLISION)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).

AIRBAG SENSOR FRONT (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).
b. When the front bumper of the vehicle or its periphery is damaged, check if there is any damage to the airbag sensor front. If any of the airbag sensor front have defects as mentioned below, replace it with a new one:
- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.
- Peeling off of the label or damage to the serial number.

CAUTION: For removal and installation procedures of the airbag sensor front, see "Replacement", and be sure to follow the correct procedure.

AIRBAG SENSOR FRONT (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)
a. Replace the airbag sensor front.

CAUTION: For removal and installation procedures of the airbag sensor front, see "Replacement", and be sure to follow the correct procedure.

HINT: The airbag sensor front on the impacted side should be replaced after the horn button assembly or front passenger airbag assembly has deployed.

SIDE AIRBAG SENSOR ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).

SIDE AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).
b. When the center pillar of the vehicle or its periphery is damaged, check if there is any damage to the side airbag sensor assembly. If there are any defects as mentioned below, replace the side airbag sensor assembly with a new one:
- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.
- Peeling off of the label or damage to the serial number.

CAUTION: For removal and installation procedures of the side airbag sensor assembly, see "Replacement", and be sure to follow the correct procedure.

SIDE AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)
a. Replace the side airbag sensor assembly.

CAUTION: For removal and installation procedures of the side airbag sensor assembly, see "Replacement", and be sure to follow the correct procedure.

HINT: The side airbag sensor assembly on the impacted side should be replaced after the front seat airbag assembly and curtain shield airbag assembly have deployed.

AIRBAG SENSOR REAR (VEHICLE NOT INVOLVED IN COLLISION)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).

AIRBAG SENSOR REAR (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).
b. When the quarter panel of the vehicle or its periphery is damaged, check if there is any damage to the airbag sensor rear. If there are any defects as mentioned below, replace the airbag sensor rear with a new one:
- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.
- Peeling off of the label or damage to the serial number.

CAUTION: For removal and installation procedures of the airbag sensor rear, see "Replacement", and be sure to follow the correct procedure.

AIRBAG SENSOR REAR (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)
a. Replace the airbag sensor rear.

CAUTION: For removal and installation procedures of the airbag sensor rear, see "Replacement", and be sure to follow the correct procedure.

HINT: The airbag sensor rear on the impacted side should be replaced after the curtain shield airbag assembly has deployed.

SEAT POSITION AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).

SEAT POSITION AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION)
a. Perform a diagnostic system check (Refer to Air Bag Systems; Testing and Inspection).
b. Even if the airbag was not deployed, perform a visual check for damage to the seat position airbag sensor including the following:
- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.

CAUTION: For removal and installation procedures of the seat position airbag sensor, see "Replacement", and be sure to follow the correct procedure.

SEAT BELT INSPECTIONS

AUDI/VOLKSWAGEN
SEAT BELT INSPECTIONS

temperature of a burning cigarette causes a chemical breakdown of the refrigerant vapor. The products of this breakdown are poisonous and cause violent coughing and sickness when inhaled.

1.7 Airbag System

Repair information ⇒ Body Interior; Rep. Gr. 69 ; Airbag

When working on the airbag system and when performing straightening work during Body Repairs the battery ground (GND) strap must be disconnected.

Caution

- ***Switch ignition on before connecting battery!***
- ***There must be nobody in the vehicle when connecting the battery!***

Airbag components must not even briefly be subjected to temperatures above 100°C (212°F).

Airbag components must not come into contact with grease, cleaning agent, oil or similar.

Mechanically damaged airbag components must be replaced:

See disposal instructions ⇒ page 34 .

Wash hands after touching airbag units which have been ignited!

1.8 Seat Belts, Checking

Caution

After every accident, seat belt system must be checked systematically. If damage is determined when checking the test points, customer must be informed regarding necessity of changing belts.

Test Points:

- Check belt strap
- Check inertia reel (locking effect)
- Visually check belt lock
- Functionally check belt lock
- Check belt guides and lock tongue
- Check securing parts and anchorage points
- Check lap belt retractor

Note

If customer refuses to have damaged belts replaced, appropriate note should be made.

1.8.1 Belt Strap, Checking

– Pull belt completely out of inertia reel or lap belt adjustment tongue.

1.8.2 Inertia Reel Locking Effect, Checking

Inertia reel has two locking functions.

- First locking function is initiated by belt being jerked out of reel (belt extraction acceleration).

Checking

– Pull belt out of inertia reel with sudden jerk.

- No locking effect - replace seat belt complete with lock.
- If difficulties are experienced when pulling belt out or reeling belt in, first check whether inertia reel is in the correct position.

- Second locking function is initiated by change in vehicle movement sequence (vehicle-dependent locking function).

Check

– Put seat belt on.

– Accelerate vehicle to 20 km/h and then carry out emergency braking with foot brake.

- If during braking procedure belt is not locked by locking mechanism, seat belt complete with belt lock must be replaced.

Caution

For safety reasons, road test should be carried out on traffic-free stretch to ensure that other motorists/pedestrians are not endangered.

1.8.3 Belt Lock, Visual Check

– Check belt lock for cracks and fracturing.

- If damage is determined, replace seat belt complete with belt lock.

1.8.4 Belt Lock, Functional Check

Checking locking mechanism:

– Push lock tongue into belt lock until it engages audibly. Check whether locking mechanism is properly engaged by giving belt firm pull.

- If belt tongue fails only once to engage properly in belt lock during minimum of 5 tests, seat belt must be replaced complete with belt lock.

Checking release mechanism:

– Release seat belt by depressing button on belt lock with finger pressure. When belt is slack, lock tongue must spring out of belt lock on its own.

- Carry out minimum of 5 tests. If belt tongue fails only once to spring out of lock, seat belt must be replaced complete with belt lock.

Caution

Under no circumstances whatsoever may lubricant be used to eliminate noise or stiffness at belt lock buttons.

Note it states a minimum of 5 times!

FIAT CHRYSLER AUTOMOTIVE
SEAT BELT INSPECTIONS

FIAT CHRYSLER AUTOMOTIVE SEAT BELT INSPECTIONS

2020 Dodge Ram 1500

2020 Dodge or Ram Truck RAM 1500 Truck 4WD V8-5.7L

Community Create Quote

Post Collision Seat Belt Inspection

Vehicle › Restraints and Safety Systems › Seat Belt Systems › Testing and Inspection › Initial Inspection and Diagnostic Overview › Post Collision Seat Belt Inspection

POST COLLISION SEAT BELT INSPECTION

POST COLLISION SEAT BELT INSPECTION

Following any collision inspect the seat belts for proper function and operation prior to returning the vehicle to the customer.

If the collision event was severe enough to activate any of the Supplemental Restraint System (SRS) components refer to to determine if there are any mandatory replacement of seat belt components.

NOTE: The following inspections, where applicable, are for the driver and all passenger positions, including the Lower Anchors and Tethers for Children (LATCH) restraint systems.

- Inspect the seat belt, for fraying, cuts, fading and torn or loose stitching. If any of these condition exist replace the seat belt.
- Inspect all of the seat belt buckles for proper latching and releasing operation. If it does not function properly, replace the seat belt buckle.
- Inspect the seat belt retractor by slowly extending the seat belt fully. It should extend smoothly without binding or locking. If it does not function properly, replace the seat belt.
- Inspect the seat belt retractor by latching the seat belt and then pulling the belt quickly. The seat belt should lock. If it does not function properly, replace the seat belt.
- Inspect the seat belt shoulder turning loop to be certain it rotates freely without binding. If it does not travel freely, replace the seat belt.
- Inspect the seat belt turning loop height adjuster. It should move freely and lock firmly into the different height positions. If it does not function properly, replace the seat belt turning loop height adjuster.

NOTE: If any of the seat belt components have physical damage or are doubtful of proper operation, replace the component.

RELATED INFORMATION

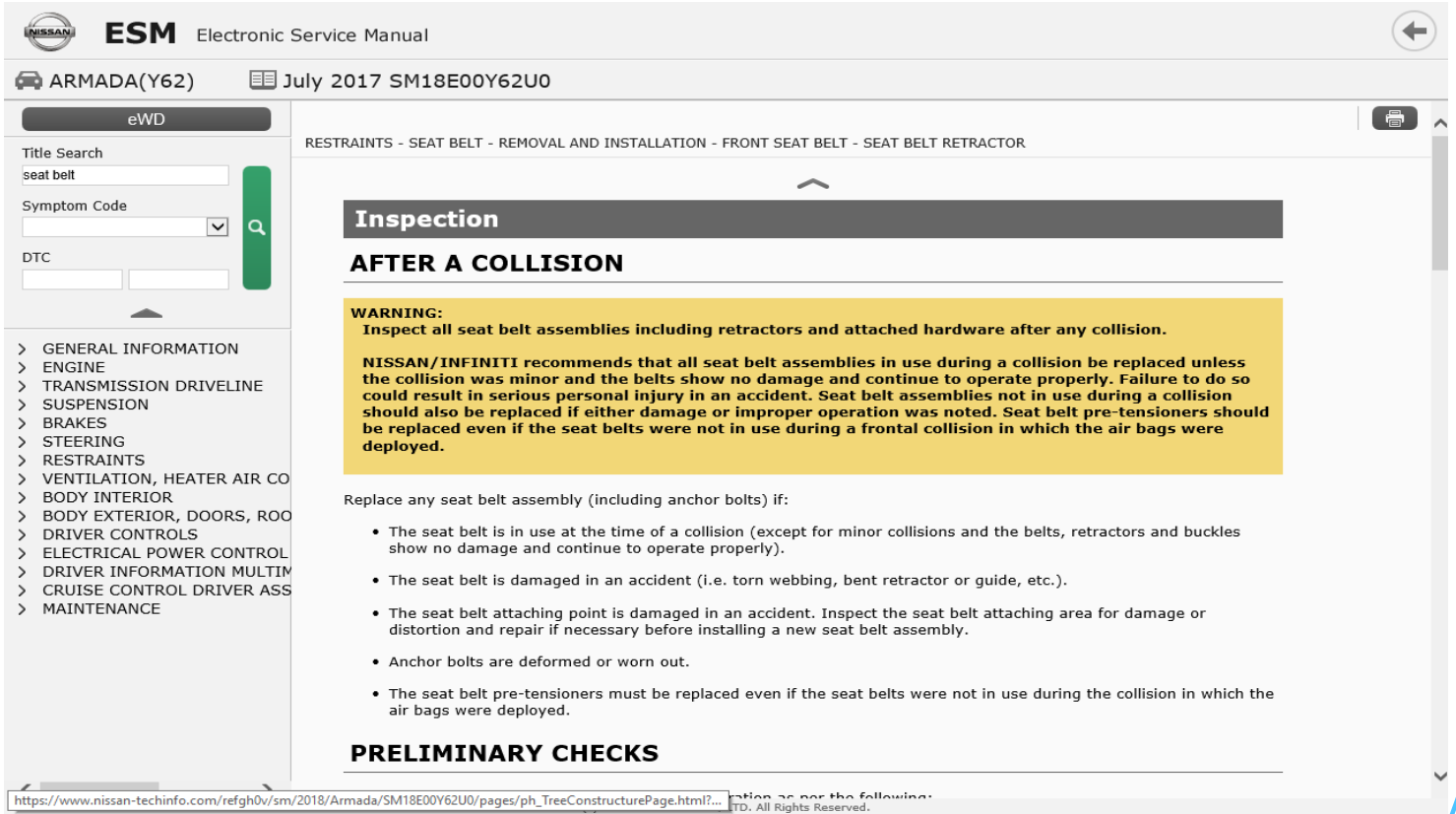
Technical Service Bulletins
All New Technical Service Bulletins
All Technical Service Bulletins
Recalls and Campaigns

Testing and Inspection
Initial Inspection and Diagnostic Overview

NISSAN/INFINITI
SEAT BELT INSPECTIONS

NISSAN/INFINITI SEAT BELT INSPECTIONS

2017 Nissan Armada - TechInfo



PORSCHE
SEAT BELT INSPECTIONS

PORSCHE SEAT BELT INSPECTION

WM 691201 Checking Seat Belts

WM 691201 Checking seat belts

Caution

→ After any accident, the seat belt system must be checked systematically for proper function and damage. If damage is found according to the test points, the entire s belt system must be replaced.

Test points

- → *Checking belt strap*
- → *Checking automatic belt device (locking effect)*
- → *Visual inspection of belt buckle*
- → *Function test of belt buckle*
- → *Checking sash guides*
- → *Checking mounting elements and mounting points*

Information

- *In the case of damage which does not occur as the result of an accident, e.g. wear, only the damaged part needs to be replaced.*

Checking belt strap

- Pull out the belt strap on the automatic belt device fully.
- Check the belt strap for soiling; clean, if necessary, with mild soap suds. When drying, avoid direct sunshine.

STEERING COLUMN

AUDI
STEERING COLUMN

STEERING COLUMN

Audi

- ❑ Quantity: 2
- ❑ Follow the assembly sequence when installing. Refer to ⇒ page 368 .

11 - Bolt

- ❑ 20 Nm
- ❑ Quantity: 2
- ❑ Follow the assembly sequence when installing. Refer to ⇒ page 368 .

12 - Steering Column

- ❑ There are different versions. For the correct allocation. Refer to the Parts Catalog.
- ❑ Calibrate after replacing the steering column on a vehicle with dynamic steering. Refer to ⇒ "3.3 Dynamic Steering Basic Setting", page 334 .
- ❑ Removing and installing. Refer to ⇒ "2.4 Steering Column, Removing and Installing", page 364 .
- ❑ Check for damage. Refer to ⇒ "2.2 Steering Column, Checking for Damage", page 362 .

13 - Bolt

- ❑ For attaching the pedal assembly
- ❑ Tightening specification. Refer to ⇒ Brake System; Rep. Gr. 46 .

14 - Bolt

- ❑ 20 Nm
- ❑ Quantity: 2
- ❑ Follow the assembly sequence when installing. Refer to ⇒ page 368 .

15 - Bolt

- ❑ 30 Nm
- ❑ Always replace if removed
- ❑ The threaded hole for the bolt must always be cleaned (for example, using a thread tap).

16 - Nut

- ❑ 3 Nm

2.2 Steering Column, Checking for Damage

Visual Check

– Check whether steering column parts show signs of damage.

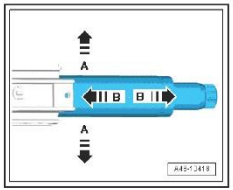
Functional Check

– Check whether steering column can be turned without catching or difficulty of movement.

– Check whether steering column can be easily adjusted laterally and vertically.

– Check if the tube clearly moves in direction of -arrow A- or direction of -arrow B-.

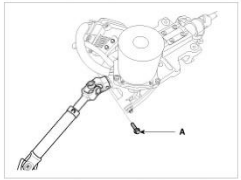
– If this is the case, the steering column must be replaced.



HYUNDAI
STEERING COLUMN

STEERING COLUMN

Hyundai



2. Reassembly is the reverse of the disassembly.

NOTICE

- Lock the steering wheel in the straight ahead position to prevent the damage of the clock spring inner cable when you handle the steering wheel.
- Do not reuse the bolt.

Inspection

1. Check the steering column for damage and deformation.
2. Check the joint bearing for damage and wear.
3. Check the tilt bracket for damage and cracks.
4. Check the key lock assembly for proper operation and replace it if necessary.

Diagnosis with GDS

ASP Calibration

– Steering-angle sensor detects the steering angle and steering angle speed. Steering angle and steering angle speed are used for steering wheel damping and return controls in addition to providing assistance torque.

NOTICE

- You can use a scan tool to(GDS) check if the battery voltage is proper before perform the "ASP Calibration".
- Make sure that no connector engaged to the vehicle or scan tool is disconnected during the "ASP Calibration".
- Once the "ASP Calibration" is complete, turn off the IG switch and wait for 10 seconds or more before starting the engine to check the operation.

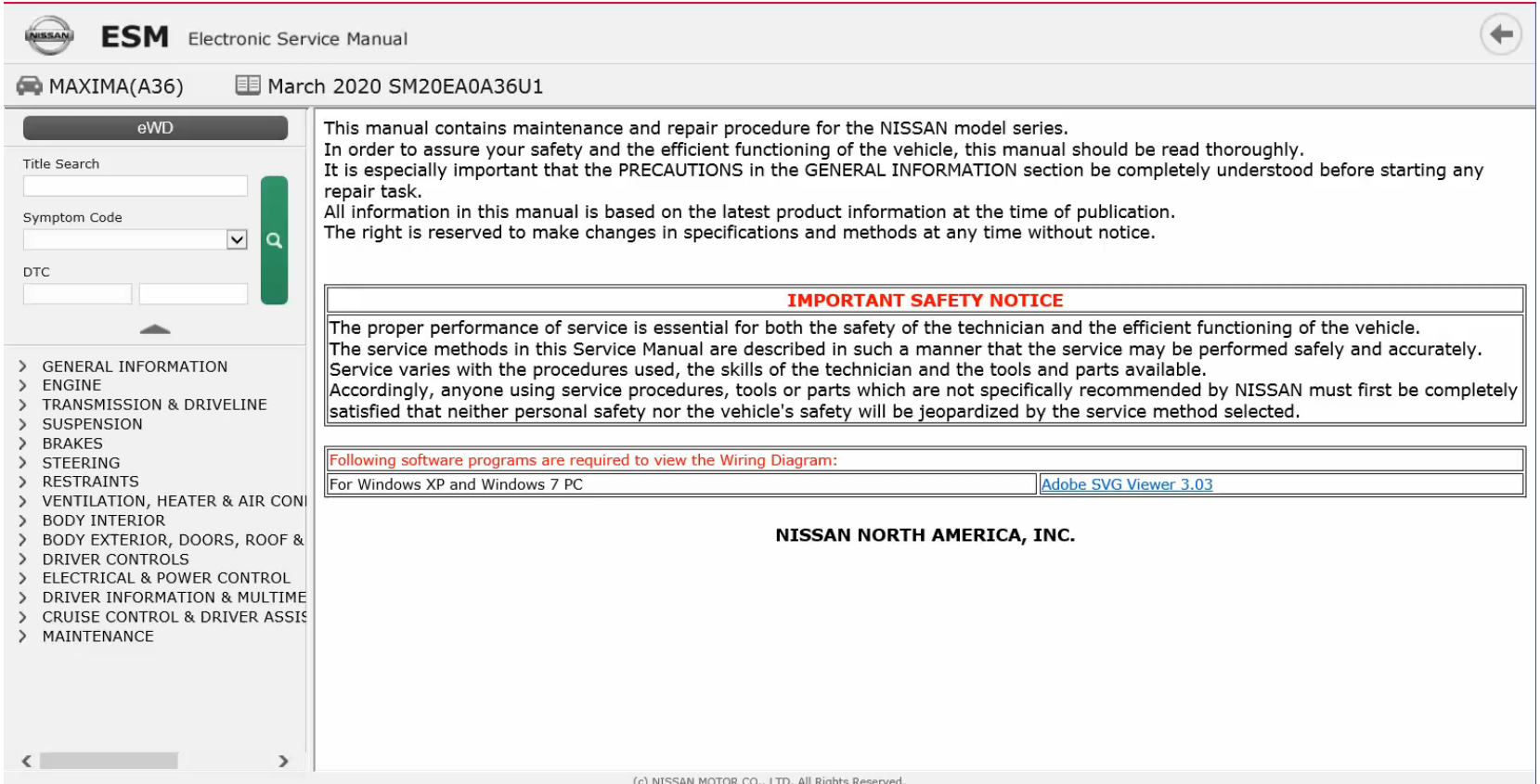
ASP Calibration procedures

1. Connect self-diagnosis connector(16pins) located in the lower of driver side crash pad to self-diagnosis device.
2. Turn the self-diagnosis device after key is ON.
3. Turn the steering wheel to straight ahead position.
4. After Selecting the "vehicle model" and "system", select the "ASP Calibration" on GDS vehicle selection screen.

NISSAN/INFINITI
STEERING COLUMN INSPECTION

NISSAN/INFINITI STEERING COLUMN INSPECTION

2020 Nissan Maxima



SUBARU
STEERING COLUMN INSPECTION

SUBARU

2020 Subaru Outback

2020 Subaru Outback F4-2.4L Turbo

AIRBAG SYSTEM - INSPECTION AND REPLACEMENT AFTER A COLLISION - REPLACEMENT

REPLACEMENT

Caution:

Replace the following parts if the airbag system has been activated.

1. WHEN THE FRONT OF THE VEHICLE COLLIDES

1. Replace the following part with new one if any airbag module or seat belt pretensioner has been activated.
   - Airbag control module
   - Driver's airbag module
   - Knee airbag module (driver's seat only)
   - Passenger's airbag module (if deployed)
   - Seat cushion airbag module (passenger's seat only)
   - Side airbag module (right and left / if deployed)
   - Curtain airbag module (right and left / if deployed)
   - Passenger's side seat cushion and frame assembly (occupant detection sensor)
   - Front seat belt pretensioner & adaptive force limiter (right and left)
   - Lap seat belt pretensioner (driver's seat only)
   - Locking tongue (front seat belt) (right and left)
   - Rear seat belt pretensioner (right and left outer side)
   - Locking tongue (rear seat belt) (right and left outer side)
   - Front impact sensor (LH and RH)
   - Instrument panel assembly (if passenger's airbag module deployed)
   - Steering wheel assembly
   - Column assembly steering
   - Steering roll connector
   - Harnesses on body side that are linked to the replaced parts
2. Visually inspect that the following items are not damaged by the impact resulting from the collision, and replace any damaged part with a new one.
   - Side impact sensor (center pillar)
   - Cover front seat backrest
   - Seat pad assembly backrest
   - Seat frame assembly backrest
   - Seat frame assembly cushion
   - Seat position sensor (front seat) (right and left)
   - Universal joint
   - Steering gearbox
   - Beam COMPL steering
   - Passenger's seat occupant detection system (Perform the inspection following the diagnostic procedure in the "AIRBAG (DIAGNOSTICS)" section.) Ref. to AIRBAG(DIAGNOSTICS)>Basic Diagnostic Procedure>PROCEDURE.
   - Harnesses and connectors on body side that are linked to the replaced parts
3. Visually inspect the following items if the airbag system has not been activated after a frontal collision.

SUBARU – STEERING COLUMN INSPECTION

2020 Subaru Outback

2020 Subaru Outback F4-2.4L Turbo

Steering Column - Inspection

Vehicle > Steering and Suspension > Steering > Steering Column > Testing and Inspection > Component Tests and General Diagnostics > Steering Column - Inspection

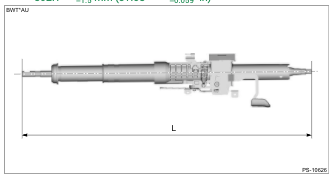
STEERING COLUMN - INSPECTION

INSPECTION

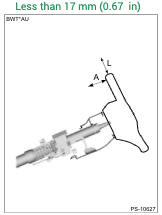
1. UNIT INSPECTION

Check the following items, and if there is anything out of standard value, it is considered to be damaged. If so, replace it with a new part.

- Measure the whole length of the column assembly steering.
  - Standard: Overall length L
  - Tilt and telescopic column (measure while minimized)
    - $802.1^{+1.5}_{-1.5}$ mm ($31.58^{+0.059}_{-0.059}$ in)



- Check the steering wheel deflection in axial and vertical directions.
  - Specification:
  - Axial deflection A (deflection of steering wheel)
    - Less than 6 mm (0.24 in)
  - Vertical deflection L (runout of steering wheel)
    - Less than 17 mm (0.67 in)



2. INSPECTION OF AIRBAG SYSTEM

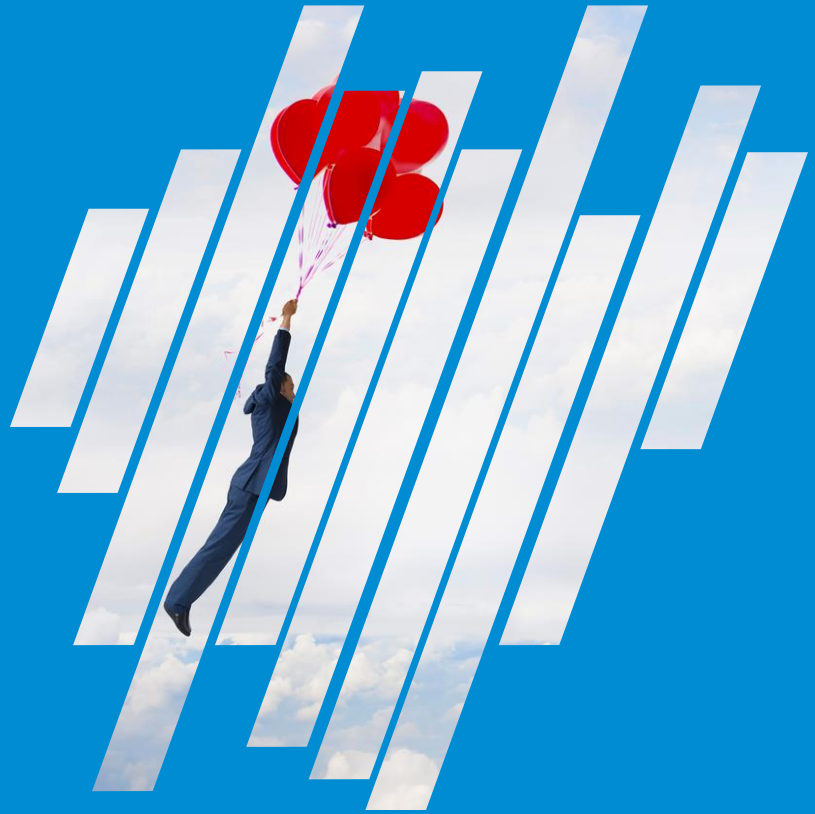
Refer to "AIRBAG SYSTEM" section for airbag inspection procedure. Ref. to AIRBAG SYSTEM>Driver's Airbag Module>INSTALLATION.

SAFETY INSPECTIONS

Subaru Steering Column Data Case Study

- # of steering columns measured : 43
- # of steering columns replaced : 11
  (26% of those measured)

FINAL THOUGHTS



FINAL THOUGHTS

Save Your OEM Repair Documentation

- Save the OEM repair procedures documents in the customer file
- **WHY?**
  - These procedures change frequently
  - Save in case you ever need to justify that you repaired the vehicle properly to the OEM repair guidelines **AT THE TIME OF THE REPAIR**

Things CHANGE!

FINAL THOUGHTS

If You Can't Find What You're Looking For

- Always exhaust your search of the Service Manual
- Reach out to OEM dealer
- Use the Feedback button or feedback form
- Certified Collision Centers:
  - Usually email to technical services team
  - Contact the third-party OEM auditing company (Verifacts, Summit Consulting, etc.)
  - Sometimes there is a hotline (Nissan Intaller Repair Hotline Identifix)
- Submit a question to "Ask I-CAR"

QUESTION & ANSWERS

THANK YOU FOR WATCHING

Don’t forget to tell your ideas about this presentation and share it with us!

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