Abnormal Noise From the AWD Dynamic Torque Vectoring Disconnect System

Service Category Drivetrain

Section Axle/Differential **Market** USA

Toyota Supports ASE Certification

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2019 - 2020	RAV4	VDS(s): J1RFV, N1RFV

SUPERSESSION NOTICE

- **The information contained in this bulletin supersedes Service Bulletin No. T-SB-0067-20.**
- **The Introduction, Warranty Information, Parts Information, and Required Tools & Equipment sections have been updated.**
- **The Production Change Information and Repair Procedure sections have been updated.**
- **The Calibration Information, Confirmation Procedures, Noise Confirmation Procedure, Transfer Assembly Replacement Procedure, Rear Differential Carrier Assembly Replacement Procedure, and 4WD ECU Reflash Procedure sections have been added.**

Service Bulletin No. T-SB-0067-20 is obsolete and any printed versions should be discarded.

Abnormal Noise From the AWD Dynamic Torque Vectoring Disconnect System

Introduction

Some 2019 – 2020 model year RAV4 Adventure and Limited grade AWD vehicles may exhibit an abnormal noise from the vehicle's AWD Dynamic Torque Vectoring Disconnect system from either the transfer assembly or rear differential carrier assembly when accelerating from a stop and/or on deceleration after driving the vehicle for 15 minutes or more. This condition occurs with "Normal" drive mode selected during disconnect/connect timing of the AWD system.

Follow the procedures in this bulletin to address these conditions.

NOTE

This Service Bulletin ONLY applies to 2019 – 2020 model year RAV4 Adventure and Limited grade vehicles with torque vectoring AWD Dynamic Torque Vectoring Disconnect system.

Production Change Information

Front Transfer Assembly Production Change Information

This bulletin applies to vehicles produced **BEFORE** the Production Change Effective VINs shown below.

Table 1. Front Transfer Assembly Production Change Information

MODEL	PLANT	DRIVETRAIN	PRODUCTION CHANGE EFFECTIVE VIN
RAV4	TMMC - C	AWD	2T3N1RFV#KC053454
			2T3J1RFV#KC053454
	TMMC - W		2T3N1RFV#LW087451
			2T3J1RFV#LW087451
	Takaoka		JTMN1RFV#KJ023026
	Shokki #1		JTMN1RFV#KD041318
	Shokki #2		JTMN1RFV#KD522367

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Production Change Information (continued)

Rear Differential Carrier Assembly Production Change Information

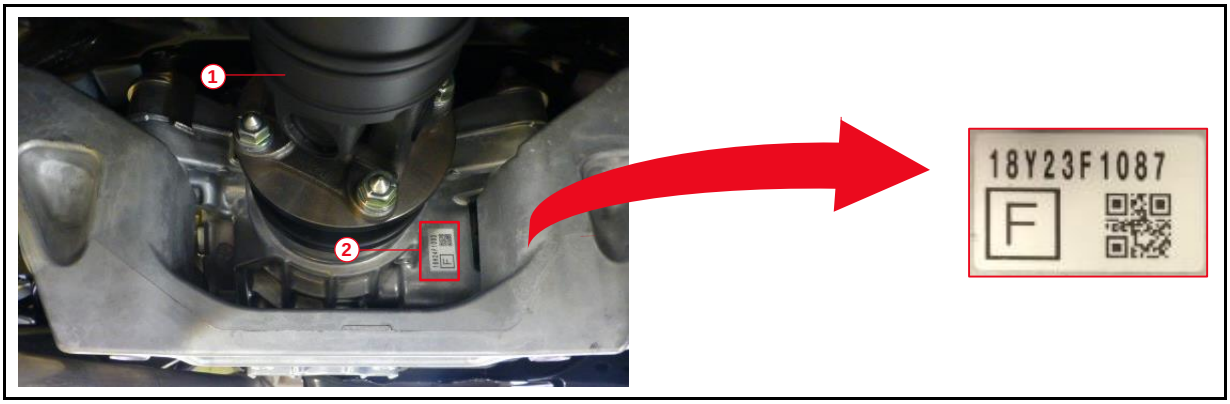
This bulletin applies to vehicles produced **BEFORE** the Production Change Effective serial number shown below.

Table 2. Rear Differential Carrier Assembly Production Change Information

MODEL	PLANT	DRIVETRAIN	PRODUCTION CHANGE EFFECTIVE SERIAL NUMBER
RAV4	TMMC - C	AWD	20E15F1013
	TMMC - W		
	Takaoka		
	Shokki #1		
	Shokki #2		

1. Locate the rear differential carrier assembly serial number, as shown in the figure below.

Figure 1. Rear Differential Carrier Assembly Differential Front View



1	**Propeller Shaft**
2	**Rear Differential Carrier Assembly Serial Number**

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Production Change Information (continued)

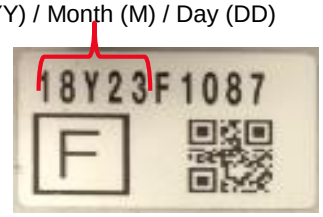
Rear Differential Carrier Assembly Production Change Information (continued)

2. Use the figure below as a guide to determine the production date from the serial number.

Figure 2. Rear Differential Carrier Assembly Serial Number Breakdown

Example:18Y23F1087 → Produced November 23, 2018

Year (YY) / Month (M) / Day (DD)



Production Month

- A: Jan
- B: Feb
- C: Mar
- D: Apr
- E: May
- F: Jun
- G: Jul
- H: Aug
- I: Sep
- X: Oct
- Y: Nov
- Z: Dec

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
TC1906	R & R Differential Carrier Assembly for Torque Vectoring Differential	5.0	41110-#####*	91	19
Combo A (Differential)	Reprogram 4WD ECU	0.5			
TC1907	R & R Front Transfer Case Assembly for Torque Vectoring with Air Conditioning	6.4	36100-#####*		
Combo A (Transfer Assembly)	Reprogram 4WD ECU	0.5			

*Warranty claim MUST be submitted with the correct 10-digit OFP. Choose the correct OFP for the vehicle being repaired by searching for the parts in the Electronic Parts Catalog using the VIN filter.

APPLICABLE WARRANTY

- **This repair is covered under the Toyota Powertrain Warranty. This warranty is in effect for 60 months or 60,000 miles, whichever occurs first, from the vehicle's in-service date.**
- **Warranty application is limited to occurrence of the specified condition described in this bulletin.**

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Parts Information

For Rear Differential Carrier Assembly Replacement

PART NUMBER		PART NAME	QTY
PREVIOUS	NEW		
41110-42050 41110-42051 41110-42052	41110-42053	Carrier Assy, Differential	1
90119-12453		Bolt, W/Washer*	2
90119-12455			2
90119-14186			1
90105-14210		Bolt, Flange*	3
90179-A0005		Nut*	2
08885-02606		LX GL-5 75W-85 Gear Oil (LX85 LSD Type)	1
12157-10010		Gasket, Drain Plug	1
00451-00001-LBL		Authorized Modifications Labels	1
89630-42130 89630-42140 89630-42160	89630-42161	Computer Assy, 4WD	–

*Nonreusable part.

NOTE

- The 4WD ECU should NOT be replaced as part of the Repair Procedure.
- Authorized Modifications Labels may be ordered in packages of 25 from the Materials Distribution Center (MDC) through *Dealer Daily – Parts – Dealer Support Materials Orders*.

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Parts Information (continued)

For Transfer Assembly Replacement

PART NUMBER		PART NAME	QTY
PREVIOUS	NEW		
36100-42170 36100-42171	36100-42172	Transfer Assy	1
00289-ATFWS		Automatic Transmission Fluid WS	4
08885-02606		Front Transfer Case Gear Oil (LX85 LSD Type)	1
00451-00001-LBL		Authorized Modifications Labels	1
12157-10010		Gasket, Drain Plug	1
89630-42130 89630-42140 89630-42160	89630-42161	Computer Assy, 4WD	–

NOTE

- The 4WD ECU should NOT be replaced as part of the Repair Procedure.
- Authorized Modifications Labels may be ordered in packages of 25 from the Materials Distribution Center (MDC) through *Dealer Daily – Parts – Dealer Support Materials Orders*.

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Required Tools & Equipment

REQUIRED TOOLS & MATERIAL	PART NUMBER	QUANTITY
Body Grease W	08887-02007	1
MP (Multi-purpose) Grease	–	As Needed

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream ADVI*	ADE	TSADVUNIT	1
Techstream 2.0		TS2UNIT	
Techstream Lite		TSLITEPDLR01	
Techstream Lite (Green Cable)		TSLP2DLR01	
ChassisEAR™ (or Equivalent)		JSP06608	1

*Essential SST.

NOTE

- Only ONE of the Techstream units listed above is required.
- Software version 16.30.011 or later is required.
- A mechanic's stethoscope or similar tool may be used in place of ChassisEAR™.
- ChassisEAR™ and Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Battery Diagnostic Tool*	DCA-8000P T	1

*Essential SST.

NOTE

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

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Calibration Information

GRADE	ECU	CALIBRATION ID	
		PREVIOUS	NEW
Adventure	4WD	F15364209200 F15364210000 F15364212000	F15364212100
Limited			

Procedures

Abnormal Noise From the AWD Dynamic Torque Vectoring Disconnect System

Noise Confirmation Procedure

1. Does the vehicle exhibit one of the following abnormal noises from the AWD Dynamic Torque Vectoring Disconnect system from either the transfer assembly or rear differential carrier assembly accelerating from a stop during AWD system disconnect timing or upon deceleration during AWD system connect timing?
   - Buzz/Groan
   - Single, Double, or Triple Clunk
   - Ratchet/Grinding
   - Bang/Thump

   NOTE
   - Use ChassisEAR™ to confirm the noise is coming from either the transfer assembly or the rear differential carrier assembly.
   - Monitor the 4WD ECU Data List “Front and rear axle coupling position sensor status” to confirm the noise is occurring at AWD system disconnect and/or connect timing.

   HINT

   On 2019 and some 2020 model year RAV4 vehicles, while driving above 20 mph, the system can be manually switched back and forth from disconnect to connect by switching drive mode from Normal to Sport.

   - **YES —** Continue to step 2.
   - **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

2. Does the vehicle have a production date BEFORE September 17, 2019?
   - **YES —** Go to step 4.
   - **NO —** Continue to step 3.

3. Confirm the location of the noise in the vehicle.
   A. Is the noise exhibited from the transfer assembly?
      - **YES —** Go to step 7.
      - **NO —** Continue to substep B.

   B. Is the noise exhibited from the rear differential carrier assembly?
      - **YES —** Go to the Rear Differential Carrier Assembly Replacement Procedure.
      - **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

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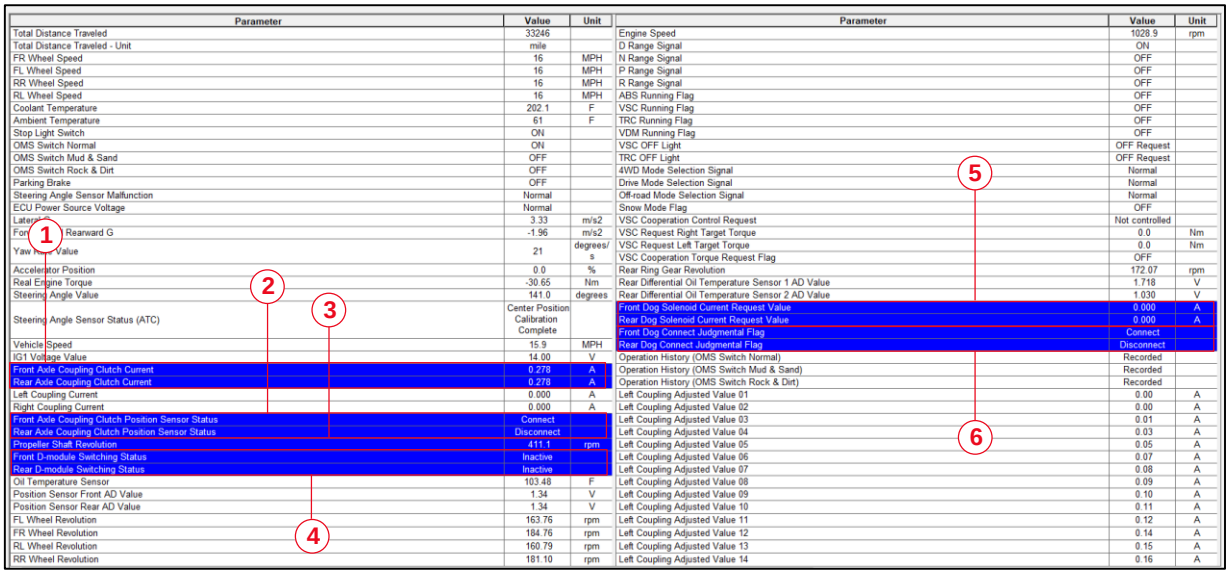
Noise Confirmation Procedure (continued)

4. Use Techstream to review the vehicle's 4WD data list and confirm 4WD connect/disconnect timing.
   A. Connect the vehicle to Techstream and navigate to *Techstream – 4WD ECU – Data List*.
   B. While driving the vehicle with Techstream still connected, review the highlighted items shown below.

CAUTION

Recommend using an assistant to drive the vehicle while observing these items in Techstream.

Figure 3. 4WD ECU Data List (Overview)



Parameter	Value	Unit
Total Distance Traveled	33246	
Total Distance Traveled - Unit	mile	
FR Wheel Speed	16	MPH
FL Wheel Speed	16	MPH
RR Wheel Speed	16	MPH
RL Wheel Speed	16	MPH
Coolant Temperature	202.1	F
Ambient Temperature	61	F
Stop Light Switch	ON	
OMS Switch Normal	ON	
OMS Switch Mud & Sand	OFF	
OMS Switch Rock & Dirt	OFF	
Parking Brake	OFF	
Steering Angle Sensor Malfunction	Normal	
ECU Power Source Voltage	Normal	
Lateral G	3.33	m/s2
Forward Rearward G	-1.96	m/s2
Yaw Rate Value	21	degrees/s
Accelerator Position	0.0	%
Real Engine Torque	-30.65	Nm
Steering Angle Value	141.0	degrees
Steering Angle Sensor Status (ATC)	Center Position Calibration Complete	
Vehicle Speed	15.9	MPH
IG1 Voltage Value	14.00	V
Front Axle Coupling Clutch Current	0.278	A
Rear Axle Coupling Clutch Current	0.278	A
Left Coupling Current	0.000	A
Right Coupling Current	0.000	A
Front Axle Coupling Clutch Position Sensor Status	Connect	
Rear Axle Coupling Clutch Position Sensor Status	Disconnect	
Propeller Shaft Revolution	411.1	rpm
Front D-module Switching Status	Inactive	
Rear D-module Switching Status	Inactive	
Oil Temperature Sensor	103.48	F
Position Sensor Front AD Value	1.34	V
Position Sensor Rear AD Value	1.34	V
FL Wheel Revolution	163.76	rpm
FR Wheel Revolution	184.76	rpm
RL Wheel Revolution	160.79	rpm
RR Wheel Revolution	181.10	rpm

Parameter	Value	Unit
Engine Speed	1028.9	rpm
D Range Signal	ON	
N Range Signal	OFF	
P Range Signal	OFF	
R Range Signal	OFF	
ABS Running Flag	OFF	
VSC Running Flag	OFF	
TRC Running Flag	OFF	
VDM Running Flag	OFF	
VSC OFF Light	OFF Request	
TRC OFF Light	OFF Request	
4WD Mode Selection Signal	Normal	
Drive Mode Selection Signal	Normal	
Off-road Mode Selection Signal	Normal	
Snow Mode Flag	OFF	
VSC Cooperation Control Request	Not controlled	
VSC Request Right Target Torque	0.0	Nm
VSC Request Left Target Torque	0.0	Nm
VSC Cooperation Torque Request Flag	OFF	
Rear Ring Gear Revolution	172.07	rpm
Rear Differential Oil Temperature Sensor 1 AD Value	1.718	V
Rear Differential Oil Temperature Sensor 2 AD Value	1.030	V
Front Dog Solenoid Current Request Value	0.000	A
Rear Dog Solenoid Current Request Value	0.000	A
Front Dog Connect Judgmental Flag	Connect	
Rear Dog Connect Judgmental Flag	Disconnect	
Operation History (OMS Switch Normal)	Recorded	
Operation History (OMS Switch Mud & Sand)	Recorded	
Operation History (OMS Switch Rock & Dirt)	Recorded	
Left Coupling Adjusted Value 01	0.00	A
Left Coupling Adjusted Value 02	0.00	A
Left Coupling Adjusted Value 03	0.01	A
Left Coupling Adjusted Value 04	0.03	A
Left Coupling Adjusted Value 05	0.05	A
Left Coupling Adjusted Value 06	0.07	A
Left Coupling Adjusted Value 07	0.08	A
Left Coupling Adjusted Value 08	0.09	A
Left Coupling Adjusted Value 09	0.10	A
Left Coupling Adjusted Value 10	0.11	A
Left Coupling Adjusted Value 11	0.12	A
Left Coupling Adjusted Value 12	0.14	A
Left Coupling Adjusted Value 13	0.15	A
Left Coupling Adjusted Value 14	0.16	A

1	**Front/Rear Axle Coupling Clutch Current**
2	**Front/Rear Axle Coupling Clutch Position Sensor Status**
3	**Propeller Shaft Revolution**

4	**Front/Rear D-module Switching Status**
5	**Front/Rear Dog Solenoid Current Request Value**
6	**Front/Rear Dog Connect Judgement Flag**

NOTE

The miss match condition can occur as both Connect/Disconnect or Disconnect/Connect.

5. Referring to Figure 3 do any of the noise conditions listed in step 1 exist during connect/disconnect timing between the front and rear electromagnetic clutch at ANY speed?
   - **YES —** Continue to step 6.
   - **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

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Noise Confirmation Procedure (continued)

6. Determine the repair direction by identifying the cause component using the list of possible scenarios shown in the table below.

Table 3. Failure Mode

SCENARIO	FAILED PART	PART GENERATING ABNORMAL NOISE	IDENTIFICATION OF FAILED PART		RECOMMENDED PART REPLACEMENT
			DESCRIPTION OF CONDITION	DATA LIST SCENARIO (TO CONFIRM, USE TECHSTREAM 4WD DATA LIST AS SEEN IN FIGURE 1)	

Front Electromagnetic Clutch (EMC) Insufficient Torque	Transfer Assembly	Rear Differential Carrier Assembly	Ratchet/ Griding	• Front Axle Coupling Clutch Current About 6 amps Just Before Abnormal Noise Occurs:
				  • Front Axle Coupling Clutch Position Sensor Status: Disconnect
				  • Rear Axle Coupling Clutch Position Sensor Status: Connect
					Replace the Transfer Assembly

				• Front Axle Coupling Clutch Current About 6 amps Just Before Abnormal Noise Occurs:
				  • Front Axle Coupling Clutch Position Sensor Status: Connect
				  • Rear Axle Coupling Clutch Position Sensor Status: Disconnect	

		Transfer Assembly	Bang/ Thump	• Front Axle Coupling Clutch Current About 6 amps Just Before Abnormal Noise Occurs	

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Noise Confirmation Procedure (continued)

Table 3. Failure Mode (continued)

SCENARIO	FAILED PART	PART GENERATING ABNORMAL NOISE	IDENTIFICATION OF FAILED PART		RECOMMENDED PART REPLACEMENT
			DESCRIPTION OF CONDITION	DATA LIST SCENARIO (TO CONFIRM, USE TECHSTREAM 4WD DATA LIST AS SEEN IN FIGURE 1)	

Rear EMC Insufficient Torque	Rear Differential Carrier Assembly	Transfer Assembly	Bang/ Thump or Ratchet/ Grinding	• Rear Axle Coupling Clutch Current: About 6 amps and Propeller Shaft Rotation Speed is Zero or Small Just Before Abnormal Noise Occurs:
				  • Front Axle Coupling Clutch Position Sensor Status: Disconnect
				  • Rear Axle Coupling Clutch Position Sensor Status: Connect
					Replace the Rear Differential Carrier Assembly

		Rear Differential Carrier Assembly	Bang/ Thump	• Rear Axle Coupling Clutch Current: About 6 amps Just Before Abnormal Noise Occurs	
Front EMC Negative Gradient	Transfer Assembly (EMC)	Transfer Assembly	Buzz/ Groan	• Abnormal Noise Occurs When Front EMC Current ON • No Switching Error DTC set • Front Abnormal Noise	Refer to T-SB-0065-21
Rear EMC Negative Gradient	Rear Differential Carrier Assembly			• Abnormal Noise Occurs When Rear EMC Current ON • No Switching Error DTC set • Rear Abnormal Noise	Replace the Rear Differential Carrier Assembly
Rear EMC Large Torque Gradient			Single, Double, or Triple Clunk	• Abnormal Noise Occurs When Rear EMC current ON or Propeller Shaft Rotation Speed is Increasing • No Switching Error DTC set • Rear Abnormal Noise	

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Noise Confirmation Procedure (continued)

Table 3. Failure Mode (continued)

SCENARIO	FAILED PART	PART GENERATING ABNORMAL NOISE	IDENTIFICATION OF FAILED PART		RECOMMENDED PART REPLACEMENT
			DESCRIPTION OF CONDITION	DATA LIST SCENARIO (TO CONFIRM, USE TECHSTREAM 4WD DATA LIST AS SEEN IN FIGURE 1)	

Transfer Piston Foreign Matter Biting	Transfer Assembly	Rear Differential Carrier Assembly	Bang/ Thump	• Front Position Sensor Status: “Disconnect” Just Before Abnormal Noise Occurs:
				  • Front Axle Coupling Clutch Position Sensor Status: Disconnect
				  • Rear Axle Coupling Clutch Position Sensor Status: Connect
					Replace the Transfer Assembly

A. Did the condition meet the criteria for one of scenarios described above in Table 3?
- **YES —** Continue to substep B.
- **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

B. Replace the recommended part based on the repair recommendation.
- **Transfer Assembly —** Go to the Transfer Assembly Replacement Procedure.
- **Rear Differential Carrier Assembly —** Go to the Rear Differential Carrier Assembly Replacement Procedure.

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Noise Confirmation Procedure (continued)

7. Does the vehicle exhibit an abnormal noise from the transfer assembly during one or both of the following conditions as described in step 1?

NOTE
- Use ChassisEAR™ to confirm the noise is coming from the transfer assembly.
- Monitor the 4WD ECU Data List "Front and rear axle coupling position sensor status" to confirm the noise is occurring at AWD system disconnect and/or connect timing.

CAUTION

Recommend using an assistant to drive the vehicle while observing these items in Techstream.

- While driving when accelerating from a stop during AWD system disconnect timing.
- While driving on deceleration during AWD system connect timing.

HINT

On 2019 and some 2020 model year RAV4 vehicles, while driving above 20 mph, the system can be manually switched back and forth from disconnect to connect by switching drive mode from Normal to Sport.

- **YES —** Continue to step 8.
- **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

8. Does the vehicle exhibit an abnormal buzz/groan noise from the transfer assembly when accelerating from a stop and/or on deceleration after driving the vehicle for 15 minutes or more?

   Refer to the buzz/groan noise example video link:

   Buzz/Groan Noise Example Video

- **YES —** Refer to T-SB-0065-21.
- **NO —** Continue to the Transfer Assembly Replacement Procedure.

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Transfer Assembly Replacement Procedure

1. Remove the transfer assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 / 2020 RAV4:
     Drivetrain – Transfer/4WD/AWD – "GF2A (Transfer / 4WD / AWD): Transfer Assembly: Removal"

2. Install the NEW transfer assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 – 2020 RAV4:
     Drivetrain – Transfer/4WD/AWD – "GF2A (Transfer / 4WD / AWD): Transfer Assembly: Installation"

3. Go to the 4WD ECU Reflash Procedure.

Rear Differential Carrier Assembly Replacement Procedure

1. Confirm the rear differential carrier assembly production date is BEFORE May 15, 2020.
   Does the differential serial number show a production date BEFORE the effective serial number in the Production Change Information section?
   - **YES —** Continue to step 2.
   - **NO —** This bulletin does NOT apply. Continue diagnosis using the applicable Repair Manual.

2. Remove the rear differential carrier assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 RAV4:
     Drivetrain – Axle/Differential – "Axle and Differential: Rear Differential Carrier Assembly (for Torque Vectoring Differential): Removal"
   - 2020 RAV4:
     Drivetrain – Axle/Differential – "Axle and Differential: Rear Differential Carrier Assembly (for Torque Vectoring Differential): Removal"

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Rear Differential Carrier Assembly Replacement Procedure (continued)

3. Disassemble the rear differential carrier assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 – 2020 RAV4:
     Drivetrain – Axle/Differential – "Axle and Differential: Rear Differential Carrier Assembly (for Torque Vectoring Differential): Disassembly"

   > NOTE
   > ONLY steps 1 – 4 and 12 – 13.

4. Reuse the side couplers/harness and brackets from the original equipment removed.

5. Reassemble the rear differential carrier assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 – 2020 RAV4:
     Drivetrain – Axle/Differential – "Axle and Differential: Rear Differential Carrier Assembly (for Torque Vectoring Differential): Reassembly"

   > NOTE
   > ONLY steps 17 – 18 and 25 – 28.

6. Reinstall the rear differential carrier assembly.
   Refer to TIS, applicable model and model year Repair Manual:
   - 2019 – 2020 RAV4:
     Drivetrain – Axle/Differential – "Axle and Differential: Rear Differential Carrier Assembly (for Torque Vectoring Differential): Installation"

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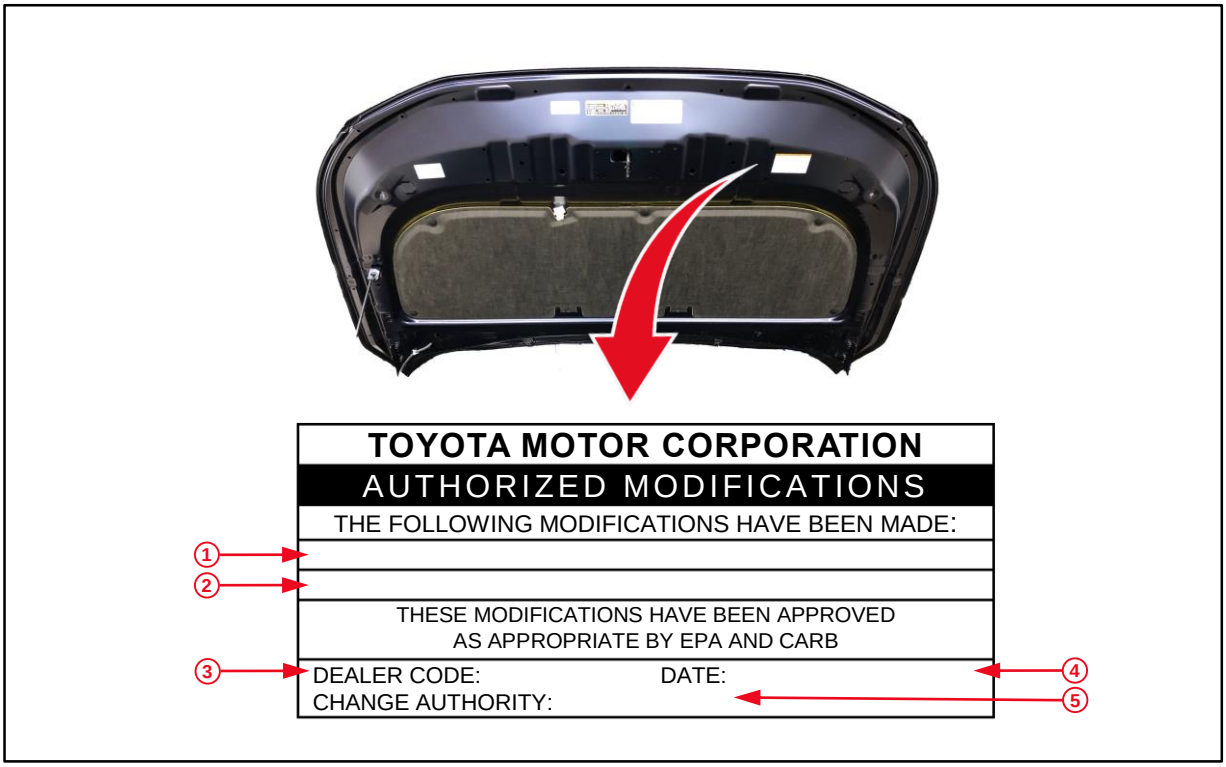
4WD ECU Reflash Procedure

1. Use Techstream to confirm if the 4WD ECU calibration has been updated and check for the Authorized Modifications Label affixed to the vehicle in the location shown below.

   Is the calibration ID listed in Techstream and on the label the latest 4WD ECU calibration?

   - **YES —** Go to step 4.
   - **NO —** Continue to step 2.

Figure 4. Location of Authorized Modifications Label on 2019 – 2020 RAV4



1	**Replacement ECM (PCM) Part Number (e.g., 89630-42161)**
2	**New Calibration ID (e.g., F15364212000)**
3	**Dealer Code**

4	**Date Completed**
5	**This SB Number**

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4WD ECU Reflash Procedure (continued)

2. Flash reprogram the 4WD ECU.

   NOTE
   - The battery diagnostic tool MUST be used in Power Supply Mode to maintain battery voltage at 13.5V while flash reprogramming the vehicle.
   - For details on how to use the battery diagnostic station, refer to the *DCA-8000 Instruction Manual* located at *TIS – Diagnostics – Tools & Equipment – Battery Diagnostics.*

   Follow the procedures outlined in T-SB-0134-16, *Techstream ECU Flash Reprogramming Procedure*, and flash the 4WD ECU with the NEW calibration file update.

3. Prepare and install the Authorized Modifications Label.
   A. Using a permanent marker, enter the following information on the label:
      - 4WD ECU part number [Refer to the **Parts Information** section for the **NEW PART NUMBER**]
      - Calibration ID(s) [Refer to the ***Calibration Information*** section for the ***NEW CALIBRATION ID****]*
      - Dealer Code
      - Repair Date
      - Change Authority [***This bulletin number***]

   B. Install the Authorized Modifications Label onto the vehicle at the location shown in Figure 4. The Authorized Modifications Label is available through the MDC, P/N 00451-00001-LBL.

4. Using Techstream, check for and clear ANY DTCs.

5. Test-drive the vehicle and confirm the condition no longer exists.