

Technical Service Bulletin



27 48V Vehicle electrical system warning, DTC P0CA700 and/or U046900 stored in the starter/generator control module/ECM

27 23 49 2058831/6 March 23, 2023. Supersedes Technical Service Bulletin Group 27 number 22-45 dated September 27, 2022, for reasons listed below.

Model(s)	Year	VIN Range	Vehicle-Specific Equipment
A6, A7, A8, and Q7	2018 – 2023	All	48 V Electrical System
S6, S7, S8, R8, and R8 Spyder	2018 2020 – 2023		
RS 7	2018 2021 – 2023		
Q8	2019 – 2023		
A6 allroad, SQ7, SQ8, and RS Q8	2020 - 2023		
A8 e quattro	2020 – 2021		
A7 e quattro	2021 – 2022		
RS 7	2021 – 2023		
R8 GT	2023		

Condition

REVISION HISTORY		
Revision	Date	Purpose
6	-	Revised header (updated PR number filter) Revised Condition (updated customer statement) Revised Service (updated diagnosis and service procedure) Revised Warranty (updated claim types and labor operations)
5	09/27/2022	Revised header (Added MY 22 & 23) Revised <i>Condition</i> (Added Symptom Code) Revised <i>Warranty</i> (Updated Damage Codes)
4	03/02/2022	Revised <i>Warranty</i> (Updated Labor Operation)

Customer states:

- The message "Electrical system: fault. See owner's manual" is displayed on the instrument cluster.



- A yellow or red battery warning symbol is displayed on the instrument cluster.

Workshop findings:

One or more of the following DTC(s) may be stored:

Battery management 2 (Battery 48V) control module, J1120 (address word 0021):

- **DTC P0CA700:** *Hybrid battery discharge current too high.*

ECM, J623 (address word 0001), or Gateway, J533 (address word 0019):

DTC U046900: *Invalid data received from starter/generator control module (Symptom 36564).*

Technical Background

The Belt Starter Generator (BSG), together with the vehicle's 48V system is an intelligent vehicle system that provides electrical power to the vehicle as needed. Therefore, traditional diagnosis methods, like expecting the alternator to output at full voltage any time the vehicle is running, are no longer viable, as the output power of the BSG is regulated according to the current requirements of the vehicle.

For further in depth information, please refer to TSB 2067906: *27 48V Reference: diagnosis and system information.*

Criterion 1:

A software related issue may cause the belt starter generator (BSG) to stop working as intended.

Criterion 2:

A hardware related issue may cause the belt starter generator (BSG) to stop working as intended.

Production Solution

Criterion 1:

An optimized software has been implemented in current production vehicles.

Criterion 2:

Not Applicable.

Service

Check the extended ambient conditions for DTC U046900 *Control unit for starter-alternator, implausible signal* that is stored in the engine control module, J623 (address word 0001), or the Gateway, J533 (address word 0019).

Criterion 1:

If the value displayed for *Starter generator, actual mode 48V* is not shown, or a value other than 5 is displayed (see Figure 1) please check the software version of the BSG (address word 00CC).

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If the software is older than, but not including SW 0527, please update the BSG via the SVM update instructions at the end of this TSB, then follow up with the checks listed under Criterion 2.

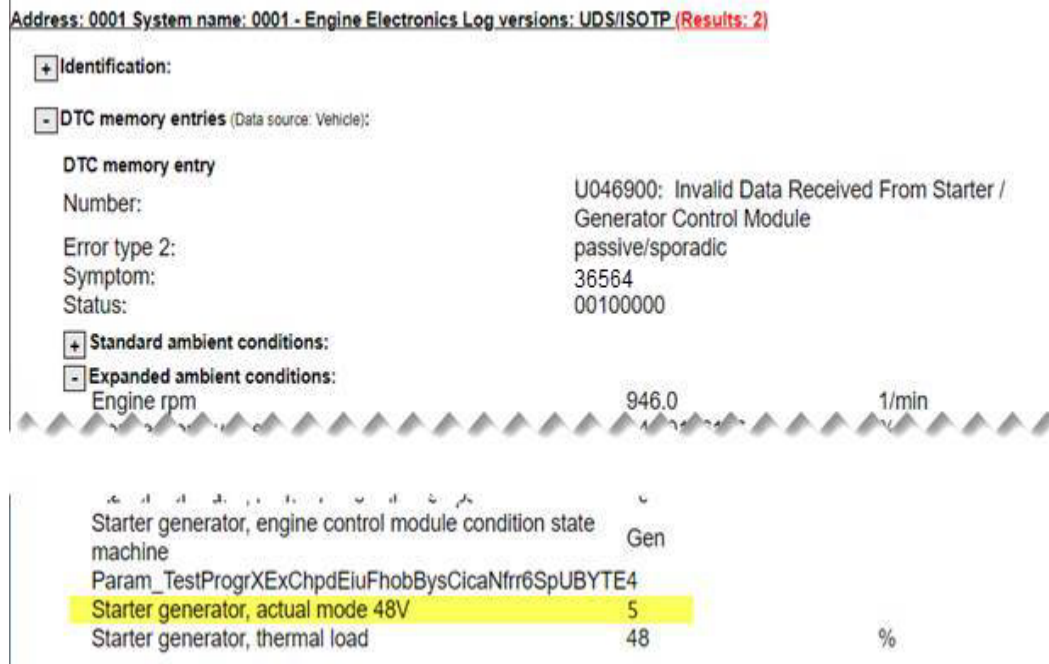


Figure 1: Extended ambient data in ODIS GFF log.

Criterion 2:

If the value displayed for *Starter generator, actual mode 48V* is 5, or otherwise, if the software of the BSG already is at SW 0527 or was updated under Criterion 1, perform the following diagnostic steps to determine if the belt starter generator is the root cause of the customer complaint:

1. Select OBD in ODIS, then select 00CC - Starter Generator >> Measurement Values.
2. Select the following measurement values for display:
 - [IDE12494]_ Voltages
 - [IDE12495]_ Torques
 - [VO]_operation_mode
3. Disconnect the battery charger from the vehicle, start the engine. The vehicle should idle in park.
4. Determine if the measurement values are within their specified tolerances:

[IDE12494]_ Voltages

Voltage of terminal 87

Values between 11.6V and 15V are normal – If the voltage is below 11.6V, please recharge or replace the 12V battery as required by the appropriate test plan.



Voltage of terminal 40

Values between 40V and 50V are normal – If the voltage is between 0V and 12V, please check the 48V battery.

[IDE12495]_Torques

- The *specified torque* indicates if the BSG is supposed to provide electrical power to the vehicle or not. The engine control module determines if and how much torque the BSG is supposed to generate.
- The *starter-alternator torque* indicates if the BSG is actually producing electrical power when the engine control module requires it to do so. If the BSG is working correctly, both torque levels should be similar (**within 5 Nm of each other**).

! NOTICE

If both torque values are 0, attempt to force the vehicle into providing electrical power from the BSG by turning the steering wheel several times to both end stops and back. You can also activate auxiliary system, like the HVAC blower to high, rear window heating, seat heaters to increase the electrical load on the vehicle.

[VO]_operation_mode

current status of the BSG

When assessing the BSG, refer to the following table

Specified torque (in Nm)	Starter-alternator torque (in Nm)	Operation_mode_actual	Recommendation
0	0	Standby	No charging demand = do not replace <u>belt-driven starter-alternator</u>
-6.5	-1	<u>TorqueControlled</u>	<u>Belt-driven starter-alternator</u> does not charge and needs to be replaced
-9.5	0	Inverter fault	<u>Belt-driven starter-alternator</u> does not charge and needs to be replaced
-9.5	-9.5	<u>TorqueControlled</u>	<u>Belt-driven starter-alternator</u> charging = do not replace

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			belt-driven starter-alternator
-3	-1	<u>TorqueControlled</u>	Belt-driven starter-alternator charging = do not replace belt-driven starter-alternator

If this TSB shows the BSG to work within specifications, further vehicle diagnostics is required to determine the root cause of the customer complaint. This however is outside of the scope of this TSB.

SVM Update Instructions

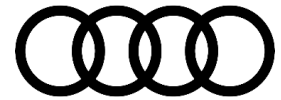
1. Follow all instructions in TSB 2011732: *00 Software Version management (SVM), operating instructions*.
2. Update the starter/generator control module, C23 (address word 00CC) using the SVM action code as listed in the table below, if necessary:

Model	Old Hardware Part Number	Old Hardware Version (or lower)	Old Software Part Number	Old Software Version	New Software Version (or higher)	SVM Code Input
A6, A7, Q7, and Q8	4N0903028 (H, J, M, and N)	H17	4N0903028 (F, G, H, J, M, and N)	523	527	CCA001

Warranty

Claim Type:	<ul style="list-style-type: none"> • 110 up to 48 Months/50,000 Miles. • G10 for CPO Covered Vehicles – Verify Owner. • 1-GW for vehicles that fall under the Starter-Alternator Limited Warranty Extension. 		
Service Number:	2726		
Damage Code:	Software Update: 0039 – if no part is replaced and only the update is required		
	Replace starter-alternator: 0040		
Labor Operations:	Software Update (Includes checking for DTCs) Only if update required	0151 0000	Time stated on the diagnostic protocol (Max 100 TU)

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	Check starter-alternator	2726 0199	10 TU
	Replace starter-alternator (if required according to this TSB)	2726 XXXX	See SRT with associated operations
Diagnostic Time:	GFF – (If no software update was performed)	0150 0000	Time stated on the diagnostic protocol (Max 100 TU)
	Road test prior to the service procedure	No allowance	0 TU
	Road test after the service procedure	No allowance	0 TU
Claim Comment:	As per TSB 2058831/6		

All warranty claims submitted for payment must be in accordance with the *Audi Warranty Policies and Procedures Manual*. Claims are subject to review or audit by Audi Warranty.

Additional Information

The following Technical Service Bulletin(s) will be necessary to complete this procedure:

- TSB 2011732: *00 Software Version Management (SVM), operating instructions.*
- TSB 2067906: *27 48V Reference: diagnosis and system information*

All part and service references provided in this TSB (**2058831**) are subject to change and/or removal. Always check with your Parts Department and/or ETKA for the latest information and parts bulletins. Please check the Repair Manual for fasteners, bolts, nuts, and screws that require replacement during the repair.

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