Project: MSS54

Module: driver diagnostic relay lambda sensor heater

Version: 1.0

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x. General

The driver diagnosis of the lambda sensor heating relay runs on the master.

x.1 I/O status setting

The LSH relay is controlled via the function **lsh_write** (unsigned char dummy, unsigned char period, unsigned char duty cycle). This function is called by the DS2 software and runs at DS2 task level.

Since the output cannot be configured as PWM, the period duration is not taken into account.

The duty cycle has a value range of 0% or 100%, where 0% means "off" and 100% means "on".

The following return values can be returned:

00:	Actuator is controlled properly
01:	control not provided
02:	actuator cannot be controlled

This function is not executed for **B_NL** and not for **B_KLA .**

By setting bit 7 in **ed_lsh,** the LSH relay is prevented from being controlled by the function software.

The function **lsh_write_undo** checks whether the DS2 control should be terminated. If **B_DIAG** is no longer fulfilled, the control is terminated. **lsh_write_undo** is called in the background task.

x.2 ELU driver diagnostics

The SLP driver HIP81 from Harris can diagnose the following errors:

- open load = interruption
- Short circuit to UB
- Short circuit to ground
- Overtemperature

The driver status is read out synchronously with the angle (every 720 °CA) and "averaged" over 100 msec. In the background task, the driver status is checked for errors and the error evaluation routine is called.

This routine is called ed_report(unsigned char error, unsigned char errortype).

The routine enters the error into the error memory after a certain error frequency.

The transfer parameter for the error is:

129:	**LSH_FEHLER**	LSH relay driver error

The transfer parameters for the error type to **ed_report** are the following values:

0x00:	no mistake
0x01:	short to battery
0x02:	short to ground
0x04:	open load
0x08:	overtemperature

When evaluating the driver status, a distinction is made as to whether the LSH relay is activated or whether it is switched off.
When the LSH relay is switched off, the error types "short to ground", "open load" and "overtemperature" can be evaluated.
When the LSH relay is activated, the error types "short to battery" and "overtemperature" can be evaluated.

The driver status is only evaluated if

- **B_ML** or **B_MS** -	and
(ub > **K_ED_UBMIN)** -	and
the electric fan is not controlled via DS2 - new driver status information is available	and

The driver status is in the variable **ed_lsh.**

Mistake	**impact**	**measure**
open load	LSH relay cannot be controlled Error memory entry become	
short circuit +	LSH relay cannot be controlled Error memory entry become	
short circuit -	LSH relay is constantly activated Error memory entry and cannot be turned off	
overtemperatur	Driver switches off automatically and can neither be switched on nor off	error log entry

x.3 variables

ed_lsh Status byte diagnosis LSH relay

Bit 0: open load
Bit 1: short to ground
Bit 2: short to battery
Bit 3: (implausible value)
Bit 4: -
Bit 5: Error counter greater than 0
Bit 6: Error entered in the error memory **(B_LSH_FEHLER)**
Bit 7: Control by DS2