ADVANCED VEHICLE TECHNOLOGIES, Inc.

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CAN Mode Error & Status Registers

Advanced Vehicle Technologies interface units model numbers: AVT-512, AVT-717, and AVT-718 support a single channel of CAN (Controller Area Network) protocol operations.

This document provides detailed information about the error report: $23 $24 $xx $yy that may be issued by those interface units, during operations, while in CAN mode.

Reference Documents.

Available from Intel (in PDF format) is the Intel document 82527 Serial Communications Controller Architectural Overview. (File name: 27241003.PDF)

We highly recommend you obtain that document and refer to it.

The Intel 82527 document contains valuable information on the operation of a CAN network, details on the use of the 82527 CAN Controller device, as well as details on the global masks and setting up and using the different message objects.

Source

Most information presented in this document is excerpted from the Intel document 82527 Serial Communications Controller Architectural Overview pages 10 and 11. Direct quotations from the Intel document are contained in "quotation" marks.

Additional or complementary information is also presented.

Numbers

Numbers in this document that are preceded by a dollar ($) sign are hexadecimal digits.

Error Message

When an AVT interface unit is operating in CAN mode there are times that the error message: $23 $24 $xx $yy may be received. In the AVT Master Commands and Responses document, this message is defined as: CAN: Error and status registers follow.

Descriptions and definitions of the $xx and $yy bytes in that message are presented here.

Error Byte (firmware versions up to and including 5.2)

The $xx byte is generated by the AVT interface unit. This byte is a bit map of the following error conditions. This table is for firmware versions up to and including version 5.2.

Bit	Description
0	SIE (Status Change Interrupt)
1	IntPnd (Interrupt Pending) doesn't match the interrupt register.
2	RXIE (Receive Interrupt) or TXIE (Transmit Interrupt) source does not match the IntPnd.
3	Auto respond object mode error. (Processing the auto respond object.)
4	Auto respond object mode error. (Processing 7x 25 command.)
5	Short form transmit failure time out.
6	reserved, always returns 0.
7	reserved, always returns 0.

Error Byte (firmware versions 5.3 and above)

The $xx byte is generated by the AVT interface unit. This byte is a bit map of the following error conditions. This table is for firmware versions 5.3 and above.

Bit	Description
0	SIE (Status Change Interrupt)
1	Auto respond object mode error (in AR processing routines).
2	RXIE (Receive Interrupt) or TXIE (Transmit Interrupt) source does not match the IntPnd.
3	No receive buffer space available, objects 1 to $0E.
4	Message lost bit set, objects 1 to $0E.
5	Short form transmit failure time out.
6	No receive buffer space available, object $0F.
7	Message lost bit set, object $0F.

<u>Status Byte</u>

The $yy byte is a copy of the "Status Register" as read from the Intel 82527 CAN Controller device (Intel 10).

Bit	Description
0	LEC0
1	LEC1
2	LEC2
3	TXOK
4	RXOK
5	Wake
6	Warn
7	BOff

A detailed description of each bit or field is presented here.

BOff Bus Off Status

0: "The 82527 is not busoff."

1: "There is an abnormal rate of occurrences of errors on the CAN bus. (...) an error counter in the 82527 has reached the limit of 256. This results in the 82527 going busoff. During busoff, no messages can be received or transmitted."

The only way to recover from this condition is to reset the CAN controller device. This can be accomplished through the $21 $06 command to reset the CAN controller; the $F1 $A5 command to reset the interface unit, or by cycling power on the interface unit.

Warn Warning Status

0: "There is no abnormal occurrence of errors."

1: "There is an abnormal rate of occurrences of errors on the CAN bus. (...) an error counter in the 82527 has reached the limit of 96."

Wake Wake Up Status

0: The device has not been awakened.

1: The device has been awakened by bus activity after being commanded to sleep.

RXOK Receive Message Successfully

0: "(...) no message has been successfully received."

1: "(...) a message has been successfully received."

<u>TXOK Transmit Message Successfully</u>

0:    "(...) no message has been successfully transmitted."

1:    "(...) a message has been successfully transmitted (error free and acknowledged by at least one other node.)"

<u>LEC 2..0 Last Error Code</u>

"This field contains a code which indicates the type of the first error to occur in a frame on the CAN bus. If a message is without error the field will be cleared to 0. The code 7 is unused (...)."

0:    "No error."

1:    "Stuff Error. More than 5 equal bits in a sequence have occurred in a part of a received message where this is not allowed."

2:    "Form Error. The fixed format part of a received frame has the wrong format."

3:    "Acknowledgment Error. The message transmitted by this device was not acknowledged by another node."

4:    "Bit 1 Error. During transmission of a message (with the exception of the arbitration field), the 82527 wanted to send a recessive level (bit of logical value 1), but the monitored CAN bus value was dominant."

5:    "Bit 0 Error. During the transmission of a message (with the exception of the arbitration field), the 82527 wanted to send a dominant level (bit of logical value 0), but he monitored CAN bus value was recessive. During busoff recovery, this status bit is set each time a recessive bit is received (indicating the CAN bus is not stuck dominant)."

6:    "CRC Error. The CRC checksum was incorrect in the message received. The CRC received for an incoming message does not match with the CRC value calculated by this device for the received data."

7:    "Unused"

Works Cited

Intel. <u>82527 Serial Communications Controller Architectural Overview</u> *Automotive*.
        Mt. Prospect, IL: Intel Corp., February 1995. Order number: 272410-002.

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