

TO: T10 Membership
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SUBJECT: T10/03-054r0, ADC Logging of Automation Faults

General

Frequently drive vendors will receive a reportedly bad drive with no indication as to the operation that the automation was attempting when the fault occurred. Without this context, stored or separately transmitted traces can be difficult to interpret. If the automation could write into the drive some sort of operation code plus an identifier for which cartridge (if any) was being used, then this information could be retrieved for later failure analysis.

An open issue is whether this information should be readable via the SSC device server. If so, then this might make retrieval using existing applications easier.

Discussion

The information needed seems to be of three types:

- Operation attempted
- Media identification
- Time of fault

I think that this information would be best written and read as log parameters. The page code could either be 0Fh (Application Client log page) or a new one. While the library controller does implement an application client, it might make drive implementation easier if we avoided using 0Fh since some may already be providing that for the use of SSC application clients. So, I suggest that we use one of the page codes in Table 174 of SPC-3 rev. 10 that are reserved to a specific device type.

To represent the failed operation, we could either assign specific codes for generic operations with a range of vendor specific values, or just let the entire range of values be vendor specific. If we define some values, then we should use the same values that we define for the proposed recovery actions instructions. I propose that we assign some of the values. I think that one byte will provide sufficient values.

The next question is how many medium identifiers of what format to use. Candidates include the MEDIUM SERIAL NUMBER (32 ASCII bytes) and NUMERIC MEDIUM SERIAL NUMBER (unspecified type and length) attributes from the READ / WRITE ATTRIBUTE commands, as well as a bar code label, probably an ASCII string. My one customer request for this is an eight-byte null-terminated ASCII string, which they'd use for a bar code. As drive NVRAM space can be very limited, this proposal starts small, i.e., an eight-byte identifier. Mapping longer identifiers to eight bytes is an open question.

We could implicitly represent the identifier type by defining a different parameter for each type, but this probably wouldn't save any NVRAM space.

Suggested Changes to ADC

Add the following to the Log Parameters clause:

x.x.x Automation Fault log page

The Automation Fault log page (see Table 1) is used by the automation to save in the ADC device server information about a fault. The information can be retrieved from the tape drive for use in failure analysis.

Table 1 – Automation fault log page

Bit Byte	7	6	5	4	3	2	1	0
0	PAGE CODE (tbd)							
1	Reserved							
2	(MSB) PAGE LENGTH (n-3) (LSB)							
3								
	Automation fault log parameters							
4	First automation fault log parameter							
	.							
	.							
n	Last automation fault log parameter							

The PAGE CODE and PAGE LENGTH fields are described in SPC-3.

Table 2 defines the parameter codes.

Table 2 – Automation fault parameter codes

Parameter code	Description
0000h	Automation fault operation code parameter data
0001h	Automation fault media identification parameter data
0002h	Automation fault time parameter data
00003h – FFFFh	Vendor specific

Table 3 shows the automation fault operation code log parameter, which describes the faulted operation..

Table 3 – Automation fault operation code log parameter data

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB) PARAMETER CODE (0000h) (LSB)							
1								
2	DU	DS	TSD	ETC	TMC	LBIN	LP	
3	PARAMETER LENGTH (01h)							
4	OPERATION CODE							

Table 4 – Parameter control bits for operation code log parameter (0000h)

Bit	Value	Description
DU	1	Value provided by application client
DS	0	Device server supports saving of parameter
TSD	0	Device server manages saving of parameter
ETC	0	No threshold comparison is made on this value
TMC	XX	Ignored when ETC is 0
LBIN	1	The parameter is in binary format
LP	1	The parameter is a list parameter

The OPERATION CODE field describes the operation that the automation was attempting when the fault occurred. The operations are defined in Table 5.

Table 5 – Operation code values

Operation code	Description
0	
1	
2	
3	
4	
tbd – 127	Reserved
128– 255	Vendor specific

The automation fault media identifier log parameter describes the medium, if any, that was associated with the fault. It is shown in Table 6.

Table 6 – Automation fault media identification log parameter data (0001h)

Bit	7	6	5	4	3	2	1	0
Byte								
0	(MSB) PARAMETER CODE (0001h)							
1	(LSB)							
2	DU	DS	TSD	ETC	TMC	LBIN	LP	
3	PARAMETER LENGTH (09h)							
4	TYPE							
5	(MSB)							
	MEDIA IDENTIFIER							
12	(LSB)							

Table 7 – Parameter control bits for automation fault media identification log parameter (0001h)

Bit	Value	Description
DU	1	Value provided by application client
DS	0	Device server supports saving of parameter
TSD	0	Device server manages saving of parameter
ETC	0	No threshold comparison is made on this value
TMC	XX	Ignored when ETC is 0

LBIN	X	The parameter is in binary or text format
LP	1	The parameter is a list parameter

The TYPE field describes the source of the information in the MEDIA IDENTIFIER field. If no media is associated with the fault, then the TYPE field shall be zero and the information in the MEDIA IDENTIFIER field shall be undefined. The TYPE field is defined in Table 8.

Table 8 – Identifier type values

Parameter code	Description
0	Invalid
1	Bar code
2	MAM serial number
3	
4	
5	
tbd – 127	
128 – 255	Vendor specific

If the MEDIA IDENTIFIER field is a binary value, then the LBIN field shall be one; if it is a text string, then the LBIN field shall be zero. If the text string is less than eight bytes in length, then the rightmost (least significant) bytes shall be zero-filled.

The automation fault time log parameter describes the time at which the fault occurred. It is described in Table 9. All of the fields in the parameter contain binary values.

Table 9 – Automation fault time log parameter data (0002h)

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB) _____							
1	PARAMETER CODE (0002h) _____ (LSB)							
2	DU	DS	TSD	ETC	TMC		LBIN	LP
3	PARAMETER LENGTH (007h) _____							
4	(MSB) _____							
5	YEAR _____ (LSB)							
6	MONTH _____							
7	DATE _____							
8	HOUR _____							
9	MINUTE _____							
10	SECOND _____							

Table 10 – Parameter control bits for automation fault time log parameter (0002h)

Bit	Value	Description
DU	1	Value provided by application client
DS	0	Device server supports saving of parameter
TSD	0	Device server manages saving of parameter

ETC	0	No threshold comparison is made on this value
TMC	XX	Ignored when ETC is 0
LBIN	1	The parameter is in binary format
LP	1	The parameter is a list parameter

To Be Done

1. Request page code from CAP working group.
2. Assign operation code values.
3. Decide whether the media identifier field is long enough, and decide whether we should define how to map longer identifiers (e.g., use least-significant eight bytes).
4. Assign additional identifier type values, if any.
5. Decide whether we should also define a vendor-specific parameter that might be used instead of one or more of the parameters above?