8.12 ST[12] on-board monitoring

8.12.1 General

a. Each packet transporting an on-board monitoring message shall be of service type 12.

8.12.2 Requests and reports

8.12.2.1 TC[12,1] enable parameter monitoring definitions

a. Each telecommand packet transporting a request to enable parameter monitoring definitions shall be of message subtype 1.

NOTE For the corresponding system requirements, refer to clause 6.12.3.6.1.

b. For each telecommand packet transporting a request to enable parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-111.

repeated N times

N	PMON ID
unsigned integer	enumerated

Figure 8-111 Enable parameter monitoring definitions

8.12.2.2 TC[12,2] disable parameter monitoring definitions

a. Each telecommand packet transporting a request to disable parameter monitoring definitions shall be of message subtype 2.

NOTE For the corresponding system requirements, refer to clause 6.12.3.6.2.

b. For each telecommand packet transporting a request to disable parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-112.

repeated N times

N	PMON ID
unsigned integer	enumerated

Figure 8-112 Disable parameter monitoring definitions

8.12.2.3 TC[12,3] change the maximum transition reporting delay

a. Each telecommand packet transporting a request to change the maximum transition reporting delay shall be of message subtype 3.

NOTE For the corresponding system requirements, refer to clause 6.12.3.8.

b. For each telecommand packet transporting a request to change the maximum transition reporting delay, the application data field shall have the structure specified in Figure 8-113.

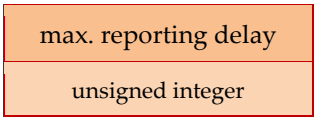

Figure 8-113 Change the maximum transition reporting delay

8.12.2.4 TC[12,4] delete all parameter monitoring definitions

a. Each telecommand packet transporting a request to delete all parameter monitoring definitions shall be of message subtype 4.

NOTE For the corresponding system requirements, refer to clause 6.12.3.9.2.

b. For each telecommand packet transporting a request to delete all parameter monitoring definitions, the application data field shall be omitted.

8.12.2.5 TC[12,5] add parameter monitoring definitions

a. Each telecommand packet transporting a request to add parameter monitoring definitions shall be of message subtype 5.

NOTE For the corresponding system requirements, refer to clause 6.12.3.9.1.

b. For each telecommand packet transporting a request to add parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-114.

repeated N times

N	PMON ID	monitored parameter ID	check validity condition			monitoring interval	repetition number	check type	check type dependent criteria (see below)
			validity parameter ID	mask	expected value				
unsigned integer	enumerated	enumerated	enumerated	bit-string (deduced size)	deduced	unsigned integer	unsigned integer	enumerated	
			optional			*optional*			

NOTE 1 For the check type enumerated values, refer to requirement 8.12.3.1a.
NOTE 2 In the check validity condition field, the size of the mask field and the format of the expected value field are specific to the validity parameter identified by its parameter ID field.
NOTE 3 The structure of the check type dependent criteria field is driven by requirement 8.12.2.5c for expected-value-checking, requirement 8.12.2.5e for limit-checking and requirement 8.12.2.5f for delta-checking.

Figure 8-114 Add parameter monitoring definitions

c. For expected-value-checking, the check type dependent criteria field of the add parameter monitoring definitions request shall have the structure specified in Figure 8-115.

mask	spare	expected value	event definition ID
bit-string (deduced size)	bit-string (of event definition ID field size)	deduced	enumerated
	optional		

NOTE 1 The size of the mask field and the structure and format of the expected value field are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-114).
NOTE 2 The spare field can be used for harmonising the size of all check types.
NOTE 3 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-115 Add parameter monitoring definitions: expected-value-checking definition fields

d. For expected-value-checking, the presence of the spare field in the expected-value-checking definition fields of the requests to add parameter monitoring definitions shall be declared when specifying the parameter monitoring subservice.

e. For limit-checking, the check type dependent criteria field of the add parameter monitoring definitions request shall have the structure specified in Figure 8-116.

low limit	event definition ID	high limit	event definition ID
deduced	enumerated	deduced	enumerated

NOTE 1 The structure and format of the low limit and the high limit fields are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-114).
NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-116 Add parameter monitoring definitions: limit-checking definition fields

f. For delta-checking, the check type dependent criteria field of the add parameter monitoring definitions request shall have the structure specified in Figure 8-117.

low delta threshold	event definition ID	high delta threshold	event definition ID	number of consecutive delta values
deduced	enumerated	deduced	enumerated	unsigned integer

NOTE 1 The structure and format of the low delta threshold and high delta threshold are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-114).

NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-117 Add parameter monitoring definitions: delta-checking definition fields

8.12.2.6 TC[12,6] delete parameter monitoring definitions

a. Each telecommand packet transporting a request to delete parameter monitoring definitions shall be of message subtype 6.

NOTE For the corresponding system requirements, refer to clause 6.12.3.9.3.

b. For each telecommand packet transporting a request to delete parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-118.

repeated N times

N	PMON ID
unsigned integer	enumerated

Figure 8-118 Delete parameter monitoring definitions

8.12.2.7 TC[12,7] modify parameter monitoring definitions

a. Each telecommand packet transporting a request to modify parameter monitoring definitions shall be of message subtype 7.

NOTE For the corresponding system requirements, refer to clause 6.12.3.9.4.

b. For each telecommand packet transporting a request to modify parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-119.

repeated N times

N	PMON ID	monitored parameter ID	repetition number	check type	check type dependent criteria (see below)
unsigned integer	enumerated	enumerated	unsigned integer	enumerated	

NOTE 1 For the check type enumerated values, refer to requirement 8.12.3.1a.
NOTE 2 The structure of the check type dependent criteria field is driven by requirement 8.12.2.7d for expected-value-checking, requirement 8.12.2.7f for limit-checking and requirement 8.12.2.7g for delta-checking.

Figure 8-119 Modify parameter monitoring definitions

c. The parameter monitoring subservice shall reject any instruction contained within a modify parameter monitoring definitions request if:

1. that instruction refers to a check type that is different from the original check type specified for that parameter monitoring definition.

NOTE This interface constraint completes requirement 6.12.3.9.4d.

d. For expected-value-checking, the check type dependent criteria field of the modify parameter monitoring definitions request shall have the structure specified in Figure 8-120.

mask	spare	expected value	event definition ID
bit-string (deduced size)	bit-string (of event definition ID field size)	deduced	enumerated

optional

NOTE 1 The size of the mask field and the structure and format of the expected value field are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-119).
NOTE 2 The spare field can be used for harmonising the size of all check types.
NOTE 3 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-120 Modify parameter monitoring definitions: expected-value-checking definition fields

e. For expected-value-checking, the presence of the spare field in the expected-value-checking definition fields of the requests to modify parameter monitoring definitions shall be declared when specifying the parameter monitoring subservice.

f. For limit-checking, the check type dependent criteria field of the modify parameter monitoring definitions request shall have the structure specified in Figure 8-121.

low limit	event definition ID	high limit	event definition ID
deduced	enumerated	deduced	enumerated

NOTE 1 The structure and format of the low limit and the high limit fields are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-119).
NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-121 Modify parameter monitoring definitions: limit-checking definition fields

NOTE 1 The structure and format of the low limit and the high limit fields are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-119).

NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

g. For delta-checking, the check type dependent criteria field of the modify parameter monitoring definitions request shall have the structure specified in Figure 8-122.

low delta threshold	event definition ID	high delta threshold	event definition ID	number of consecutive delta values
deduced	enumerated	deduced	enumerated	unsigned integer

NOTE 1 The structure and format of the low delta threshold and high delta threshold are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-119).
NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-122 Modify parameter monitoring definitions: limit-checking definition fields

8.12.2.8 TC[12,8] report parameter monitoring definitions

a. Each telecommand packet transporting a request to report parameter monitoring definitions shall be of message subtype 8.

NOTE For the corresponding system requirements, refer to clause 6.12.3.10.

b. For each telecommand packet transporting a request to report parameter monitoring definitions, the application data field shall have the structure specified in Figure 8-123.

repeated N times

N	PMON ID
unsigned integer	enumerated

Figure 8-123 Report parameter monitoring definitions

c. To report all parameter monitoring definitions, N shall be set to 0.

8.12.2.9 TM[12,9] parameter monitoring definition report

a. Each telemetry packet transporting a parameter monitoring definition report shall be of message subtype 9.

NOTE For the corresponding system requirements, refer to clause 6.12.3.10.

b. For each telemetry packet transporting a parameter monitoring definition report, the source data field shall have the structure specified in Figure 8-124.

repeated N times…

max. transition reporting delay	N	PMON ID	monitored parameter ID	check validity condition		
				validity parameter ID	mask	expected value
unsigned integer	unsigned integer	enumerated	enumerated	enumerated	bit-string (deduced size)	deduced
optional				*optional*		

… repeated N times

monitoring interval	PMON status	repetition number	check type	check type dependent criteria (see below)
unsigned integer	enumerated	unsigned integer	enumerated	

optional

NOTE For the check type enumerated values, refer to requirement 8.12.3.1a.

Figure 8-124 Parameter monitoring definition report

c. For expected-value-checking, the check type dependent criteria field of the parameter monitoring definition report shall have the structure specified in Figure 8-125.

mask	spare	expected value	event definition ID
bit-string (deduced size)	bit-string (of event definition ID field size)	deduced	enumerated
	optional		

NOTE 1 The size of the mask field and the structure and format of the expected value field are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-124).
NOTE 2 The spare field can be used for harmonising the size of all check types.
NOTE 3 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-125 Parameter monitoring definition report: expected-value-checking definition fields

d. For expected-value checking, the presence of the spare field in the expected-value-checking definition fields of the parameter monitoring definition reports shall be declared when specifying the parameter monitoring subservice.

e. For limit-checking, the check type dependent criteria field of the parameter monitoring definition report shall have the structure specified in Figure 8-126.

low limit	event definition ID	high limit	event definition ID
deduced	enumerated	deduced	enumerated

NOTE 1 The structure and format of the low limit and the high limit fields are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-124).
NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-126 Parameter monitoring definition report: limit-checking definition fields

f. For delta-checking, the check type dependent criteria field of the parameter monitoring definition report shall have the structure specified in Figure 8-127.

low delta threshold	event definition ID	high delta threshold	event definition ID	number of consecutive delta values
deduced	enumerated	deduced	enumerated	unsigned integer

NOTE 1 The structure and format of the low delta threshold and high delta threshold are derived from the monitored parameter identified by the monitored parameter ID field (refer to Figure 8-124).

NOTE 2 The value 0 for in the event definition ID field means "no event report to generate".

Figure 8-127 Selected parameter monitoring definition list: delta-checking definition fields

8.12.2.10 TC[12,10] report the out-of-limits

a. Each telecommand packet transporting a request to report the out-of-limits shall be of message subtype 10.

NOTE For the corresponding system requirements, refer to clause 6.12.3.12.

b. For each telecommand packet transporting a request to report the out-of-limits, the application data field shall be omitted.

8.12.2.11 TM[12,11] out-of-limits report

a. Each telemetry packet transporting an out-of-limits report shall be of message subtype 11.

NOTE For the corresponding system requirements, refer to clause 6.12.3.12.

b. For each telemetry packet transporting an out-of-limits report, the source data field shall have the structure specified in Figure 8-128.

repeated N times

N	PMON ID	monitored parameter ID	check type	expected value check mask	parameter value	limit crossed	previous PMON checking status	current PMON checking status	transition time
unsigned integer	enumerated	enumerated	enumerated	bit-string (deduced size)	deduced	deduced	enumerated	enumerated	absolute time

deduced presencce

NOTE 1 The expected value check mask field is only present when the check type is "expected-value-checking". The size of the field is specific to the monitored parameter identified by its parameter ID field.
NOTE 2 For the check type enumerated values, refer to requirement 8.12.3.1a
NOTE 3 The format of the parameter value field and limit crossed field is specific to the monitored parameter identified by its parameter ID field.
NOTE 4 For the PMON checking status enumerated values, refer to requirement 8.12.3.1b.

Figure 8-128 Out-of-limits report

8.12.2.12 TM[12,12] check transition report

a. Each telemetry packet transporting a check transition report shall be of message subtype 12.

NOTE For the corresponding system requirements, refer to clause 6.12.3.7.

b. For each telemetry packet transporting a check transition report, the source data field shall have the structure specified in Figure 8-129.

repeated N times

N	PMON ID	monitored parameter ID	check type	expected value check mask	parameter value	limit crossed	previous PMON checking status	current PMON checking status	transition time
unsigned integer	enumerated	enumerated	enumerated	bit-string (deduced size)	deduced	deduced	enumerated	enumerated	absolute time

deduced presence

NOTE 1 The expected value check mask field is only present when the check type is "expected-value-checking". The size of the field is specific to the monitored parameter identified by its parameter ID field.
NOTE 2 For the check type enumerated values, refer to requirement 8.12.3.1a
NOTE 3 The format of the parameter value field and limit crossed field is specific to the monitored parameter identified by its parameter ID field.
NOTE 4 For the PMON checking status enumerated values, refer to requirement 8.12.3.1b.

Figure 8-129 Check transition report

8.12.2.13 TC[12,13] report the status of each parameter monitoring definition

a. Each telecommand packet transporting a request to report the status of each parameter monitoring definition shall be of message subtype 13.

NOTE For the corresponding system requirements, refer to clause 6.12.3.11.

b. For each telecommand packet transporting a request to report the status of each parameter monitoring definition, the application data field shall be omitted.

8.12.2.14 TM[12,14] parameter monitoring definition status report

a. Each telemetry packet transporting a parameter monitoring definition status report shall be of message subtype 14.

NOTE For the corresponding system requirements, refer to clause 6.12.3.11.

b. For each telemetry packet transporting a parameter monitoring definition status report, the source data field shall have the structure specified in Figure 8-130.

repeated N times

N	PMON ID	PMON status
unsigned integer	enumerated	enumerated
NOTE For the PMON status enumerated values, refer to requirement 8.12.3.1c.		

Figure 8-130 Parameter monitoring definition status report

8.12.2.15 TC[12,15] enable the parameter monitoring function

a. Each telecommand packet transporting a request to enable the parameter monitoring function shall be of message subtype 15.

NOTE For the corresponding system requirements, refer to clause 6.12.3.5.1.

b. For each telecommand packet transporting a request to enable the parameter monitoring function, the application data field shall be omitted.

8.12.2.16 TC[12,16] disable the parameter monitoring function

a. Each telecommand packet transporting a request to disable the parameter monitoring function shall be of message subtype 16.

NOTE For the corresponding system requirements, refer to clause 6.12.3.5.2.

b. For each telecommand packet transporting a request to disable the parameter monitoring function, the application data field shall be omitted.

8.12.2.17 TC[12,17] enable the functional monitoring function

a. Each telecommand packet transporting a request to enable the functional monitoring function shall be of message subtype 17.

NOTE For the corresponding system requirements, refer to clause 6.12.4.4.1.

b. For each telecommand packet transporting a request to enable the functional monitoring function, the application data field shall be omitted.

8.12.2.18 TC[12,18] disable the functional monitoring function

a. Each telecommand packet transporting a request to disable the functional monitoring function shall be of message subtype 18.

NOTE For the corresponding system requirements, refer to clause 6.12.4.4.2.

b. For each telecommand packet transporting a request to disable the functional monitoring function, the application data field shall be omitted.

8.12.2.19 TC[12,19] enable functional monitoring definitions

a. Each telecommand packet transporting a request to enable functional monitoring definitions shall be of message subtype 19.

NOTE For the corresponding system requirements, refer to clause 6.12.4.5.2.

b. For each telecommand packet transporting a request to enable functional monitoring definitions, the application data field shall have the structure specified in Figure 8-131.

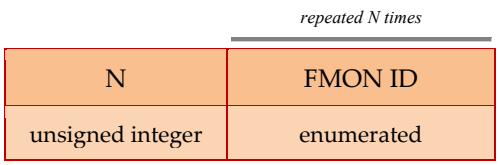

Figure 8-131 Enable functional monitoring definitions

8.12.2.20 TC[12,20] disable functional monitoring definitions

a. Each telecommand packet transporting a request to disable functional monitoring definitions shall be of message subtype 20.

NOTE For the corresponding system requirements, refer to clause 6.12.4.5.3.

b. For each telecommand packet transporting a request to disable functional monitoring definitions, the application data field shall have the structure specified in Figure 8-132.

repeated N times

N	FMON ID
unsigned integer	enumerated

Figure 8-132 Disable functional monitoring definitions

8.12.2.21 TC[12,21] protect functional monitoring definitions

a. Each telecommand packet transporting a request to protect functional monitoring definitions shall be of message subtype 21.

NOTE For the corresponding system requirements, refer to clause 6.12.4.6.1.

b. For each telecommand packet transporting a request to protect functional monitoring definitions, the application data field shall have the structure specified in Figure 8-133.

repeated N times

N	FMON ID
unsigned integer	enumerated

Figure 8-133 Protect functional monitoring definitions

8.12.2.22 TC[12,22] unprotect functional monitoring definitions

a. Each telecommand packet transporting a request to unprotect functional monitoring definitions shall be of message subtype 22.

NOTE For the corresponding system requirements, refer to clause 6.12.4.6.2.

b. For each telecommand packet transporting a request to unprotect functional monitoring definitions, the application data field shall have the structure specified in Figure 8-134.

repeated N times

N	FMON ID
unsigned integer	enumerated

Figure 8-134 Unprotect functional monitoring definitions

8.12.2.23 TC[12,23] add functional monitoring definitions

a. Each telecommand packet transporting a request to add functional monitoring definitions shall be of message subtype 23.

NOTE For the corresponding system requirements, refer to clause 6.12.4.7.1.

b. For each telecommand packet transporting a request to add functional monitoring definitions, the application data field shall have the structure specified in Figure 8-135.

repeated N1 times

repeated N2 times

N1	FMON ID	check validity condition			event definition ID	minimum PMON failing number	N2	PMON ID
		validity parameter ID	mask	expected value				
unsigned integer	enumerated	enumerated	bit-string (deduced size)	deduced	enumerated	unsigned integer	unsigned integer	enumerated
		optional				*optional*		

NOTE In the check validity condition field, the size of the mask field and the format of the expected value field are specific to the validity parameter identified by its parameter ID field.

Figure 8-135 Add functional monitoring definitions

8.12.2.24 TC[12,24] delete functional monitoring definitions

a. Each telecommand packet transporting a request to delete functional monitoring definitions shall be of message subtype 24.

NOTE For the corresponding system requirements, refer to clause 6.12.4.7.2.

b. For each telecommand packet transporting a request to delete functional monitoring definitions, the application data field shall have the structure specified in Figure 8-136.

repeated N times

N	FMON ID
unsigned integer	enumerated

Figure 8-136 Delete functional monitoring definitions

8.12.2.25 TC[12,25] report functional monitoring definitions

a. Each telecommand packet transporting a request to report functional monitoring definitions shall be of message subtype 25.

NOTE For the corresponding system requirements, refer to clause 6.12.4.8.

b. For each telecommand packet transporting a request to report functional monitoring definitions, the application data field shall have the structure specified in Figure 8-137.

repeated N times

N	FMON ID
unsigned integer	enumerated

Figure 8-137 Report functional monitoring definitions

c. To report all functional monitoring definitions, N shall be set to 0.

8.12.2.26 TM[12,26] functional monitoring definition report

a. Each telemetry packet transporting a functional monitoring definition report shall be of message subtype 26.

NOTE For the corresponding system requirements, refer to clause 6.12.4.8.

b. For each telemetry packet transporting a functional monitoring definition report, the source data field shall have the structure specified in Figure 8-138.

repeated N1 times

repeated N2 times

N1	FMON ID	check validity condition			FMON protection status	FMON status	event definition ID	minimum PMON failing number	N2	PMON ID
		validity parameter ID	mask	expected value						
unsigned integer	enumerated	enumerated	bit-string (deduced size)	deduced	enumerated	enumerated	enumerated	unsigned integer	unsigned integer	enumerated

optional *optional* *optional*

NOTE 1 In the check validity condition field, the size of the mask field and the format of the expected value field are specific to the validity parameter identified by its parameter ID field.
NOTE 2 For the FMON protection status enumerated values, refer to requirement 8.12.3.2a.
NOTE 3 For the FMON status enumerated values, refer to requirement 8.12.3.2b.

Figure 8-138 Functional monitoring definition report

8.12.2.27 TC[12,27] report the status of each functional monitoring definition

a. Each telecommand packet transporting a request to report the status of each functional monitoring definition shall be of message subtype 27.

NOTE For the corresponding system requirements, refer to clause 6.12.4.9.

b. For each telecommand packet transporting a request to report the status of each functional monitoring definition, the application data field shall be omitted.

8.12.2.28 TM[12,28] functional monitoring definition status report

a. Each telemetry packet transporting a functional monitoring definition status report shall be of message subtype 28.

NOTE For the corresponding system requirements, refer to clause 6.12.4.9.

b. For each telemetry packet transporting a functional monitoring definition status report, the source data field shall have the structure specified in Figure 8-139.

repeated N times

N	FMON ID	FMON protection status	FMON status	FMON checking status
unsigned integer	enumerated	enumerated	enumerated	enumerated

optional

NOTE 1 For the FMON protection status enumerated values, see requirement 8.12.3.2a.
NOTE 2 For the FMON status enumerated values, see requirement 8.12.3.2b.
NOTE 3 For the FMON checking status enumerated values, see requirement 8.12.3.2c.

Figure 8-139 Functional monitoring definition status report

8.12.3 Enumeration

8.12.3.1 Parameter monitoring

a. The values of the check type shall be as specified in Table 8-6.

Table 8-6 Service 12 check type

engineering value	raw value
"expected-value-checking"	0
"limit-checking"	1
"delta-checking"	2

b. The values of the PMON checking status shall be:

1. for expected-value-checking, as specified in Table 8-7.

Table 8-7 Service 12 PMON checking status for expected-value-checking

engineering value	raw value
"expected value"	0
"unchecked"	1
"invalid"	2
"unexpected value"	3

2. for limit-checking, as specified in Table 8-8.

Table 8-8 Service 12 PMON checking status for limit-checking

engineering value	raw value
"within limits"	0
"unchecked"	1
"invalid"	2
"below low limit"	3
"above high limit"	4

3. for delta-checking, as specified in Table 8-9.

Table 8-9 Service 12 PMON checking status for delta-checking

engineering value	raw value
"within thresholds"	0
"unchecked"	1
"invalid"	2
"below low threshold"	3
"above high threshold"	4

c. The values of the PMON status shall be as specified in Table 8-10.

Table 8-10 Service 12 PMON status

engineering value	raw value
"disabled"	0
"enabled"	1

8.12.3.2 Functional monitoring

a. The values of the FMON protection status shall be as specified in Table 8-11.

Table 8-11 Service 12 FMON protection status

engineering value	raw value
"unprotected"	0
"protected"	1

b. The values of the FMON status shall be as specified in Table 8-12.

Table 8-12 Service 12 FMON status

engineering value	raw value
"disabled"	0
"enabled"	1

c. The values of the FMON checking status shall be as specified in Table 8-13.

Table 8-13 Service 12 FMON checking status

engineering value	raw value
"unchecked"	0
"running"	1
"invalid"	2
"failed"	3