TRANBERG TEF 4900 Commander Control system

Annex I

TEF4900 BAM implementation details

Rev.	Date	Author	Description	Checked	Approved
00	2023-03-09	BKF	Initial release	GRS	MRE

Contents

1 Introduction

1.1 Purpose

This document describes the NMEA messages to and from the Navigation Light Controller when used with CPU partnumber 4900902. The NMEA interface provides messages to and from an external system, and in particular the alert management system (BAM and CAM). The document also highlights requirements enforced by governing rules and regulations.

1.2 Definitions, acronyms and abbreviations

BAM	Bridge Alert Management
CAM	Central Alert Management
Emcy	Emergency
EUT	Equipment Under Test
I/F	Interface
IO	Input / Output
NLC	Navigation Light Controller
NL	Navigation Light
NMEA	National Marine Electronics Association.
system	Navigation Light Control system
panel	NLC user interface

1.3 Regulations and standards

Standards relevant for BAM/CAM systems:

#	Std	Title
[1]	A.1021(26)	Code on alerts and indicators, 2009, General design guidance for alerts and indicators
[2]	MSC.302(87) (2010)	Adoption of Performance standards for Bridge Alert Management.
[3]	IEC 61162-1: 2016	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners.
[4]	IEC 61162-2: 1998	Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 2: Single talker and multiple listeners, high-speed transmission
[5]	IEC 62923-1: 2018	Maritime navigation and radiocommunication equipment and systems –Bridge Alert Management – Part 1: Operational and performance requirements, methods of testing and required test results. (BAM Operational Standard
[6]	IEC 62923-2: 2018	Maritime navigation and radiocommunication equipment and systems –Bridge Alert Management – Part 2: Alerts and cluster identifiers and other additional features. (BAM identifiers and features)

In this document the 'NMEA' acronym is used as a short form for referring to the NMEA 0183 standard - which is the basis for the IEC 61612 standard - and the electrical interface used for this communication.

2 Tranberg TEF4900 NLC BAM Implementation

2.1 Function type

Tranberg TEF4900 Commander NLC is function type: **P** (BAM compliant equipment).

2.2 Alert List

Event	Cat.	Prio.	ID	Inst.	Short text	Decription
Output failure	A	W	3008	-	Lost Navlight	A Navigation Light is not working
Power supply fail main or emcy	A	W	3022	-	Power Fail	Navigation Lights power supply failure, main or emcy
NLC internal fault	A	W	3062	-	Internal Fault	Navigation Light Controller internal fault

Alert priority: W - Warning

Category
TEF4900 uses category A alerts for all alert types. This means that the operator must go to the NLC panel to see which NL is failing, and to acknowledge the alert. According to standards IEC62923-1 [5], chapter 6.2.2.2 and MSC.302(87) [2], category A alerts are not allowed to transfer responsibility.

Alert ID
TEF4900 uses standard identifiers according to IEC62923-2 [6], table A.1.

Alert instance
Alert instance not used in TEF4900 NLC.

Alert short text
TEF4900 uses short text adapted from IEC62923-2 [6], table A.1.

2.3 Talker identifier

(From IEC 61162-1 [3] chapter 8.2 Field definitions, Table 4 – Talker identifier mnemonics:)

Talker device	Identifier	Comment
Navigation light controller	NL---	
Proprietary code	P---	Used in existing Tranberg products for the proprietary sentence PTRA

2.4 Supported alert handling sentences

Sentences ACN, AGL, ALC, ALF, ARC and HBT are used for alert handling. Table below shows what sentences the Tranberg NLC supports.

Mnemonic	Name	Trnsmt	Rcv	Comment
ACN	Alert command		X	For receiving change in alert state
AGL	Alert group list			Tranberg NLC does not support grouping of alerts
ALC	Cyclic alert list	X		Transmitted regularly: "It shall be published cyclically at least every 30 s by each alert generating device." IEC 61162-1 [3], ch. 8.3.12 ALC – Cyclic alert list
ALF	Alert message	X		Information on new alerts and if requested for existing alerts
ARC	Alert command refused	X		See note below
HBT	Heartbeat			Whenever a Responsibility Transfer is active, the NLC requires the requesting part to send HBT sentences repeatedly at a defined interval, otherwise the NLC will resume the responsibility for the alert (IEC 62923-1 [3], ch. 6.9.2.2)

NOTE: Regarding ARC and Responsibility Transfer, IEC 62923-1 [5], ch. 6.9.2.2 states that all Responsibility Transfer Request shall be supported and executed. However, IEC 61162-1 [3], ch. 8.3.16 states that for Category A or C alerts, a refusal of responsibility transfer shall be executed:

"This sentence is used for Category A or C alerts (see IMO MSC.302(87)), for which it is illegal to accept acknowledge or responsibility transfer, e.g. not enough information for decision support available or the source of acknowledgement is not acceptable. In a system working properly such attempts should not happen."

Functions not supported in TEF4900 NLC:

- Long alert description text (ALF sentence)
- Alert Aggregation
- Alert Escalation
- Alert Grouping
- Alerts of priority Alarm or Emergency Alarm

2.5 Fields used in sentences

This list refer to the ALF sentence, since it uses all relevant fields.

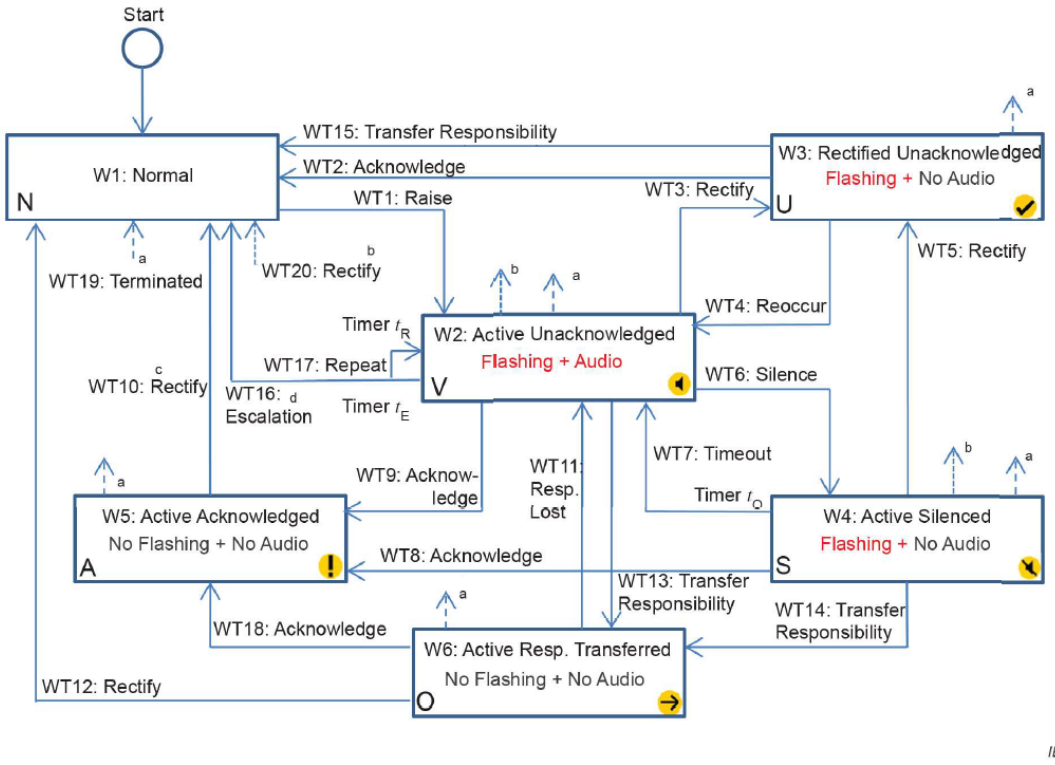
No.	Field Name	Use in NLC
1	Total number of ALF sentences for this message, 1 to 2	Used as appropriate for the relevant sentence
2	Sentence number, 1 to 2	Used as appropriate for the relevant sentence
3	Sequential message identifier, 0 to 9	Used as appropriate for the relevant sentence / message
4	Time of last change	Not used in Tranberg NLC. Null field
5	Alert category, A, B or C	See alert list
6	Alert priority, E, A, W or C	See alert list
7	Alert state, A, S, N, O, U or V	Used as appropriate for the relevant alert and alert state
8	Manufacturer mnemonic code	Not used in Tranberg NLC. Null field
9	Alert identifier	See alert list
10	Alert instance, 1 to 999999	See alert list
11	Revision counter, 1 to 99	Used as appropriate for the relevant alert and alert state
12	Escalation counter, 0 to 9	Escalation is not used in Tranberg NLC. Set to 0.
13	Alert text (Max 16 characters)	See alert list

General Sentence Format:
(See IEC 61162-1 [3] for detailed description)

```
$--ACN,hhmmss.ss,aaa,x,x,x,x,c,a*hh<CR><LF>
$--AGL,xx,xx,xx,c-c,ccc,x.x,x.x,...,c-c,c-c,x.x,x.x*hh<CR><LF>
$--ALC,xx,xx,x.x,aaa,x.x,x.x,x.x,...,aaa,x.x,x.x,x.x*hh<CR><LF>
$--ALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c---c*hh<CR><LF>
$--ARC,hhmmss.ss,aaa,x.x,x.x,c*hh<CR><LF>
$--HBT,xx,A*hh<CR><LF>
```

2.6 States for Warning and Caution

(Figures G.3 and G.4 from IEC 62923-1 [5])



NOTE State change WT18 is an optional feature, for which this document contains no further requirements.

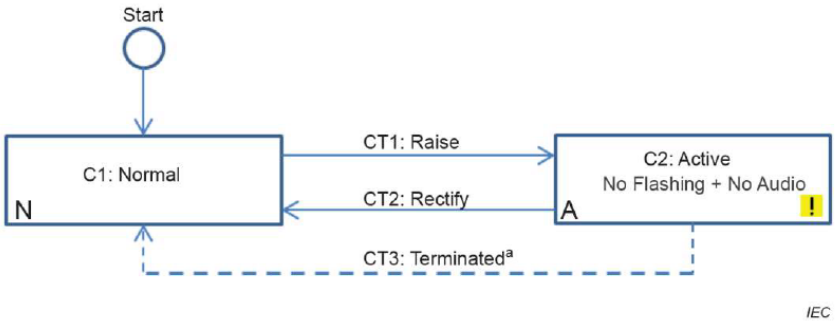
[a] Terminating an alert providing function (e.g. switching off the associated function or equipment) implies that its state should be regarded as "normal".

[b] If required by an individual equipment standard, an alert providing function could, if the alert cause is rectified, bypass the state "rectified – unacknowledged" and transfer to the state "normal" (e.g. in case of CPA/TCPA alarms, see Table 3).

[c] In case of an alert caused by a transitory event (i.e. without significant time duration), "acknowledgement" triggers the rectifying event (e.g. "ECCW", "ACCW" and "End of track").

[d] Indicates termination of an alert of priority warning as a result of escalation to priority alarm.

Figure G.3 – State diagram of an alert of priority warning



[a] Terminating an alert providing function (e.g. switching off the associated function or equipment) implies that its state should be regarded as "normal".

Figure G.4 – State diagram of an alert of priority caution

Warning states:

State	Fault present	Code	Flashing	Audio
W1: Normal		N		
W2: Active Unacknowledged	X	V	X	X
W3: Rectified Unacknowledged		U	X	
W4: Active Silenced	X	S	X	
W5: Active Acknowledged	X	A		
W6: Active Resp. Transferred	X	O		

ADDITIONAL: Terminating (turn off equipment), set to Normal
ADDITIONAL: Escalation to Alarm (not supported by TEF4900)

Responses to communication failure
Ref. IEC 62923-1 [5], ch. 6.5 Systems failures, redundancies, back-up and fallback arrangements, and ch. 6.5.2
Requirement: *"A failure of system communication between an alert source and CAM shall not result in an alert at the alert source."*

2.7 Actions

Outgoing msgs:

1. Send **ALC** regularly (each 25 - 30 sec, max 30 sec delay/interval)
2. Any change of alert state (E.g. when alerts become silenced, rectified, etc) for all alert instances, send a a new **ALF** with new info (new state and revision counter).
3. If a request for responsibility transfer (O) has been sent, then a refusal **ARC** must be replied back.

Incoming msgs:

1. If **ACN**: Check for:
   a) acknowledge (A). There are only cat. A alerts here, so send an **ARC** (refuse responsibility transfer) as response.
   b) request / repeat information (Q). send **ALF** sentence for the requested alert instance. As long as the alert ID and instance are correct, an **ALF** will be sent out for the requested alert, also if the state is Normal.
   c) responsibility transfer (O). There are only cat. A alerts here, so send an **ARC** (refuse responsibility transfer) as response.
   d) silence (S). Silence the panel buzzer. Change alert state and send new **ALF** sentence. If alert state is already 'S', ignore.

Note that alert state may change as a result of change in internal conditions (from the source itself), or as a result of an incoming **ACN** sentence.