

# NMEA 0183 ADVANCEMENTS

This Standard's Evolution Continues



Lee A. Luft – USCG R&D Center



# NMEA 0183 V4.00

**Published by NMEA on  
November 1, 2008**

**Approaching Three Years Since  
Publication**

**Version 4.10 expected January 2011**

# New v4.00 Sentences

- **Supporting the VDR**
  - ▲ Providing Detailed Alarm information
- **Supporting RADAR**
- **Supporting AIS Shore Stations**
- **Supporting AIS AtoN Stations**
- **Supporting Shipboard and AIS Shore Stations**
- **Supporting Protocol Extensions (beneficial for all equipments)**

# New v4.00 Items

- A host of new Talker IDs for AIS
- A new Talker ID
  - ✦ Containing a numeric value
  - ✦ Configurable per application
- New Status Flag for Sentences
  - ✦ Command vs Status

# New v4.00 Protocol Extension

- **Transport Sentences**
- **Annotate Sentences**
- **Group Sentences**
- **Enables Safe and Accurate Transport**
- **Use Shipboard and on Shore**
- **TAG Block**

# What's in the Works for 0183 v4.10

*Its around the corner . . .*

- **New Sentences supporting Galileo**
- **Expanded GNSS Sentences supporting Galileo**
- **Enhanced AIS support & More**

# New v4.00 Sentences

## Voyage Data Recorder

- **AKD - Acknowledge Detail Alarm Condition**
- **ALA - Set Detail Alarm Condition**
- **DOR - Door Status Detection**
- **ETL-Engine Telegraph Operation Status**
- **EVE – General Event Message**
- **FIR – Fire Detection**

# New v4.00 Sentences

## Voyage Data Recorder

- **GEN – Generic Status Information**
- **HSS-Hull Stress Surveillance Systems**
- **PRC-Propulsion Remote Control Status**
- **TRC-Thruster Control Data**
- **TRD-Thruster Response Data**
- **WAT- Water Level Detection**



# New v4.00 Sentence Supporting RADAR

- **TTD – Tracked Target Data**
- **Six-bit Encapsulation**
- **Up to Four Targets / 256 sentences**

# New v4.00 Sentences

## AIS Shore Stations

- **ACM: Preparation and initiation of an AIS Base Station addressed channel management message (ITU-R M.1371 Message 22)**
- **AGA: Preparation and initiation of an AIS Base Station broadcast of a group assignment message (Message 23)**
- **ASN: Preparation and initiation of an AIS Base Station broadcast of assignment VDL Message 16**
- **BCG: Base Station configuration, General command**
- **BCL: Base Station configuration, Location command**
- **DLM: Data link management slot allocations for Base Station**

# New v4.00 Sentences

## AIS Shore Stations

- **ECB: Configure broadcast rates for Base Station messages with epoch planning support**
- **SPO: Select AIS device's processing and output**
- **TFR: Transmit feed-back report**
- **TSA: Transmit slot assignment**
- **TSP: Transmit slot prohibit**
- **TSR: Transmit slot prohibit status report**
- **VSI: VDL signal information**

# New v4.00 Sentences

## AIS AtoN Stations

- **ACF: General AtoN Station Configuration Command**
- **ACG: Extended General AtoN Station Configuration Command**
- **AFB: AtoN Forced Broadcast Command**

# New v4.00 Sentences

## AIS AtoN Stations

- **AID: AtoN Identification Configuration Command**
- **CBR: Configure Broadcast Rates for AIS AtoN Station Message Command**
- **MEB: Message input for Broadcast, Command**
- **TPC: Transmit slot Prohibit Command**

# New v4.00 Sentences Shipboard & AIS Shore

- **ADS: Automatic device status**
- **CEK: Configure Encryption Key Command**
- **COP: Configure the Operational Period, Command**
- **DCR: Device Capability Report**
- **DDC – Display Dimming Control**

# New v4.00 Sentences Shipboard & AIS Shore

- **FSR: Frame summary of AIS reception**
- **NAK: Negative Acknowledgement**
- **RST: Equipment ReSeT command**
- **SID: Set an equipment's IDentification command**
- **VER: Version**

# TAG Block

## v4.00 Configuration

- **CPC: Configure Parameter-code for UNIX time parameter (c)**
- **CPD: Configure Parameter-code for destination-identification parameter (d)**
- **CPG: Configure Parameter-code for the sentence-grouping parameter (g)**
- **CPN: Configure Parameter-code for the line-count parameter (n)**



# TAG Block

## v4.00 Configuration

- **CPR: Configure Parameter-code for relative time parameter (r)**
- **CPS: Configure Parameter-code for the source identification parameter (s)**
- **CPT: Configure Parameter-code for general alphanumeric string parameter (t)**
- **TBR: TAG Block Report**
- **TBS: TAG Block listener Source-identification configuration command**

# TAG Block

- **Contents (30 pages)**
  - ▲ **Background**
  - ▲ **Interoperability**
  - ▲ **Structure**
  - ▲ **Coding Rules**
  - ▲ **Parameter Code Dictionary**
  - ▲ **Interpretation**
  - ▲ **Filtering**
  - ▲ **Rules for transmission**
  - ▲ **Rules for reception processing**
  - ▲ **Configuration**

# TAG Block

- **Designed for Networks**
- **Useful on any interface**
- **Clarifies sentence relationships**
- **Provides sentence Linkage**
- **Does not transport equipment data**
- **Provides sentence related information**

# TAG Block

- Reliably link ...
- Accurately Identify Source ...
- Accept Recognized Sources ...
- Identify Timing relationships ...

# TAG Block

- **Accurately Identify Destination ...**
- **Ignore Sentences ...**
- **Allow annotation during transport ...**
- **Detect Loss ...**

# TAG Block

- **Interoperable with Legacy 0183 Equip**
- **Considers Existing Rules**
- **Implemented Proper Decoding**
- **Device has Sufficient Buffer Space**
- **Device Handles Valid / Invalid Chars**

# TAG Block

## Basic Structure

**\s:r003669961,c:1153612428\*77\**

Begin TAG Block Delimiter - Back Slash Character “\”

Parameter Code    Code Delimiter    Parameter Value

Field Delimiter    Standard 0183 Checksum

End TAG Block Delimiter - Back Slash Character “\”

# TAG Block

## 2 Line Example

\g:1-2-1234,s:r3669961,c:1120959341\*hh\!ABVDM,1,1,1,B,,,,,0\*hh

\g:2-2-1234\*hh\ \$ABVSI,r3669961,1,013536.96326433,1386,-98,,\*hh





# TAG Block

## 3 Line Example

```
\g:1-3-1234,s:r3669961,c:1120959341*hh\
```

```
\g:2-3-1234*hh\!ABVDM,1,1,1,B,,,,,0*hh
```

```
\g:3-3-1234*hh\ $ABVSI,r3669961,1,013536.96326433,1386,-98,,*hh
```

# TAG Block

## Parameter Code Dictionary

c	UNIX time	c:positive integer
d	Destination-identification	d:alphanumeric string (15 char. maximum)
g	Sentence-grouping	g:numeric string
n	Line-count	n:positive integer
r	Relative time	r:positive integer
s	Source-identification	s:alphanumeric string (15 char. maximum)
t	Text-string	t:valid character string

Room for growth!

# TAG Block

## Configuration Reporting

- **TBR – TAG Block Report Request**
- **Two sides – Listener & Talker**
- **All Parameter Codes Active.**
- **All Parameter Codes Supported**
- **All Parameter Codes Inactive but Supported**

# TAG Block

## Source Configuration

- **TBS – TAG Block Listener Source-identification Configuration Command**
- **One side – Listener**
- **Add**
- **Remove / Remove All**
- **Report configured Sources**

# NMEA 0183 V4.00 TAG Block

## Application Growth by Regulation

- **Implemented in the USCG's Nationwide AIS Increment 1 Network**
- **Specified for use in the USCG's Nationwide AIS Increment 2 Network**
- **Specified as Mandatory for SOLAS Bridge Equipment per IEC 61162-450**

# NMEA Technical Bulletin

## NMEA 0183 V4.00 TAG Block Errata

(Errata # 0183 0910 01 – Published September 2010)

- **Five corrections and clarifications have been identified within the specifications of TAG Block methods.**
- **These corrections are intended to ensure consistency across TAG Block sections, clarify application of multiple TAG Blocks, improve error detection, and clarify the application of the TAG Block Line Count Parameter Code “n”.**

# 0183 Advancements for v4.10

- **Corrections**
- **Clarifications**
- **New Sentences**
- **Enhanced Sentence Capabilities**
- **ALS revisions (under consideration)**

# 0183 Advancements for v4.10

## Corrections

- **FIR – Fire Detection**

- ✦ **Data field for the Fire Detection Indicator has been modified to support a broader range of identifiers.**
- ✦ **Specifically, from alpha representation to alpha and alpha-numeric.**



# 0183 Advancements for v4.10

## Clarifications

- **NRM – NAVTEX Receiver Mask Command**
  - ▲ Usage Clarification in the sentence Description
- **TUT – Transmission of Multi-Language Text**
  - ▲ Usage Clarification in the sentence Notes
- **HSC – Heading Steering Command**
  - ▲ Sentence Status Flag

# 0183 Advancements for v4.10

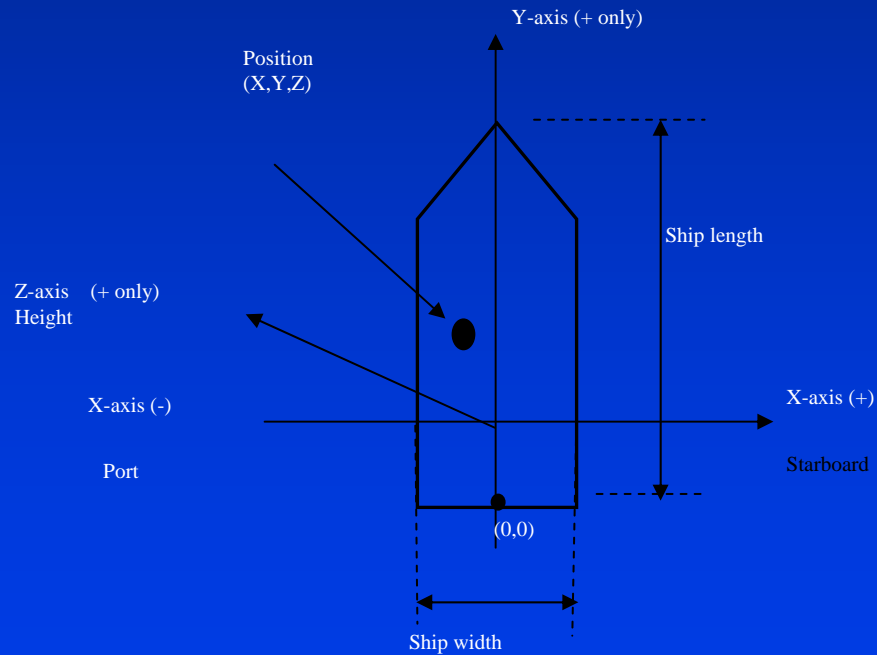
## New Sentences

- **GFA – GNSS Fix Accuracy and Integrity**
  - ▲ Supports Galileo and other GNSS
  - ▲ Different than the GST Sentence
- **HBT – Heartbeat Supervision Report**
  - ▲ Periodic / Configurable Rates / Equip Status

# 0183 Advancements for v4.10

## New Sentences

- POS – Device Position and Ship Dimensions Report or Configuration Command



# 0183 Advancements for v4.10



# 0183 Advancements for v4.10

## The Satellite Identification Challenge

System	System ID	Satellite ID	Signal ID	Signal/Channel
GPS	1 (GP)	1 – 99	0	All Signals
		1 - 32 is reserved for GPS	1	L1 C/A
		33 - 64 is reserved for SBAS	2	L1 P(Y)
		65 - 99 is undefined	3	L1 M
			4	L2 P(Y)
			5	L2C-M
			6	L2C-L
			7	L5-I
			8	L5-Q
			9 - F	Reserved
GLONASS	2 (GL)	1 – 99	0	All Signals
		1 – 32 is undefined	1	G1 C/A
		33 - 64 is reserved for SBAS	2	G1 P
		65 - 99 is reserved for GLONASS	3	G2 C/A
			4	GLONASS (M) G2 P
			5 - F	Reserved
GALILEO	3 (GA)	1 - 99	0	All Signals
		1 - 36 is reserved for Galileo SVs	1	E5a
			2	E5b
		37- 64 is reserved for Galileo SBAS	3	E5 a+b
			4	E6-A
		65-99 is undefined	5	E6-BC
			6	L1-A
			7	L1-BC
			8-F	Reserved

RESERVED 4 to F

# 0183 Advancements for v4.10

## Navigational Status Indicator (IEC 61108)

- **S = Safe**
  - ▲ estimated positioning accuracy (95% confidence)
  - ▲ integrity meets requirements of navigation mode
  - ▲ calculated within 1 s for a conventional craft and 0,5 s for a high speed craft
- **C = Caution - integrity is not available**
- **U = Unsafe**
  - ▲ Positioning accuracy below selected accuracy of navigation mode
  - ▲ Integrity exceeds the requirements of navigation mode
  - ▲ Not calculated within 1 s for a craft and 0,5 s for a high speed craft
- **V = Navigational invalid, No navigational status indication.**

# 0183 Advancements for v4.10

## Expanded GNSS Mode Indicator Definition for “P”

- **P = Precise - Satellite system used in precision mode. Precision mode is defined as: no deliberate degradation (such as Selective Availability) and higher resolution code (P-code) is used to compute position fix. P is also used for satellite system used in multi-frequency, SBAS or Precise Point Positioning (PPP) mode**

# GNSS Support for Galileo

## Enhanced Sentence Capabilities

- **GLL – Geographic Position - Latitude/Longitude**
  - ✦ Expanded Mode Indicator Value (P=Precise)
  - ✦ Additional Navigational Status Indicator field
  
- **GMP – GNSS Map Projection Fix Data**
  - ✦ Expanded Mode Indicator Value (P=Precise)
  - ✦ Additional Navigational Status Indicator field



# GNSS Support for Galileo

## Enhanced Sentence Capabilities

- **GNS – GNSS Fix Data**
  - ✦ Expanded Mode Indicator Value (P=Precise)
  - ✦ Additional Navigational Status Indicator field
- **GRS – GNSS Range Residuals**
  - ✦ GNSS System ID field (1=GP, 2=GL, 3=GA, 4=??)
  - ✦ GNSS Signal ID field (0 – F)

# GNSS Support for Galileo

## Enhanced Sentence Capabilities

- **GSA – GNSS DOP and Active Satellites**
  - ▲ GNSS System ID field (1=GP, 2=GL, 3=GA, 4=??)
- **GSV – GNSS Satellites in View**
  - ▲ GNSS Signal ID field (0 – F)
- **RMC – Recommended Minimum Specific GNSS data**
  - ▲ Expanded Mode Indicator Value (P=Precise)
  - ▲ Additional Navigational Status Indicator field

# GNSS Support for Galileo

## New Sentence in Development

- **GAL – Galileo Almanac Data**
  - ▲ Different than ALM
  - ▲ Different than MLA

# 0183 Advancements for v4.10

## AIS Sentence Revisions in Development

Resulting from new Messages & Changes in



**Recommendation ITU-R M.1371-4  
(04/2010)**

# 0183 Advancements for v4.10

## AIS Sentence Revisions in Development

- **ABK – AIS Addressed and Binary Broadcast Acknowledgement**
  - ▲ Possible support for message 5 and 12
- **AIR – AIS Interrogation Request**
  - ▲ Possible Clarifications
- **CBR - Configure Broadcast Rates for AIS AtoN Station Message Command**
  - ▲ Possible support for message 26



# 0183 Advancements for v4.10

## AIS Sentence Revisions in Development

- **SSD – AIS Ship Static Data**
  - ▲ Source ID Data Field Formatter Clarification (ac)
- **BBM – AIS Broadcast Binary Message**
  - ▲ Remove incorrect references to messages 19 & 21
- **MEB – AIS Message Input for Broadcast Command**
  - ▲ Possible support for message 26

# SUMMARY

- **NMEA 0183 is Still Evolving**
- **Meeting new challenges**
- **Supporting new equipment**
- **Both On Ship or On Shore**

# SUMMARY

- **Supports Advanced communications through use of TAG Block**
- **TAG Block is Powerful and Extensible for ALL Interfaces**
- **Used Today in the USCG's Nationwide AIS Increment 1/2 Networks and for IEC 61162-450.**



# NMEA 0183 ADVANCEMENTS

**This Standard's Evolution Continues**

# ? QUESTIONS ?

**Lee A. Luft – USCG R&D Center**

