

1 Overview

This document describes the format and usage of NMEA messages for Orion GPS navigation software. It also details the implementation specifics of NMEA input commands and output sentences supported by Orion.

2 Message Format

Orion NMEA messages conform to the NMEA-0183 Ver. 3.01 (January 1, 2002) standard with implementation specifics as noted below.

Commands start with a dollar-sign ("\$\$"), followed by "PUNV", and a comma (","). The command text (which is defined in section 4) comes next, followed by an asterisk ("*"), two-digit hexadecimal checksum, and the <carriage return> <new line> characters.

Example:

```
$PUNV,<command>*cc<carriage return><new line>
```

2.1 Checksum Calculation

In accordance with NMEA-0183, the checksum is calculated by taking the 8 bit exclusive OR of all characters between (but not including) the "\$" and the "*". The checksum is then appended after the "*" as a 2 character hexadecimal number.

If a command's checksum is omitted or illegal the command will be rejected and an error message issued.

A command with the checksum value "cc" (two lower case "c" characters) will be accepted as valid (this is primarily used for testing purposes).

2.2 Sentence Termination Delimiter

All sentences end with the sentence termination delimiter <carriage return><new line>. This combination is "\n" in C-language format and hexadecimal ASCII values are 0Dh 0Ah. Both characters are required for a command to be recognized.

2.3 NMEA Message Sizes

In accordance with NMEA-0183, the maximum number of characters between the starting delimiter "\$" and the terminating <CR><LF> should be 79. That is, the maximum needed buffer size should be 82 for one output sentence.

For input NMEA commands, the maximum size accepted is 128 characters.

Orion Gps Manual

John MALHAM



Orion Gps Manual:

Bradshaw's monthly railway and steam navigation guide George Bradshaw,1862 **Bradshaw's continental [afterw.] monthly continental railway, steam navigation & conveyance guide. June 1847 - July/Oct. 1939** George Bradshaw,1864 **Bradshaw's continental [afterw.] monthly continental railway, steam navigation & conveyance guide. June 1847 - July/Oct. 1939. Special ed** George Bradshaw,1865 **Bradshaw's General (monthly) Railway and Steam Navigation Guide for Great Britain and Ireland** ,1877 The Official Guide of the Railways and Steam Navigation Lines of the United States, Puerto Rico, Canada, Mexico and Cuba ,1896 Also time tables of railroads in Central America Air line schedules *Transformative Impact of AI in Supply Chain Management* Arif, Jabir,Jawab, Fouad,2025-08-06 Artificial intelligence AI plays a transformative role in shaping the future of supply chains AI driven technologies including machine learning ML predictive analytics and autonomous systems are revolutionizing traditional supply chain processes They enable real time decision making demand forecasting risk management and end to end visibility for Supply Chain 4.0 As a result AI can enhance supply chain resilience sustainability and efficiency in the digital and increasingly globalized market The strategic application of AI will not only reduce operational costs but also contribute to long term organizational resilience and sustainability goals Transformative Impact of AI in Supply Chain Management has broad implications for multiple sectors providing deep insights into the transformative potential of AI in supply chain operations It highlights the role of AI in achieving sustainability optimizing routes and inventory management and creating agile supply chains that can respond dynamically to market fluctuations and disruptions Covering topics such as industrial prosperity integrated business planning IBP and social sustainability this book is an excellent resource for logistics specialists supply chain managers industrial engineers operations executives technology developers professionals researchers scholars academicians and more Guide to Seafaring Collective Bargaining United States. Maritime Administration,1959 **A Buyer's and User's Guide to Astronomical Telescopes & Binoculars** James Mullaney,2007-05-26 Both beginning novice amateur astronomers at the level of Astronomy and Night Sky magazine readers as well as more advanced amateur astronomers level of Sky and Telescope will find this book invaluable and fascinating It includes detailed up to date information on sources selection and use of virtually every major type brand and model of such instruments on today's market The book also includes details on the latest released telescope lines e.g. the 10 12 14 and 16 inch aperture models of the Meade LX R series As a former editor for Sky Telescope Astronomy and Star Sky magazines the author is the ideal person to write this book **Guide to Seafaring Collective Bargaining; 1959** United States. Maritime Administration,1960 **Navigation made Easy; ... or, the young Sailor's sure guide and Scholar's best instructor in the Art of Navigation, etc** John MALHAM,1790

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