LD6 Operation Manual

Version 8 & Version 50

VERIPOS

Table of Contents

1 Introduction

1.1 General

For installation guidance please see the LD6 Installation manual (AB-V-MA-00520).

Throughout this manual reference will be made to the VERIPOS Helpdesk. The Helpdesk is provided by VERIPOS and the first point of contact for technical enquiries and assistance. It is manned 24 hours per day, 365 days per year.

Details are in the *Contact information* chapter.

1.2 Scope

The LD6 Operating manual comprises information on connecting the unit, beam and access code entry, COM and IP ports.

Please be aware that this manual covers the operation of the LD6 receivers running software version 8 or 50. LD6's on this software version are equipped with Septentrio GNSS cards. Some aspects of this version will differ from other LD6 software versions. More information regarding versions is provided in Section 2. For operation of the LD6 on any other software versions, please refer to the appropriate Operations Manual.

Manuals are available for download at https://help.veripos.com.

1.2.1 Contents

Chapter	Contents
1. Introduction	This chapter specifies the purpose and target group for this manual. It also contains a list of used abbreviations and a specification of the document conventions.
2. Operation	This chapter describes the interfaces in detail, the initial start-up, the status indicators and possible corrective actions and how to shut the system down safely.
3. VERIPOS Software Compatibility	This chapter states compatible and non-compatible VERIPOS software.
4. Troubleshooting	This chapter describes basic fault tracing and a detailed description on how to report problems or operating queries to the VERIPOS Helpdesk.
5. Reference information	This chapter comprises additional information for configuration, station ID listings and a list of the serial and IP port designations.
6. Contact information	This chapter contains contact information details about the VERIPOS Helpdesk and VERIPOS offices worldwide.

1.3 Terms and abbreviations

APEX	Veripos PPP GNSS service
DGPS	Differential GPS
DOP	Dilution of Precision
EIA	Electronics Industry Association (this document uses the previous terminology "RS" that is generally recognized in the industry)
GDOP	Geometric Dilution of Precision
GLONASS	Globalnaya Navigatsionnaya Sputnikovaya Sistema – Russian GNSS system
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
HDOP	Horizontal Dilution of Precision
Hz	Hertz
LAN	Local Area Network
L-band	Methods of transmitting correction data to mobile users
MF	Medium Frequency Radio used to transmit correction data
MHz	Mega-Hertz
MMI	Man-Machine Interface
NMEA	National Marine Electronics Association
N/A	Not applicable
PDOP	Positional Dilution of Precision
PPP	Precise Point Positioning
PPS	Pulse per Second
PRN	Pseudo Random Noise
RoHS	Restrictions of Hazardous Substances
RTCM	Radio Technical Commission for Maritime Services
SAL	Service Access License
SBAS	Satellite Based Augmentation System
SD	Standard Deviation
SNR	Signal to Noise Ratio
Spotbeam	High Power L-Band Signal
SS	Signal Strength
Standard / Std	Veripos Single Frequency DGPS System
SV	Space Vehicle
Ultra	Veripos PPP GNSS Service
USB	Universal Serial Bus
UTC	Coordinated Universal Time
VDOP	Vertical Dilution of Precision
VERIPOS	Global DGPS service provider
VOSS	VERIPOS Online Support System

W	Watt
WAAS	Wide Area Augmentation System
WEEE	Waste Electrical and Electronic Equipment
WER	Word Error Rate

1.4 Document conventions

1.4.1 Typographical conventions

Italic or **bold** text is used to emphasize certain parts of the information.

Italic is also used in cross-references to other parts of the document.

Bold text is also used for indicators and touch screen "push-button" commands.

"Text within quotes" is used when display screens are mentioned in text.

Monospace text is used for input/output strings to/from the device.

1.4.2 Special notices

⚠ **WARNING**

A warning indicates the risk of bodily harm or serious damage to the hardware.

ⓘ **CAUTION**

A caution indicates the risk of damaging the hardware.

ℹ **NOTE**

A note shows important information that helps you make better use of the system.

1.5 VERIPOS Helpdesk

VERIPOS encourage all users to promptly report problems or operating queries to the Helpdesk so that they may receive assistance.

The VERIPOS Helpdesk is the first point of contact for technical enquiries and fault reports. It is manned 24 hours per day, 365 days per year.

Helpdesk contact details are in the *Contact information* chapter.

For assistance with basic troubleshooting see the *Troubleshooting* chapter. We recommend initial contact is made by email to the Helpdesk.

Users can also create a fault ticket on the web site. This will ensure contact details and the description of the fault are correctly recorded.

The duty operator is trained to provide direct assistance with most queries and problems and can request technical staff to provide support for more complex issues.

1.6 VERIPOS online support (VOSS)

VERIPOS have an online customer support system called VOSS (VERIPOS online support system).

VERIPOS recommend users to frequently view the announcements made on this system.

VOSS includes a facility for raising fault tickets which are then automatically submitted to the VERIPOS Helpdesk.

The VOSS URL is: **https://help.veripos.com**

VOSS has comprehensive help and assistance that provides:

- Updates on VERIPOS service availability and notifications
- Knowledge base
- Trouble-shooter
- Downloads
- Online fault reporting.

1.7 Enabling the equipment for use

Access to VERIPOS Correction Services requires a valid subscription before they can be activated on the LD6.

To activate VERIPOS services on the LD6, the user must send a service activation request (containing the unit **User Code**, **Vessel Name**, **SAL** number and **services required**) to the VERIPOS Helpdesk. Once processed, the activation will then be sent via L-band satellite to the unit. Upon activation, the unit will start using VERIPOS services.

When not required, some service agreements may allow for deactivation of the service.

—⃞ⓘ⃞ **NOTE** —————————————————————

To use VERIPOS services a contract between the users' company and VERIPOS must be in place. VERIPOS refers to this as a Service Access License (SAL).

To avoid delays, users should record and provide the SAL number associated with the VERIPOS equipment.

The Helpdesk are unable to activate any equipment unless an active SAL exists.

1.8 Waste electrical and electronic equipment

The Waste Electrical and Electronic Equipment Directive (hereinafter referred to as the "WEEE directive") places an obligation on EU-based manufacturers, distributors, retailers and importers to take back electronic products at the end of their useful life. A sister directive, RoHS (Restriction of Hazardous Substances) complements the WEEE directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE directive covers all VERIPOS products imported into the EU as of August 13 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the requirements contained in the WEEE Directive.

Instructions for disposal of WEEE by users in the European Union

Products which have the undernoted symbol located on either the product itself or its packaging indicates that the product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the product by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment (hereinafter referred to as "WEEE").

The separate collection and recycling of your WEEE at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about recycling centres, please contact the local city office, the household waste disposal service or the product supplier.

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2   LD6 Operation

The controls for working with the LD6 are all available on the touch screen front panel.

Use the LD6 touch screen to configure the unit.

It has a home or main screen display.

Touch screen
control area

Figure 1 LD6 IMU

Description

The LD6 Integrated Mobile Unit (IMU) is used offshore on vessels to provide high precision Satellite Positioning Services from VERIPOS.

The LD6 can optionally be equipped to run Verify QC software or the Orion DP software.

It can be fitted with modules to receive the following;

- GNSS satellite positioning data

- L-Band satellite positioning augmentation data from geostationary satellite transmissions

- Optional MF Beacon position augmentation data

- Optional UHF position augmentation data

> **i** **NOTE**
>
> Only one GNSS receiver card may be fitted to the LD6.
>
> The LD6 must have at least 2Gb RAM installed before use with Verify QC on - board.

The LD6 unit supports all VERIPOS position augmentation data services.

Up to three simultaneous position solutions can be calculated (depending on VERIPOS services enabled). One of these may be a Precise Point Positioning (PPP) solution.

The LD6 supports switching between high accuracy PPP solutions (subject to settling before position is output).

When configured the LD6 automatically selects the best available solution for output, with automatic fall – back to the next best solution.

Multiple messages are supported with configurable outputs of position data from the ports in NMEA format (V3).

For timing a ZDA message can be output for use with 1PPS output.

The LD6 supports RS 232 and 422 output from galvanic isolated ports and output to LAN.

—— ⓘ NOTE ——————————————————————

Some of the features discussed in this manual are only available in the latest system software version. If any of the features described are not available on your LD6, please contact VERIPOS to check if you have the latest LD6 software installed.

2.1 Versions

Different version 8 or 50 build numbers may exist (for example, 50.02.00.01 or 50.02.00.02) however, these will be referred to within this manual collectively as either 'Version 8 or 'Version 50' respectively. LD6 systems on either software version 8 or 50 are supplied with Septentrio AsteRx2 GNSS receiver cards and both are capable of providing a corrected solution in NMEA format.

Version 8 and Version 50 LD6 systems can compute GPS and GLONASS VERIPOS services (Ultra[2], Apex[2] and Standard[2]).

The table below shows details the available LD6 GNSS variants:

Software Version	GNSS Variant	Tracking Capabilities
8 (or) 50	Septentrio AsteRx2	GPS & GLONASS
101	NovAtel OEM615	GPS & GLONASS
105	NovAtel OEM617D	GPS, GLONASS, Galileo & QZSS
	NovAtel OEM7720	GPS, GLONASS, Galileo, QZSS & Beidou

LD6 systems with an MF module** installed allow the LD6 to be capable of receiving third party corrections directly from local reference stations (where available).

LD6 systems with UHF module** installed allow the LD6 to receive corrections by UHF broadcast (where available).

*An on-screen icon for each receiver card will be shown when the LD6 has that particular receiver card installed.

Do's and Don'ts for LD6

DO's

- <u>Do</u> use the **Shutdown** control (in the *Actions* menu) for the LD6 BEFORE turning off the power. Wait until the LD6 screen is blank before disconnecting power.

- <u>Do</u> take care not to obstruct the side ventilation panels for the fan assisted cooling tunnel.

- <u>Do</u> only use VERIPOS supplied crossover cable adapters for input / outputs. This is especially important for serial RS232/422 use where different RJ45 to D9 adapters are used.

- <u>Do</u> only connect the LAN Crossover network adapter to an LD6 LAN port. The adapter wiring is not compatible with serial COM ports.

DON'Ts

- <u>Do not</u> load software onto the LD6 not issued from VERIPOS e.g. as part of the LD6 build. Doing so could seriously compromise system performance.

- <u>Do not</u> insert USB memory device unless first scanned with up to date virus scanning software

- <u>Do not</u> activate the pin reset buttons on the rear of the unit unless directed by a VERIPOS representative

- <u>Do not</u> remove the QC dongle when using the LD6 in QC mode.

- <u>Do not</u> use a pen or any other sharp object to operate the touch screen as this could cause damage.

2.2 Satellite constellations

When specifying the LD6, users choose which satellite constellations are used by the GNSS receiver card.

The internal GNSS card is preconfigured to the use either **GPS** or **GPS+GLONASS** satellite constellations.

2.3 Views and controls

Figure 2 LD6

LD6 Front Panel Controls

1	Labels with Unit ID (above) and phone number to Helpdesk (below)
2	Front panel speaker
3	3 x USB 2.0 sockets
4	Screen brightness control
5	Volume control (press to mute/un-mute)
6	Colour touchscreen display
7	Front panel power on/off switch (with security cover)
8	Removable handle (one on each side)

Figure 3 LD6 Front Panel Controls

> **i NOTE**
>
> Audio is not implemented on the LD6.

LD6 Rear

1.	Ground (cable not supplied)
2.	Power
3.	L-band antenna 90984
4.	GNSS antenna AD491
5.	MF Beacon A31 antenna (optional)
6.	Serial RJ45
7.	LAN*

* LAN 1 = Upper LAN 2 = Lower

Figure 4 LD6 Rear Panel Connectors

┌─────┐
│ i │ **NOTE**
└─────┘

Previously, a GA-530 GNSS antenna may have been supplied if Glonass was not required. The V460 is the standard antenna currently supplied for GNSS signals on an LD6 regardless of whether Glonass is required or not.

The Video out connection is only used with Verify-QC and Orion software

If using a combined L-Band / GNSS antenna (e.g. V460) connect it to the input to the L-Band receiver card. Remove the terminator from the RF out of the L-Band card and link the GNSS card RF in to the L-Band RF out connector, using the lead which is supplied.

Figure 5   LD6 with Combined GNSS/L-Band antenna and link cable connected

2.4 LD6 Start up

Confirm the LD6 has been correctly installed.

Where required refer to the *LD6 Installation Manual* and the *Antenna & Coaxial Cable Installation Guide*.

These documents are provided with the unit or may be downloaded in .pdf format from the VERIPOS online support system (VOSS) at:

https://help.veripos.com

Plug in power to the rear of the unit. Turn on power switch.

Wait a few minutes while a self-test is performed.

Following successful test you will see the main or home screen.

The LD6 is disabled when first started. Before a beam is selected and the unit is enabled the L-Band icon will be red.

If there is a problem refer to the *Troubleshooting* chapter in this manual.

Figure 6 LD6 Main Screen

Key

1   LD6 Unit ID

2   S – L-Band beam Sync Green = yes, Red = not synced with beam

3   E – VERIPOS corrections Green = enabled Red = not enabled

4   L-Band signal strength indicator

5   Touch screen buttons to access **L-Band** card, **GNSS** card, *optiona*l **MF** (Beacon SBX receiver) and **UHF** ADL cards, information and controls. Buttons provide access to each receiver (as fitted).

6   LD6 time display (UTC)

7   Buttons in red indicates the cards have configuration or fault condition and are not working to correct limits

8   **Actions** – Shut down, Log Off, Reboot, Factory Reset or LD6 Screen calibration of screens 1 and 2, Launch Apps

9   **Solutions** – Status including current position, select the required PPP solution, config of solution and NMEA output selection

10   **Settings** –Set up of position output ports, reference stations and network configuration

Figure 6 shows an enabled LD6 touch screen. Four of the six rear bays are equipped with receiver cards. Two bays are for future use.

The home page of the LD6 touch screen displays the Unit ID number (top left).

The time is shown in Coordinated Universal Time (UTC), 24 hour format (top right).

Each of the four upper touch screen buttons correspond to a receiver or card housed in bays accessed from the rear of the LD6. LD6 units may not have all cards fitted.

ℹ NOTE ————————————————

Only when a receiver card is present a button is displayed on the touch screen

————————————————————————

Configuration of each installed and working receiver card is done using the touch screen front panel (*Figure 3*). Select the corresponding on screen button.

2.5 L-Band Receiver Configuration

This section describes how to make a Beam Selection, input the Access Code, RTCM Station selection, adjust antenna voltage and view the L-Band Status information.

2.5.1 Antenna Voltage

Antenna power must be toggled **on** (*Home/ LBand/ Antenna is off*) when the L-Band card is **directly** connected to an L-Band antenna. The Antenna power should be toggled off where the LD6 is connected to a powered signal splitter or other external equipment.

2.5.2 Regional Beam selection

Preparation

To receive VERIPOS corrections select a geostationary satellite beam that covers the area of operation for the vessel. See the L-band Coverage Map for beam footprints.

Up to date copies and service update information available on VERIPOS online support system (VOSS) at:

https://help.veripos.com

You need to know the VERIPOS beam(s) that cover the general area of operation for the vessel.

To ensure correct beam selection when configuring the LD6 use the VERIPOS **VeriChart** programme.

This is a free download from VOSS and allows VERIPOS users to generate their own regional chart information.

Beam

Beam Name	Coverage
98W	North America, Gulf of Mexico, South America
AORW	North America, Gulf of Mexico, South America, North Sea, West Africa
25E	North Sea, Mediterranean Sea, Africa, Persian Gulf, Caspian Sea
IOR	Asia, Indian Ocean, East Africa, Persian Gulf, Caspian Sea, East Mediterranean
143.5	Asia, Australasia, Indian Ocean

See the L-band Coverage Map for beam footprints. Up to date beam coverage charts are available on VOSS.

After turning on the LD6, touch the **LBAND** button.

The L-Band screen is displayed:

To select a Beam to receive VERIPOS Corrections –

Refer to the L-band Coverage Map and select the correct satellite beam for your area.

Touch the **Config** button;

Next touch the *Beams* button to view or amend the Beam selected. If the correct regional Beam is shown no edit is required.

If "*No Beam*" or the incorrect regional beam is shown, select *Edit* and select the beam for your work region.

Use the up/down on-screen arrows to highlight and select the beam required.

When the required beam name is highlighted, touch the *Enable* button, and then *Close*.

Return to the LD6 *Home* page

The 'S' (Sync) icon will turn from red to green when a usable beam is correctly selected and signals are received.

To view overall L-Band signal status and confirm a beam is being received - select *Home/ LBAND/ Status.*

```
1: LBAND - LBR1
1: Status
1: Device Status

Frame Sync: ✔
Signal Lock: ✔
SS: 41.52 dB/Hz
Access Enabled: ✔
Beam: 25E/1539.8825 MHz
RTCMa : Good 1.0s
RTCMb : Good 1.0s
```

Confirm '*Frame Sync'*, '*Signal Lock'* and beam settings for the selected beam.

For reliable operation the SS values should be **≥ 38.0dB/Hz.**

2.5.3 Custom Entry of User Beam Frequency

User Beams should only be selected under direction from VERIPOS.

User Beams are not used during normal LD6 operation. Custom entry of a user Beam is provided to allow the user to manually configure a Beam frequency and bit rate for reception of Veripos L-Band corrections.

Full instructions regarding User Beam entry can be found in Section 5.4 of this manual.

2.5.4 Enable for VERIPOS corrections

Tel. +44 1224 965900   Email: helpdesk@veripos.com

Go to the LD6 Access Code page *LBAND/ Access Info*

Contact the VERIPOS Helpdesk to request the unit is enabled and quote:

- **Unit ID**
- Service Access Licence (**SAL**) number.
- Provide details of the type of Service(s) you require, e.g. **Standard**, **Standard²**, **Ultra, Apex** and **Orion**

┌─────┐
│ i │ **NOTE**
└─────┘

Only when the L-Band receiver gets sync with a beam will it display access code information or allow you to enable/disable the unit.

The Helpdesk will enable the services for the LD6 over the air.

View the Access code provided from the Helpdesk following the steps below;

```
1: LBAND - LBR1          ↺    ⌂

  Status   Config   Access   Antenna
                     Info      is
                                on

  Module   Factory   Hints
  Reboot    Reset
```

```
1: LBAND - LBR1          ↺    ⌂
4: AccessInfo

  Unit ID: 47022
  Access State: Enabled
  Service Code: 6
  Services: STD, STD², Ultra, Ultra², Apex,
            Apex²
```

The Access State will show:

Enabled for the requested VERIPOS services
Or
Disabled for VERIPOS service.

This confirms service(s) are enabled and being received by the LD6 from the selected beam.

2.5.5 View and Edit Reference Stations

Once the LD6 is enabled, the VERIPOS reference station RTCM information is available.

The LD6 L-Band card outputs two data streams of RTCM corrections:-
RTCMa and **RTCMb**.

These may be configured independently and both may be selected for output on the LD6 COM or LAN ports.

RTCMa is additionally used internally, providing correction information to the LD6 internal position computation.

<u>Recommendation</u>

On the **RTCMa** data stream all reference stations should be set to **enabled**. The LD6 internal calculations will determine automatically the best stations for use.

Use **RTCMb** to provide output of corrections to third party equipment. Depending on the application it may be desirable for the user to select the appropriate stations for this equipment.

The following section describes this process.

Refer to a list of all VERIPOS stations showing their station number, name and region which can be downloaded from https://help.veripos.com

To enable or disable station(s):

From the Home screen select **LBAND/ Config** and select **RTCMa** or **RTCMb** then touch *Edit.*

Use the up/down arrows to highlight the station number and the disable button to remove it from use.

When finished editing touch the *Close* button.

The above process can be carried out for both RTCMa and RTCMb data streams.

veripos
ON TARGET

NOTE

Reference stations on RTCMa are used internally and are also available for output to other devices. Veripos recommend in most cases that all stations are enabled. The LD6 will use up to a maximum of **eight** reference stations for VERIPOS *Standard* solutions, depending on user's location and LD6 variant.

2.5.6   View L-Band Station Status

To View stations:

Go to *LBAND/ Config* and select the RTCM data stream required and touch the view button.

Slide your finger up and down on the touch screen to view more stations available on the Beam or to view the list of Disabled stations.

To view the L-Band signal status:

From the *Home* screen select *LBAND/ Status*.
Review the status of SNR, Beam, Frame Sync, Signal Lock, Signal Strength and LD6 enable status.

```
1: LBAND - LBR1
1: Status
1: Device Status

Frame Sync: ✔
Signal Lock: ✔
SS: 41.52 dB/Hz
Access Enabled: ✔
Beam: 25E/1539.8825 MHz
RTCMa : Good 1.0s
RTCMb : Good 1.0s
```

2.6 GNSS Receiver Config and Status

The LD6 GNSS screen controls power to the GNSS Antenna, shows GNSS receiver status information and provides access to configuration settings all from *Home/ GNSS*.

```
2: GNSS - AsteRx2

Status    Config    Antenna
                    is
                    off

Module    Factory   Hints
Reboot    Reset
```

Options include the ability to monitor and make changes to GNSS receiver:

- **Status** – view module info, the current status of position outputs and SV's used by the GNSS card
- **Config** – edit PPS settings on the GNSS card
- **Antenna voltage** – toggle antenna power on or off to the GNSS antenna
- **Module Reboot** – to be used only under instruction from or by a VERIPOS engineer
- **Factory Reset** – to be used only under instruction from or by a VERIPOS engineer
- **Hints** – advice where available

2.6.1 Antenna Voltage

Antenna power must be toggled **On** (*Home/ GNSS/ Antenna is off*) when the GNSS card is directly connected to a GNSS antenna. The Antenna power should be toggled off where the LD6 is connected to a powered signal splitter or other external equipment.

2.6.2 GNSS Status

From the Home screen touch the **GNSS/ Status** button to view the 'Device Status' screen.

The '**Device Status'** screen shows the current number of satellites (SV's) being tracked from the GPS and (optionally) GLONASS constellations with information relating to the quality of the Position monitor, NMEA and Raw data streams.

Example screen shows a GNSS card which has capability to receive only GPS satellite signals.

2.6.2.1 GLONASS Constellation

Where the screen entry "GLO SV's tracked" shows **0** (zero), VERIPOS services using GLONASS will not be available.

The GNSS receiver can, (*as an option),* be provided with the capability to receive position information from the GLONASS satellite constellation. When GLONASS SV's are being tracked by the Septentrio *AsteRx* card, the number of SV's tracked will be displayed on this page.

Touch the **SV Info** button (bottom) to view the 'SV Info' screen.

Touch **View SV Info** to view each satellite in the constellation(s) in turn.

2.1.3-V: Satellite Information:

▲	PRN: 01
	Type: GPS
	Elevation: 77.11°
19 R	Azimuth: 128.39°
01	SNR L1: 53.25dB/Hz
11	SNR L2: 48.50dB/Hz
▼	Back

Move between SV's using the *Up/Down* arrows and return to the previous screen with the *Back* button.

Where GLONASS satellites are tracked an "**R**" will be shown in the SV number field.

2.6.3 GNSS Config

This screen (*Home/ GNSS/ Config*) allows the user access to the GNSS Configuration Menus for PPS polarity profile settings and information on Event Markers.

2.6.3.1 NMEA Config

⎯⎯ ⓘ **NOTE** ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

If using Veripos Services, the output message settings for Veripos Solutions are set in *Solutions/ Config/ NMEA*.
⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

The *GNSS/ Config/ NMEA Config* page within is used when:
- The user requires an accurate timing signal (i.e. ZDA)
- The user is using an SBAS backup to the VERIPOS Solution.

2: GNSS - AsteRx2
2: Config
4: NMEA Config

↺   ⌂

Messages
ZDA

Edit

PPS Settings

SBAS Config

NOTE

If using SBAS backup the user should set the NMEA Config to the same messages that are set on Solutions 1, 2 or 3 (depending on the solution that is being output).

Use the *Edit* button, arrow keys and *Update* button to amend the selected output messages.

Touch *Close* when finished.

2.6.3.2   PPS Settings

Use the *Edit* button, arrow keys and *Enter* button to amend settings of pulse polarity characteristics between Low-to-High and High-to-Low.

Touch *Close* when finished.

2.2.1-E: Edit PPS Settings

Interval	Polarity
sec1	Low2High

Enter

Close

2.6.3.3 Event marker

The event marker function is not implemented on the LD6.

2.6.4 Module Reboot

This will perform a reboot on the GNSS module without rebooting other modules and the full LD6 system. If using this function it will then lead to all position calculations being reset.

2.6.5 Factory Reset

Use only under instruction from a VERIPOS engineer. This feature is password protected.

2.6.6 Hints

Shows where to locate further reference information from.

2.7 MF Receiver SBX-4

The MF SBX-4 card (where fitted) allows for reception of non-VERIPOS MF Marine Beacon and IALA differential corrections.

Access from **Home/ MF** to configure for use.

When required, toggle the Antenna power button to Antenna is **on** (default is **off**).

Where the MF antenna is connected using a splitter or to other external equipment providing DC power to the antenna the power may be set to off.

Once MF antenna power is turned on you may need to allow a few minutes before continuing with configuration.

2.7.1   Status

Touch the *Status* button.

This shows the device status screens for the MF card (MF-SBX4) and gives access to MF card Module info and available channels for correction data.

```
3: MF - SBX-4
1: Status
1: Device Status

RTCM : Good 2.0s
```

[↺] [⌂]

[Module info ►]

[◄ Channel]

The RTCM entry shows the correction age in seconds. In normal use this will correct every few seconds.

If the MF RTCM signal is lost the time will increment up to 300 seconds then show >300 s.

2.7.1.1   *Channel*

Touching the *Channel* arrow shows the Channel Monitor screen with information on the channel selected – Station, Frequency, Bit rate, Signal strength (SS), Signal to noise ratio (SNR) and Word error rate (WER).

```
3: MF - SBX-4
1: Status
3: Channel Monitor

Stat: 686 : Girdle Ness
Freq: 297 kHz
Rate: 100 bps
SS: 19 dB µV/m
SNR: 24 db/Hz
WER: 0 %
```

[↺] [⌂]

[Device Status ►]

[Module info ►]

A typical MF channel values range is shown in the screen above.

Stat:	Unique numerical ID number and name of station
Freq:	Frequency of the received station
Rate:	Data baud rate of the received transmission
SS:	The signal strength received in dB µV/m
SNR:	The current signal to noise ratio in dB/Hz
WER:	The word error rate

2.7.1.2   Module info

Touch the arrow to display the SBX-4 module information.

3: MF - SBX-4
1: Status
2: Module Info

SerNo: 799783
FWare: P030-0.004
Mode: AUTOMATIC

Channel

Device Status

This gives information on whether the MF receiver is in AUTOMATIC, AUTODISTANCE or MANUAL mode as well as the serial and firmware numbers for the SBX-4 MF receiver card.

2.7.2   MF Config

Use *Home/ MF/ Config* to edit the operating mode of the SBX-4 card between Automatic, Autodistance and Manual.

VERIPOS recommend the use of AUTOMATIC mode.

Operating mode options:

AUTOMATIC   Searches for strongest signal

AUTODISTANCE   Configures for closest MF reference station
                              Selects only from stations in the LD6 database
                              NOTE: not available when in QC Mode.

MANUAL   User entered frequency and bit rate

To change operating mode, touch the *Edit* button to amend the card channel setting.

3: MF - SBX-4
2: Config
1: Operating Mode

Current: AUTOMATIC

Edit

AUTOMATIC and AUTODISTANCE are selected from the three options using the arrows and Update button.

2.7.2.1   MANUAL frequency input

When selecting a manual frequency, first select the MANUAL mode and touch *Update* then *Close*.

Next use the *Manual Tuning* arrow on the right to *Edit* the Frequency and then the *Bitrate* for the channel required.

When the Bitrate is entered press *Update* button then touch *Close*.

2.8 UHF Receiver

The UHF receiver card is an optional receiver.

The card comes preconfigured for use with Petrobras systems.

Channels 1 to 9 have channels as specified by Petrobras.

Channels 10 to 12 are available for user configuration.

Touch the onscreen UHF button to display *Status* and *Config* options.

The *Module Reboot* will perform a reboot to the module and save a full LD6 reboot.

The *Factory Reset* button should only be used under direction from VERIPOS.

Hints can display relevant advice.

2.8.1   Status Channel Monitor and Tuning summary

Go to *Home/ UHF/ Status/ Module Info*

Displays the UHF card serial number and firmware version.

2.8.1.1   Channel Monitor

UHF/Status/Channel shows the Channel number, Frequency and rate.

It is useful to monitor the UHF signal strength.

```
3: UHF - ADL
1: Status
4: Channel Monitor

Chan: 04
Freq: 464.250 MHz
Rate: 9600 bps
SS: -62 dBm
```
[Device Status] [Tuning Summary]

Typical ranges in use are;
**SS   =   ** Signal Strength

**SNR =   ** Signal to Noise Ratio

2.8.1.2   Tuning Summary

UHF/ Status/ then use **arrow keys**

Displays the Channel number used, Frequency entered, baud rate, protocol, Modulation, FEC and Sensitivity.

```
4: UHF - ADL
1: Status
3: Tuning Summary

Channel: 10
Frequency: 469.975 MHz
Rate: 9600
Protocol: Trans. EOT (timeout)
Modulation: GMSK
FEC: FEC OFF
Sensitivity: High
```
[Channel] [Module Info]

2.8.1.3 Device Status

```
4: UHF - ADL
1: Status
1: Device Status

RTCM : Good 1.0s
```
[↺] [⌂]
Module Info ▲
Channel ◀

Displays the time in seconds elapsed from the last RTCM string received.

The value provides the clearest indication of the UHF link.

Correction age >30 seconds – UHF main screen Icon will turn Green to Amber.

Correction age >60 seconds – UHF main screen Icon will turn Red.

Where the UHF RTCM signal is lost the time will increment up to 300 seconds then show >300 s.

2.8.2 Configuration

Configuration is accessed from *Home/UHF/Config*.

Entering Command Mode

Entering command mode may cause output of RTCM to cease until the window is closed.

Do you wish to continue?

[Yes] [No]

ⓘ **NOTE** ————————————————

When amending the UHF receiver card configuration the output of UHF RTCM data is interrupted.

———————————————————————

Amend the Frequency, Channel, Forward Error Correction, Sensitivity and Link Speed using the onscreen arrows and buttons.

Selection of existing Frequencies against channel numbers can be made if suitable. **Home/ UHF/ Config/ Yes**

Use the up/down arrows to select from the pre-entered channel numbers and associated frequencies.

2.8.2.1 *Manual Frequency entry*

To manually enter details for a UHF frequency:

Home/ UHF/ Config/ Yes/ Tune/ Edit

Select using the Arrows to show the required Channel number then press the *Edit* button.

Use the *Arrows*, *Previous* and *Next* buttons to enter the Frequency required.

When entered touch the *Update* button then the *Close* button.

The Manually entered channel can then be selected for use;

Home/ UHF/ Config/ Yes.

Select the channel number / frequency combination required and touch *Select*.

2.8.2.2 Link Speed, FEC and Sensitivity

Amend the link speed from *Home/ UHF/ Config/ Yes/ Tune/ Link Speed.*

Use the onscreen controls to select

- Select **Link Speed** of 4800 or 9600 bps.
- *Forward Error Correction* on or off
- Switch *Sensitivity* between Low, Medium and High.

When finished entering information return to the *Status* section (*Home/ UHF/ Status*) to review the RTCM data delay and channel settings applied.

2.8.2.3   UHF – Module Reboot

The module reboot will reboot the UHF module without disruption to the other receiver cards.

Only use when the UHF module is not operating correctly.

2.8.2.4   UHF – Factory Reset

This function should only be used under direction of a VERIPOS representative. All user configurations are deleted.

2.9 LD6 Solutions

Depending on the services enabled by the VERIPOS service code (Access code), the LD6 processor and software will simultaneously compute **up to three** different position solutions.

Only ONE of these may be a PPP solution.

Where both Ultra and APEX are enabled by the service code, the user manually selects which PPP solution to use.

Refer to section 2.10.4 in this manual for details on selecting the NMEA solution strings under **Home/ Solutions/ NMEA.**

For most positioning applications users are recommended to select the **Best** solution.

The three solutions have designated names:-

- Std (Standard) – a Differential GPS (DGPS) solution using GPS satellites only

- Std² (Standard²)– a DGNSS solution using **both** GPS and GLONASS satellites (where available from the GNSS receiver card)

- Best – The best (high accuracy) solution currently available

Best solution output and backups

Where a VERIPOS Precise Point Positioning (PPP) solution is available, this will normally be output as the "Best" solution.

During PPP settling or should there be a PPP service outage, the position output will **automatically** switch to the next, most accurate solution. In this way the Differential GNSS solutions will be used as backup to the PPP solution.

In addition for comparison purposes a Differential GNSS solution may be output from another port.

2.9.1 Solutions

Go to **Home/ Solutions**

Solutions provide access to the Status, Configuration and three output configurations for NMEA signal streams.

```
7: Solutions              ↺        ⌂

        Status   Config   NMEA
```

> **ℹ NOTE**
>
> Solution output from the LD6 is unavailable when in QC Mode.

- **Status** – shows General information, Position, DOP, Mask and Maximum values for the currently selected position solution, e.g. Ultra.
- **Config** – shows details related to each solution and allows limited editing of mask values and to enable the input of third party, e.g. MF Beacon corrections.
- **NMEA** – these message streams can be selected as part of the output from the LD6 to ships system and allows the setup of up to three message streams (Out 1, 2 and 3) using the following message types:

GGA, GGX, VTG, GLL, GSA, GRS, GSV, GST, RMC, ZDA

Up to three message streams can be classified as 'Best', 'Std²' or 'Std' (standard) to suit.

2.9.2 Status

The General Info, Position Info, DOP Mask Values and Max Values screens Provide information relating to the Solution settings currently being output from the LD6.

General Info

Screen shows the VERIPOS service being used, the Position Mode and number of Satellites being used to derive the position output.

Position Info

Shows current Lat, Long, Height and a Course reading for the solution that is being output.

DOP Values

Values are shown for HDOP, PDOP and VDOP

DOP Mask Values

The HDOP, PDOP and VDOP Mask values are displayed.

Max Values

The maximum age for service being used, the maximum range to a station for usage (if PPP solution then *not applicable* will be displayed) and the minimum SNR values are displayed.

2.9.3 Config

The *Config* menu provides controls to select which PPP Solution is used, the Elevation Mask setting for the available DGNSS services, the DOP masks for PPP and DGNSS services and if the optional MF/UHF are available you can choose to enable or disable the use of the RTCM from each module.

Solutions/ Config/ Elevation Mask

You can edit the elevation mask of all DGNSS services such as Standard and Standard². For PPP services such as Ultra or Apex – the Elevation mask <u>**cannot**</u> be configured (**default 7°**).

```
7: Solutions
2: Config
1: Elevation Mask

           Service: DGPS
PPP        Elevation Mask: 7 °    DOP Masks

PPP              Edit           PPP  Service
```

Solutions/ Config/ DOP Masks

```
7: Solutions
2: Config
2: DOP Masks

           Service: PPP
DGPS       H/P/V: 99 / 99 / 99   Corr. Input

DGPS             Edit           Elev Mask
```

This section allows editing of the mask settings by service.

Use the arrow keys to select the service then select Edit to highlight and select the required elevation and HDOP, PDOP and VDOP mask settings in degrees.

Touch the *Edit* button and use the **Up/Down** and **Right** arrows to select the value(s) for each parameter. Touch the *Enter* button when finished.

Solutions / Config/ Correction Input/ Edit

This menu option is used in LD6 units when fitted with MF and/or UHF receivers.

Use this menu to Enable or Disable the Receiver card(s).

7.2.3-E: Edit Correction Input

Use the Arrows to highlight the card to **Enable** or **Disable** and use the onscreen buttons to action. Where enabled, the corrections received by these modules will be included in the DGNSS solution.

Solutions/ Config/ PPP Service

The menu item only appears where the Access code supports multiple PPP services. This section allows users to switch between High accuracy PPP services.

> **i** — **NOTE** ——————
>
> The LD6 will only compute and output ONE PPP solution. Users can switch between High Accuracy PPP solutions but must allow for service convergence time before high accuracy position output.

Use the Button to switch to the required High Accuracy service to be used by the internal algorithm of the LD6, e.g. Apex.

The LD6 will request confirmation for this change. A warning box appears to alert user that switching between PPP solutions will lead to a period of time (settling) where there is a loss of PPP solution data being output.

2.9.4 NMEA

Use the arrows on the left to select from Solutions *1, 2 or 3.*

Touch the Next arrow.

Use the up/ down arrows on the left to select if this solution is to output ***Best***, ***Std²*** or ***Std*** (Standard), as required / available.

Touch ***Next***, then select the Message(s) strings to be output.

A notification message will appear when multiple position strings (which may cause operational problems) are selected for output.

When all messages required for that solution are selected, touch the ***Finish*** arrow.

The LD6 will confirm that you wish to reset the output port.

ⓘ NOTE

During change there may be no output of position data.
You will be unable to select both GGA and GGX strings, as GGX is a NMEA GGA output with precision to 7 decimal places in lat and long fields.

2.10   Actions

From the Home page select *Actions*.

This displays the menu below;

| Software version 8.2.0.3 Actions menu | Software version 50.2.0.2 Actions menu |

Use the on – screen buttons to perform actions.

Certain actions, e.g. Factory Reset, should only be undertaken under instruction from a Veripos technician.

Details below cover those most frequently used.

— ⓘ **NOTE** —————————————————————

The *Calibrate Screen 2* icon only appear when an external monitor is connected.

───────────────────────────────────

2.10.1   Log off

Touch to Log off the LD6 software. Use under guidance from a Veripos Technician.

2.10.2   Reboot

Touch to Reboot the LD6.

2.10.3   Shutdown

To shut down the LD6 go to *Actions/ Shutdown/ Yes.*

2.10.4   Factory *Reset*

Touch to perform a Factory Reset of the LD6. Use under guidance from a Veripos Technician.

2.10.5   Display Config

The **Display Config** menu is only present on LD6's on software version 50.2.0.2.

2.10.5.1 Display Select

The **Display Select** menu is only relevant when a touch-screen enabled external monitor is connected to the LD6. This setting allows the correct drivers to be installed. The supported touch-screen monitors are **Hatteland** and **Norco**. Contact VERIPOS for further advice for use of other external touch-screen monitors.

Select the appropriate drivers for the monitor in use using the *Up/ Down* arrows then press **Enter**.

— [i] NOTE —————————————————————

After editing the *Display Select* settings, a reboot will be required to ensure settings are applied. This will result in a temporary loss of positioning.

The **Display Select** option only present on LD6's running software version 50.2.0.2. LD6's on older software versions will automatically load the correct drivers for the touch-screen monitor attached.

2.10.5.2 Calibrate Screen 1/ 2

On LD6's running software version 50.2.0.2, the **Calibrate Screen** settings are located within the **Display Config** menu. On LD6's running older software versions, the **Calibrate Screen** options are found via the **Actions** menu.

For further information on screen calibration, please refer to **Section 2.11.7**.

2.10.6   Apps

Using the Apps button At **Home/ Actions/ Apps,** the following applications can be launched:

— [i] NOTE —————————————————————

The **Apps** icon will only be available when a VGA monitor has been connected to the LD6.

2.10.6.1 Launch /Close Orion

This will allow user to Launch the on – board Orion DP application.

> **NOTE**
>
> Icon is greyed out if already in use or another application is launched.

If you need to make the launch button available, first exit the application that is in use – e.g. on-board Verify QC.

When the Orion program is running, there will be a **Close Orion** option available with the **Apps** menu:

For details in the use of this software refer to the **Orion** manual.

2.10.6.2 QC Mode

This launches the Verify QC software (requires USB Dongle to be connected to LD6 prior to launching QC Mode).

> **NOTE**
>
> Icon is greyed out if already in use or another application is launched.

Exit the application that is being used to make the launch button available.

For details in the use of this software refer to the **Verify QC for LD6 manual**.

2.10.6.3 File Manager

The File Manager button and function is only made available when the LD6 is in QC Mode.

Use of File Manager is described in the **Verify QC for LD6 manual**.

2.10.6.4 Dual Monitor Screen Layout

When an external monitor is attached, the external monitor effectively becomes an extension of The LD6 screen. The LD6 screen is *always* defined as screen 1 and the external screen is screen 2.

A mouse can be used to control both screen 1 and screen 2. To move the mouse from the LD6 screen on to the external monitor, drag the mouse to the right.

To mouse the mouse from the external monitor to the LD6 screen, drag the mouse to the top left of the monitor.

The screen layout used is shown below:

LD6 Dual screen layout

2.10.7 Calibrate Screens 1/2

Touch these buttons when displayed and follow the instructions to calibrate the touchscreen.

⎯ ⅰ **NOTE** ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

The **Calibrate Screen 2** will only appear when an external monitor has been connected.

Screen 2 can only be calibrated when an external **touchscreen** monitor is used.

2.11   Settings

Access from **Home/ Settings**

This section provides information on the controls to:

- Configure serial I/O ports

- View and configure Network settings

- Day / Night screen toggle

- View the LD6 status

2.11.1 Day/Night Mode

Day/night toggle setting of the LD6 screen, press the yellow "dot" button to switch screen display between night and day setting. When in night mode the yellow "dot" appears further away (smaller) and a darker shade.

2.11.2 Status

This provides access to overall system status for the LD6; use the right hand side arrow keys to review:

- Application system version
- Fan speeds
- Temperature sensor readings
- System resource

```
0: LD6 Settings
1: Status
3: Temp. Readings

Sensor 1: 40°C
Sensor 2: 42°C
Sensor 3: 35°C
```

2.11.3 I/O - Input/output COM port setup

```
0.10.1: Select COM Port
Port: COM1
Source: LBAND
Content: RTCMa
COM14    Line: RS232
COM1     Rate:  9600 / 8/n/1
COM2
Remove Output
Next    Back    Close
```

This is used to access configuration of the fourteen com ports

Default port settings are:

PORT	Device /Data Stream	Protocol	LAN
COM1	LBAND - RTCMa	RS232 9600 8N1	9001
COM2	Solution 1	RS232 9600 8N1	19016
COM3	GNSS - Raw	RS232 115200 8N1	9012
COM4	LBAND - RTCMb	RS232 9600 8N1	9002
COM5	GNSS - NMEA	RS232 9600 8N1	9011
COM6	MF – RTCM	RS232 4800 8N1	9031
COM7	UHF - RTCM	RS232 38400 8N1	9051

COM ports 8 – 14 are not configured by default.

VERIPOS recommend using the default port settings wherever practical.

Changes to default port settings should be recorded so that they may easily be re-instated if it becomes necessary to replace a unit or perform a factory reset.

COM6 and **COM7** are configured when the associated receiver modules (MF and UHF) are installed.

2.11.3.1 LD6 Default COM Port Settings

COM1 – LBAND RTCMa Output – Veripos Corrections

The *LBAND - RTCMa* output is typically used to provide corrections to Verify QC or other VERIPOS Equipment.

The same RTCM data is supplied to the LD6 internal calculations.

Veripos recommend that <u>all reference stations are enabled on RTCMa</u>.

All Veripos algorithms are designed to automatically select the optimum stations for use in the calculation.

COM2 – NMEA Solution 1 Position Output

Solution 1 is the primary NMEA position output and is used to provide position data to the users' equipment.

The choice of calculations and the NMEA messages are configured using the *NMEA* menu which is accessed via the *Solutions* button on the Home page. By default, the "Best" calculation and NMEA GGA message are configured.

COM3 – Raw GNSS Output – Verify QC

The GNSS – Raw output is reserved for use with Verify QC.

It should not be used for any other purpose without first consulting the VERIPOS Helpdesk.

> **i** **NOTE**
>
> The baud rate <u>may not be reduced below</u> 57600 baud – lower settings result in data loss.

For long cable runs, it is preferable to use a LAN interface or RS422 rather than RS232**.**

COM4 – LBAND RTCMb Output – User applications

The **LBAND - RTCMb** output is typically used to provide corrections to users' equipment.

This enables the user to enable/disable reference stations as required by his equipment without adversely affecting the internal solutions. It may be necessary to make changes to the transmission protocol if long cable runs are required.

COM5 – GNSS NMEA ZDA Message, direct from GNSS Receiver

The **GNSS – NMEA** output is only used to provide NMEA ZDA time stamp data for use in conjunction with the 1pps pulse. The message is taken directly from the GNSS receiver to ensure the best possible synchronisation with the 1PPS.signal

No changes should be made to the configuration of the GNSS receiver without first consulting VERIPOS.

COM6 – MF RTCM Output

The **MF – RTCM** output provides RTCM correction data from the MF station.
It is mainly intended for use by Verify QC as a backup when all other correction sources have failed or been disabled.

COM7 – UHF RTCM Output

The **UHF – RTCM** output provides RTCM data from the UHF station when in use.
The corrections may be output to be used by Verify QC or third party equipment.
(This option is designed to support the Petrobras UHF chain in Brazil. Users considering other applications should consult the VERIPOS Helpdesk for advice.)

Further details for all ports are given in Section 4.

2.11.3.2 LD6 Available I/O Options

Device	Data Stream	Function
LBAND:LBR1	**RTCMa**	Primary output of RTCM data from L-Band receiver. The same data stream is used by the internal computations**.**
	RTCMb	Secondary output of RTCM data from L-Band receiver.
	Config	*Use only under Veripos Guidance*
GNSS:AsteRx2	NMEA	NMEA ZDA time stamp data. Only for use with 1PPS signal
	Raw	Raw GNSS data. Only for use with Verify QC
	Config	*Use only under Veripos Guidance*
MF:SBX4	RTCM	RTCM data from MF receiver.
	Config	*Use only under Veripos Guidance*
UHF:PacificCrest	RTCM	RTCM data from UHF receiver.
	Config	*Use only under Veripos Guidance*
RTCM in 1	Veripos	External Veripos RTCM data input
	3rd Party	External 3rd Party RTCM data input
RTCM in 2	Veripos	External Veripos RTCM data input
	3rd Party	External 3rd Party RTCM data input
RTCM in 3	Veripos	External Veripos RTCM data input
	3rd Party	External 3rd Party RTCM data input
Solutions 1	NMEA	NMEA position data output 1
Solutions 2	NMEA	NMEA position data output 2
Solutions 3	NMEA	NMEA position data output 3
Gyro Input	Head	Gyro heading input, for use with Orion. Must be in NMEA HDT or THS format.

2.11.3.3 NMEA output

When configuring the NMEA position outputs, the COM ports and protocol are selected for each of three solutions (**1, 2** and **Out3**) from the *Settings / I/O* screen.

Home / Solutions / NMEA.

```
              7.15.1: Select Solution
                 Solution: 1              Next
                 Service: Best
                 Messages: ZDA, GST,
                           GGX, VTG       Back
        3
        1
        2
                                          Close
```

Assign a service (**Best**, **Std²** or **Std**) to each solution.

```
              7.15.2: Select Service
                 Current: Best            Next
                 Selected: Best

        Std²
                                          Back
        Best
        Std
                                          Cancel
```

Next select the required NMEA messages to each:-

2.11.3.4 Multiple Data Stream Outputs

Users can output the identical messages to different ports.
First select an unassigned LD6 COM port e.g. COM14.

Settings/ I/O and the use the Arrows to highlight the port:

Press **Next** and use the Arrows to select the data streams to output to this port.

Where multiple LD6 outputs of the same device/data stream are required, it is only necessary to assign the same data stream to ports. Each port may use a different protocol.

Any External RTCM input data is made available to the LD6 internal calculations. The RTCM external data is also available on the Ethernet connection for use e.g. in Verify QC.

2.11.3.5 LD6 Serial cable Pin – out

DB9	RS-232	RS422
1	Not connected	Not connected
2	TxD	Tx(-)
3	RxD	Rx(+)
4	Not connected	Not connected
5	Signal ground	Signal Ground
6	Not connected	Not connected
7	Not connected	Tx(+)
8	Not connected	Rx(-)
9	Not connected	Not connected

2.11.3.6 LD6 RS 232 / RS422

Default configuration for each COM port is:

- 1 start bit
- 8 data bits
- No parity
- 1 stop bit

This information may be required when interfacing to ships systems using RS-232/422 standards. The LD6 is the transmitting device.

2.11.4 Network

2.11.4.1 Settings/Network

Touch the "Network" button in the Settings menu to open the Network page:

2.11.4.2 RJ45 LAN Ports

There are two RJ45 LAN ports mounted under the power connector on the extreme left of the rear panel labelled "Ethernet".

The upper port is LAN1, the lower port is LAN2.

To view the LAN Port status:

Touch **Settings / Network / Status** button to display the current settings of the ports:

0.16.1: Network Status	0.16.1: Network Status
Name: LAN1 (Up)	Name: LAN1 (Up)
Addr: 00:50:C2:61:5F:CF	Addr: 00:50:C2:61:5F:CF
IP: 192.168.2.2 (static)	IP: 192.168.0.75 (auto)
Mode: Static	Mode: DHCP

The **Up/Down** arrows may be used to switch between LAN1 and LAN2.

Name: Identifies the port and status is shown in brackets:

Up	= Port connected
Down	= Port disconnected
Addr:	= MAC address of interface card
IP:	= Current IP Address of port

In **Static** mode, this is the static IP address assigned in Config

In **DHCP** mode, this is normally the IP address assigned by the external DHCP server.

a) If an IP is received from the server, it is displayed followed by "(auto)".
b) If no IP is received from the server, the unit falls back to the static IP.

The static IP is displayed followed by "(fallback)" [this is usually an indication of a fault]

Mode: Shows the mode selected in **Config** (either Static or DHCP)

2.11.4.3 Network / Config

From the LAN menu touch the **Config** button to open the configuration page:

0.16.1: Select Network
Name: LAN1
IP: 192.168.0.75
Mode: DHCP

Use the Up/Down arrows to switch between LAN1 and LAN2.

The display shows the port name, current IP and current mode.

Note that in the illustration above, the IP is the current IP assigned by the DHCP server, not the current setting of the static address (also known as the **Fallback Address**).

To change the current configuration, touch the *Next* button:

Use the *Up/Down* arrows to change the mode if required, then touch the Next button to move to the next setting. It is necessary to cycle through all four pages in order to reach the "Finish" button which is used to accept the changes.

The four pages allow the user to:

Set	Description
Mode	Choose between Static or DHCP – Veripos recommend use of Static
Static Address	To Set Static / Fallback address
Subnet Mask	To set the Subnet Mask info
Gateway Address	Where required – Use Finish button to confirm changes.

The factory LAN **DEFAULT SETTINGS** are as follows:

Mode: **STATIC**

Static IP (LAN1):	**192.168.002.002**
Static IP (LAN2):	**192.168.003.003**
Subnet Mask:	**255.255.255.000**
Gateway Address (LAN1):	**192.168.002.001**
Gateway Address (LAN2)	**192.168.003.001**

2.11.4.4 Verify QC and IP / Ethernet

Ethernet is the preferred method of interfacing to Verify QC.

All interfaces can be supported using a single CAT5e network cable.
Cable runs typically encountered on vessels fall within the Ethernet specification.
This contrasts to when using RS232, multiple cables are required and longer runs may pose problems when high baud rates are required [e.g. for GNSS Raw].

All I/O signals which are available on the COM ports can also be interfaced via the LAN.

2.11.5 IP Ports

The LD6 IP port assignments are listed below.

Data Stream	IP Socket
LBAND: LBR1 – RTCMa	9001
LBAND: LBR1 - RTCMb	9002
GNSS: AsteRX2 - Raw	9012
GNSS: AsteRx2 - Config	9013
MF: SBX4 - RTCM	9031
GNSS: AsteRx2 - NMEA (ZDA)	9011
UHF: PacificCrest RTCM	9051
Solutions: Out1	19016
Solutions: Out2	19017
Solutions: Out3	19018
Solutions: In RTCM1	19013
Solutions: In RTCM2	19014
Solutions: In RTCM3	19015

2.12 Archiving Data

In the event of any receiver issues, such as loss of solution, it is possible to archive the raw GNSS and RTCM data in a VERIPOS proprietary format. These files can then be sent to VERIPOS for analysis in order to determine the cause of any issues.

To archive LD6 data, insert a USB memory stick into an available LD6 USB socket. The screen below will appear:

Select **Archive Log Files** to commence archiving the raw logged data to the USB memory stick.

The screen will now show that the data is currently being archived and an option to cancel the operation will be available if required:

NOTE

Always perform a virus scan on the USB memory stick before inserting into the LD6.

The data archive may take several minutes and is complete when the **Eject all** icon becomes available.

Before removing the USB memory stick from the LD6, ensure that **Eject all** is pressed. This will then allow the USB memory stick to be safely removed.

2.13 LD6 Configuration Backup

The LD6 configuration settings can be backed up onto an external USB drive if required. This allows for configurations to be saved and restored after a factory reset. This also allows for the transfer of configuration settings from one LD6 to another.

The configuration backup procedure backs up the following:

- All user-configurable settings entered via the LD6 front panel display e.g. LBAND beam selection, network settings, COM port settings etc.
- Orion software settings – If applicable
- Verify QC configuration files – If applicable (Must be loaded on after an LD6 configuration restore).

During the backup process, an LD6ImportExport directory will be created on the USB drive. Where applicable, within this directory subdirectories containing Verify QC and/or Orion configuration back-ups will be created. The back-up process will create a subdirectory containing all other settings, named using the following date/time naming convention:

YYYY-MM-DDTHH-MM-SS (example 2019-01-09T20-54-33)

To back up the current LD6 configuration, insert a USB memory stick. The following page will then be displayed:

Touch **Export Config Files**. After this, the window below will appear confirming that the LD6 configuration has been successfully exported:

Press **OK**, followed by **Eject all** before removing the USB memory stick:

For information relating to restoring LD6 configuration files on to an LD6, please contact the VERIPOS Helpdesk.

---

[i] NOTE ──────────────────────────────

Configuration backups can only be restored on an LD6 running on the same software version as that which the backup configuration was created from.

2.14　　　Use of External Touchscreen Monitors

A touchscreen monitor can be connected to the LD6. The VERIPOS *Orion* software can then be operated using the touchscreen monitor.

Verify QC is not designed to be operated via touchscreen therefore a keyboard and mouse will be required for operation and configuration of Verify QC.

Touchscreen monitors require both VGA and USB connection to the LD6. VERIPOS recommend the use of USB 2.0 cables, up to a maximum length of 5 metres.

The LD6 supports the use of *NORCO* and *HATTELAND* touchscreen monitors. Refer to **Section 2.11.5** for information on touchscreen display configuration.

3 VERIPOS Software Compatibility

LD6 IMU's running software version 50.2.0.2 and below are compatible with the following VERIPOS software:

Compatible VERIPOS Software	Compatible Software Version
Orion DP (On-board LD6 & PC)	2.0.2.74 & above
Verify QC (On-Board LD6)	1.12A
Verify QC (on PC)	1.20

LD6 IMU's running software version 50.2.0.2 and below are **NOT** compatible with the following VERIPOS software:

- Quantum

4 Troubleshooting

4.1 Overview of troubleshooting

The LD6 uses a touch screen to access an embedded Windows XP operating system.

The system contains no user-serviceable parts.

The cover should not be removed except under the guidance of a VERIPOS engineer, first ensuring that **the unit is isolated from all AC and DC power supplies**.

Problems experienced when using the LD6 system relate to antenna connectivity, correction signal reception, configuration errors or relate to the GNSS satellite positioning signal reception for inclusion in calculating a position solution.

4.1.1   Hardware

Hardware fault finding should be limited to checking the security of connectors and checking supply voltage.

It is **strongly recommended** before detailed investigation is undertaken to first check coaxial cable integrity and correct location of antennas.

This manual provides some guidance for troubleshooting the LD6 IMU.

4.1.2   Power faults

Fault	Reason	Remedy
Screen blank	Shutdown has been activated from Action menu but the power switch in on	Toggle the power switch. This will reboot the unit and the MMI should appear.
	External supply fault, disconnected or switched off	Check power to the LD6. Adjust screen brightness using the control on the left side of the LD6. Check power connections to the unit for physical and electrical integrity.
	Fault in AC/DC supply.	Disconnect the power supply. Check voltages to and from unit. The LD6 AC is 110/240 V. DC power 12–24 VDC. Reconnect power and allow LD6 to restart.
	LD6 fault.	If the PSU voltage is correct contact the VERIPOS Helpdesk.

4.1.3 Enable/disable faults

Fault	Reason	Remedy
Enable indicator shows red. ID: 47033 🟢S 🔴E	Unit disabled; Access code incorrect.	Contact VERIPOS helpdesk for appropriate enable code. Repeat entry of code. Use Quick Guide. Disconnect unit from power for one minute. Reconnect and allow to initialise, then repeat entry of code.
Unable to enter an Access code. ID: 47033 🔴S 🟢E	Not receiving L-band signal. 'Sync' icon is Red.	Unit needs to receive a beam (L-band frequency) for the global work region before it can be enabled / disabled. Ensure L-band antenna is connected, has a clear view of sky to equator. Use the Quick Guide to select and confirm a valid regional satellite beam has been selected for the work area.

4.1.4 L-Band signal faults

Fault	Reason	Remedy
Sync indicator shows red. ID: 47033 🔴S 🟢E	No sync with satellite beam. No beam being received. Unit requires a restart.	Use the L-band Coverage Map to check which beam is correct for current location. Go to **L-Band/Config/Beams** to check and, if required, amend to the correct regional beam. **Where L-Band signal** is derived from vessel's Inmarsat. – Unit may have lost beam lock or has switched to a different geostationary satellite. Confirm the Inmarsat is tracking the correct satellite. Check the correct frequency is entered - refer to Section 4 of this manual. Contact Helpdesk.
	Vessel has moved to a new work region - beam used has not been changed.	Check which beam is selected at **L-Band/Status/ Device Status**. If necessary consult the L-band Coverage Map and if required select the regional beam.
	Antenna blockage.	Visually check whether the path between the antenna and satellite is subject to blockage. This can occur when the vessel is in port and/or alongside a large structure. Blockage can also be caused by the vessel's own superstructure. This may be eliminated by changing the heading.

Fault	Reason	Remedy
	Interference.	Investigate any source of L-band transmissions and high power transmissions of other frequencies. If possible shut down possible sources to eliminate them.
	Antenna disconnected or inoperative.	Visually check antenna and cable for DC power and damage. Check coaxial connections and inspect antenna for damage.

For Verify QC, consult the Verify QC Operations Manual for guidance on its' use where provided in conjunction with the LD6.

For problems relating to antennas or cables, see the LD6 Installation manual (AB-V-MA-00520) and the Antennas & Coaxial Cable Installation guide (GD-GL-VER- EQP-001) before installing replacement equipment and for a general guide to equipment installation.

4.2 VERIPOS Helpdesk

For assistance with basic troubleshooting please refer to the section in this   manual.

VERIPOS encourage all users to report problems or operating queries to the Helpdesk so that they may receive assistance.

For general help please see the extensive library of FAQ and reference material on the VERIPOS Online support system, VOSS at:

https://help.veripos.com

The VERIPOS Helpdesk is the first point of contact for technical enquiries and fault reports. It is manned 24 hours per day, 365 days per year. Helpdesk contact details are in the *Contact information* chapter. VERIPOS recommend initial contact is made by email.

You can also create a fault ticket accessed from the VOSS. Using this system will ensure contact details, fault description etc. are correctly recorded and you can track progress without using email.

The Helpdesk is trained to provide assistance to most queries. They can request technical staff to provide support for complex issues.

To ensure a rapid response, initial communication should include the following information:

- **User's name**
- **Telephone number**
  If possible, choose a phone near the equipment.
- **Email address**
- **Full vessel name**
  Correct identification is important; VERIPOS may have installation drawings.
- Name of **parent company**
- **User Code** (on front panel) and current 'Access code' of LD6, see the Operation chapter for details.
- **Current status** of the LD6

- Brief **description of other VERIPOS hardware and software installed**
- Vessel's current **operating region** and lat/long.
- **Vessel's status**
  Is it alongside, in transit, in operation, or shut down due to fault?
- **History of fault** including time when a problem occurred.
  - Is this a new installation which has not yet been fully commissioned?
  - Did a problem suddenly arise with a system which was previously operational?
  - Did the system cease working after moving to a new region?
- **Description of fault**

Once basic information has been received the Helpdesk raise a fault ticket. Users can access the ticket from the VOSS site.

5 Reference information

5.1 Service access licence

VERIPOS correction signals are provided as a chargeable service.

In order to receive this service the user must first arrange a **Service Access License** (SAL). This takes the form of a contract which is agreed between the user's company and the VERIPOS Operations department.

The equipment cannot be used until an enable code is obtained from the VERIPOS Helpdesk. The Helpdesk is not authorised to issue a code unless an active SAL exists, and its number can be determined. To avoid delays the user should keep a record of the SAL number associated with his unit.

5.2 L-band Coverage Map

An up-to-date VERIPOS L-band Coverage Map can be found on the VERIPOS Online support system at https://help.veripos.com.

5.3 LD6 Menu structure

Overall Menu Structure of the LD6

L-Band Menu Structure of the LD6

GNSS Menu Structure of the LD6

* Manual Tuning page is only available whenin Manual Mode

MF Menu Structure of the LD6

UHF Menu Structure of the LD6

* Solutions option will not be available when the LD6 is in QC Mode
** Correction Input is not available if MF or UHF Modules are not Installed
*** PPP Service is only avaiable when both Ultra and Apex Serivices are enabled on the same unit

Solutions Menu Structure of the LD6

Actions

Log Off | Reboot | Shutdown | Factory Reset | Calibrate Screen 1 | Calibrate Screen 2* | APPS*

Yes / No | Yes / No | Yes / No | Enter System Access Code | Yes / No | Yes / No | Launch /Close Orion

QC Mode / LD6 Mode**

File Manager

* Only shown if an external monitor is connected to the LD6
** QC mode will be shown when in LD6 mode and LD6 mode shown when in QC mode

Actions Menu Structure of the LD6 (Software version 8.2.0.3)

Actions

Log Off | Reboot | Shutdown | Factory Reset | Display Config | APPS*

Yes / No | Yes / No | Yes / No | Enter System Access Code | Display Select | Launch /Close Orion

Calibrate Screen 1 | QC Mode / LD6 Mode**

Calibrate Screen 2* | File Manager

* Only shown if an external monitor is connected to the LD6
** QC mode will be shown when in LD6 mode and LD6 mode shown when in QC mode

Actions Menu Structure of the LD6 (Software version 50.2.0.2)

Settings Menu Structure of the LD6

5.4 Add User beam

The 'User Beam' facility is provided for the manual entry of new satellite beams to receive VERIPOS corrections.

Use this channel for your work region ONLY when advised by VERIPOS.

Go to *LBand/Config/Beams User Beams/Edit*

Use the Arrow buttons to Select from preset names, 'User 1-3'.

Where a new beam frequency needs to be entered:
On the **User beam** to edit (User1 – 3), touch *Edit* and use the *Arrow* buttons / *Next* to enter the frequency and Bitrate (normally 1200).

Touch Update to enter the frequency.
Finally navigate to *Home / Lband /Config /Beams* and *Enable* the User beam as required.

Change Beam

Current Beam:
Name: User1
Freq: 1539.9825 MHz
Frame Sync: ✔
Signal Lock: ✔

98W
User1 ✔
AORE

Enable   Close

5.5 NMEA Sentences

This section describes the message structure of the following positioning output messages: -

GGA	GGX	VTG	GLL	GSA
GRS	GSV	GST	RMC	ZDA

NMEA GGA Sentence

The NMEA GGA sentence contains time and position fix related data for a GPS system. It includes basic quality information, which is limited to 'Fix Quality', 'Number of Satellites in Use', 'HDOP' and 'Age of Differential GPS Data'.

Structure and Example: -

$GPGGA,hhmmss.ss,ddmm.mmmmm,a,dddmm.mmmmm,b,q,xx,p.p,a.b,M,c.d,M,x.x,nnnn*hh<CR><LF>

$GPGGA,123519,4807.0378783,N,01131.0054784,E,1,08,0.9,545.4,M,46.9,M,,*47

GGA sentence defined: -

GGA	Global Positioning System Fix Data
hhmmss.ss	UTC of position
ddmm.mmmmm	latitude of position
a	N or S, latitude hemisphere
dddmm.mmmmm	longitude of position
b	E or W, longitude hemisphere
q	GPS Quality indicator (0 = invalid, 1 = GPS SPS, 2 = DGPS fix, 3 = GPS PPS, 4 = Fixed RTK, 5 = Float RTK, 6 = Estimated (dead reckoning), 7 = Manual Input Mode, 8 = Simulation Mode
xx	number of satellites in use
p.p	horizontal dilution of precision
a.b	antenna altitude above mean-sea-level
M	units of antenna altitude, meters
c.d	Geoidal height
M	units of geoidal height, meters
x.x	age of differential GPS data
nnnn	Differential reference station ID, 0000 to 1023
*hh<CR><LF>	checksum, carriage return and line feed

NMEA GGX Sentence

GGX is similar to GGA but the latitude and longitude are specified with increased accuracy (7 decimal places instead of 5). Because of the increased message length, some systems may not be able to decode it.

NMEA VTG Sentence

The NMEA VTG sentence provides the actual course and speed relative to the ground.
Structure and Example:
    $GPVTG,p.p,T,q.q,M,r.r,N,s.s,K,u*hh<CR><LF>
$GPVTG,054.7,T,034.4,M,005.5,N,010.2,K*33
VTG sentence defined:
VTG = Course over ground and ground speed
p.p   course over ground
T   degrees True
q.q   course over ground
M   degrees Magnetic
r.r   speed over ground
N   knots
s.s   speed over ground
K   km/hr
U   mode indicator (A = Autonomous, D = Differential, E = Estimated)
*hh<CR><LF>   checksum, carriage return and line feed

Note that, as of the 2.3 release of NMEA, there is a new field in the VTG sentence at the end just prior to the checksum. Receivers that don't have a magnetic deviation (variation) table built in will null out the Magnetic track made good.

NMEA GLL Sentence

The NMEA GGL sentence provides 2D position data.

Structure and Example:
$GPGLL,ddmm.mmmmmmm ,a, dddmm.mmmmmmm ,b,hhmmss.ss,S,I*cc<CR><LF>
    $GPGLL,5708.7104685,N,00217.1169613,W,062859.00,A,D*72

GLL sentence defined:
GLL = Geographic position - Latitude and Longitude
ddmm.mmmmmmm   latitude of position
a   N or S
dddmm.mmmmmmm   longitude of position
b   E or W
hhmmss.ss   UTC of position
S   status (A = data valid ; V = data not valid)
I   mode indicator (A = Autonomous, D = Differential, E = Estimated, M = Manual, S = Simulator, N = data Not valid)
*cc<CR><LF>   checksum, carriage return and line feed

NMEA GSA Sentence

GSA sentence defined:

GNSS DOP and Active Satellites
GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentence, and DOP values.

If only GPS, GLONASS, etc. is used for the reported position solution the talker ID is GP, GL, etc. and the DOP values pertain to the individual system. If GPS, GLONASS, etc. are combined to obtain the reported position solution multiple GSA sentences are produced, one with the GPS satellites, another with the GLONASS satellites, etc. Each of these GSA sentences shall have talker ID GN, to indicate that the satellites are used in a combined solution and each shall have the PDOP, HDOP and VDOP for the combined satellites used in the position.

```
$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR><LF>
                                                  └── VDOP
                                              └── HDOP
                                          └── PDOP
                      └── ID numbers¹ of satellites used in solution
      └── Mode: 1 = Fix not available, 2 = 2D, 3 = 3D
    └── Mode: M = Manual, forced to operate in 2D or 3D mode
         A = Automatic, allowed to automatically switch 2D/3D
```

Notes:

1) Satellite ID numbers. To avoid possible confusion caused by repetition of satellite ID numbers when using multiple satellite systems, the following convention has been adopted:

a) GPS satellites are identified by their PRN numbers, which range from 1 to 32.
b) The numbers 33-64 are reserved for WAAS satellites. The WAAS system PRN numbers are 120-138. The offset from NMEA WAAS SV ID to WAAS PRN number is 87. A WAAS PRN number of 120 minus 87 yields the SV ID of 33. The addition of 87 to the SV ID yields the WAAS PRN number.
c) The numbers 65-96 are reserved for GLONASS satellites. GLONASS satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.

NMEA GRS Sentence

GNSS Range Residuals

This sentence is used to support Receiver Autonomous Integrity Monitoring (RAIM). Range residuals can be computed in two ways for this process. The basic measurement integration cycle of most navigation filters generates a set of residuals and uses these to update the position state of the receiver.
These residuals can be reported with GRS, but because of the fact that these were used to generate the navigation solution they should be recomputed using the new solution in order to reflect the residuals for the position solution in the GGA or GNS sentence.
The MODE field should indicate which computation method was used. An integrity process that uses these range residuals would also require GGA or GNS, GSA, and GSV sentences to be sent.
If only GPS, GLONASS, etc. is used for the reported position solution the talker ID is GP, GL, etc. and the range residuals pertain to the individual system. If GPS, GLONASS, etc. are combined to obtain the position solution multiple GRS sentences are produced, one with the GPS satellites, another with the GLONASS satellites, etc. Each of these GRS sentences shall have talker ID "GN", to indicate that the satellites are used in a combined solution. It is important to distinguish the residuals from those that would be produced by a GPS-only, GLONASS-only, etc. position solution. In general the residuals for a combined solution will be different from the residual for a GPS-only, GLONASS-only, etc. solution.

$--GRS,hhmmss.ss,x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>

Range residuals in meters for satellites used in the navigation solution[1,2].
Order must match order of the satellite ID[3] numbers in GSA.
When GRS is used GSA and GSV are generally required.

Mode: 0 = residuals were used to calculate the position given in the matching GGA or GNS sentence
1 = residuals were recomputed after the GGA or GNS position was computed

UTC time of the GGA or GNS fix associated with this sentence

Notes:

1) If the range residual exceeds +99.9 meters, then the decimal part is dropped, resulting in an integer (-103.7 becomes -103). The maximum value for this field is +999.

2) The sense or sign of the range residual is determined by the order of parameters used in the calculation.
The expected order is as follows: range residual = calculated range - measured range.

3) When multiple GRS sentences are being sent then their order of transmission must match the order of corresponding GSA sentences.
Listeners shall keep track of pairs of GSA and GRS sentences and discard data if pairs are incomplete.

NMEA GSV Sentence

GSV sentence defined:

GNSS Satellites in View

Number of satellites (SV) in view, satellite ID numbers, elevation, azimuth, and SNR value. Four
satellites maximum per transmission. Total number of sentences being transmitted and the number of the sentence being transmitted are indicated in the first two fields.

If multiple GPS, GLONASS, etc. satellites are in view, use separate GSV sentences with talker ID GP to show the GPS satellites in view and talker GL to show the GLONASS satellites in view, etc. The GN identifier shall not be used with this sentence.

```
$--GSV,x,x,xx,xx,xx,xxx,xx,...............,xx,xx,xxx,xx*hh<CR><LF>
                                              |          |    4th SV2
                                              |        2nd-3rd SV2
                                              |  SNR (C/No) 00-99 dB-Hz, null when not tracking
                                              | Azimuth, degrees True, 000 to 359
                                              | Elevation, degrees, 90° maximum
                                              | Satellite ID number3
                                              | Total number of satellites in view
                                              | Sentence number1, 1 to 9
                                              | Total number of sentences1, 1 to 9
```

Notes:

1) Satellite information may require the transmission of multiple sentences all containing identical field formats when sending a complete message. The first field specifies the total number of sentences, minimum value 1.

The second field identifies the order of this sentence (sentence number), minimum value 1. For efficiency it is recommended that null fields be used in the additional sentences when the data is unchanged from the first sentence.

2) A variable number of "Satellite ID-Elevation-Azimuth-SNR" sets are allowed up to a maximum of four sets per sentence. Null fields are not required for unused sets when less than four sets are transmitted.

3) Satellite ID numbers. To avoid possible confusion caused by repetition of satellite ID numbers when using multiple satellite systems, the following convention has been adopted:

a) GPS satellites are identified by their PRN numbers, which range from 1 to 32.
b) The numbers 33-64 are reserved for WAAS satellites. The WAAS system PRN numbers are 120-138. The offset from NMEA WAAS SV ID to WAAS PRN number is 87. A WAAS PRN number of 120 minus 87 yields the SV ID of 33. The addition of 87 to the SV ID yields the WAAS PRN number.
c) The numbers 65-96 are reserved for GLONASS satellites. GLONASS satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.

NMEA GST Sentence

The NMEA GST sentence provides error statistics of the position fix. These statistics follow from the position calculation process.

Structure and Example:

$GPGST,hhmmss.ss,a.a,b.b,c.c,d.d,e.e,f.f,g.g*hh<CR><LF>
$GPGST,024603.00,3.2,6.6,4.7,47.3,5.8,5.6,22.0*58

GST sentence defined:

GST = GNSS Pseudo-range Error Statistics
hhmmss.ss   UTC time in hours, minutes, seconds of the GPS position
a.a   RMS value of the standard deviation of the range inputs to the navigation
process. Range inputs include pseudo-ranges and differential DGNSS corrections
b.b   Standard deviation of semi-major axis of error ellipse (meters)
c.c   Standard deviation of semi-minor axis of error ellipse (meters)
d.d   Orientation of semi-major axis of error ellipse (meters)
e.e   Standard deviation of latitude error (meters)
f.f   Standard deviation of longitude error (meters)
g.g   Standard deviation of altitude error (meters)
*hh<CR><LF>   checksum, carriage return and line feed

NMEA RMC Sentence

NMEA has its own version of essential gps pvt (position, velocity, time) data. It is called RMC, The Recommended Minimum, which will look similar to:
$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,230394,003.1,W*6A
Where:

    RMC   Recommended Minimum sentence C
    123519   Fix taken at 12:35:19 UTC
    A   Status A=active or V=Void.
    4807.038,N   Latitude 48 deg 07.038' N
    01131.000,E   Longitude 11 deg 31.000' E
    022.4   Speed over the ground in knots
    084.4   Track angle in degrees True
    230394   Date - 23rd of March 1994
    003.1,W   Magnetic Variation
    *6A   The checksum data, always begins with *

Note that, as of the 2.3 release of NMEA, there is a new field in the RMC sentence at the end just prior to the checksum. For more information on this field.

NMEA ZDA Sentence

The NMEA ZDA sentence provides time and time zone information.

Structure and Example:

    $GPZDA,hhmmss.ss,dd,mm,yyyy,xx,yy*hh<CR><LF>
    $GPZDA,201530.00,04,07,2002,00,00*6E

ZDA sentence defined:

    ZDA = Time & Date
hhmmss.ss   UTC time in hours, minutes, seconds of the GPS position
    dd,mm,yyy   Day,Month,Year (UTC)
    xx   local zone hours (00 to +/-13 hrs)
    yy   local zone minutes (00 to 59)
*hh<CR><LF>   checksum, carriage return and line feed

6 Contact information

All initial contacts regarding technical or support issues should be initially addressed to the VERIPOS Helpdesk. Where appropriate, the Helpdesk will refer issues to the regional operations and engineering teams.

6.1 VERIPOS Helpdesk

Helpdesk telephone   +44 (0)1224 965900

Helpdesk e-mail   helpdesk@veripos.com

VERIPOS Online support https://help.veripos.com

NOTE

If shipping equipment back to VERIPOS, please contact the Helpdesk who will provide the current shipping address, according to the user's area of operations.

6.2 VERIPOS Office Locations

UK Veripos office address:

	Veripos House, 1B Farburn Terrace, Dyce, Aberdeen. AB21 7DT Scotland UK

For other VERIPOS office locations visit www.veripos.com