

LD2 Operation

Manual

VERIPOS

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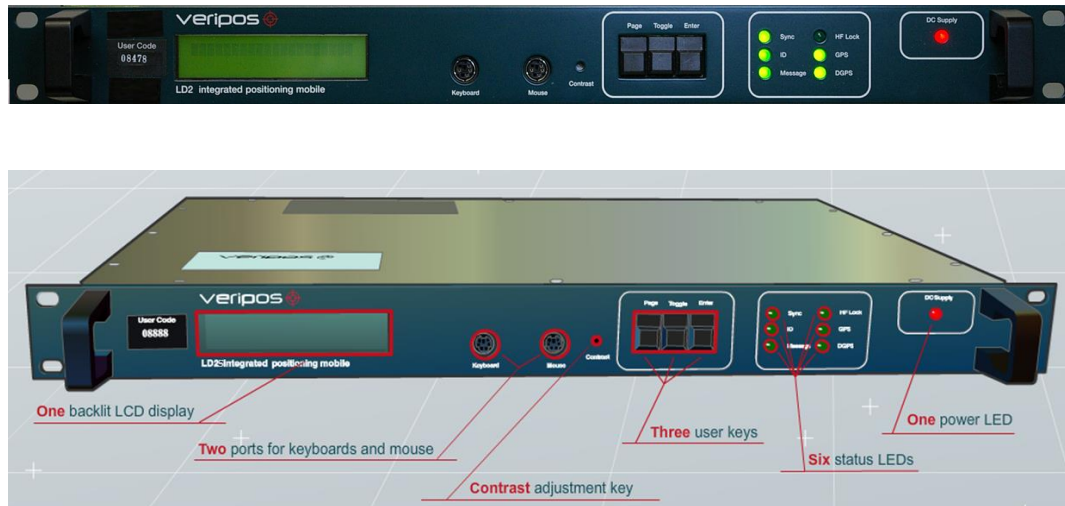
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1. INTRODUCTION

This manual contains the information required to operate the Veripos LD2 unit.



1.1 VERIPOS

Veripos specialise in providing robust data broadcast services for precise positioning applications for the offshore industry. For optimum performance it is essential that the receiving and processing hardware is of an equally high standard.

To ensure this Veripos offers a range of hardware designed and manufactured to the highest specifications, and with relevant certifications.

1.1.1 LD2

The LD2 integrated mobile unit is designed to achieve the product philosophy of standardised, upgradeable hardware with maximum flexibility whilst being simple to operate and maintain.

The LD2 is available in a number of configurations from basic satellite receiver to a fully integrated mobile positioning unit with demodulator and multi-frequency GNSS receiver. Completely modular, the unit can be upgraded to different configurations as required. Functionally, the LD2 can be used in a virtual “black box” mode to generate most of the Veripos proprietary position solutions, depending upon the data subscriptions enabled.

Additionally it can be used as a sensor to output received data and GNSS measurements to external processing or quality control software such as Veripos’ Verify QC suite.

A small LCD and a keypad allow for quick and easy user setup. In addition to calculating position the LD2 is able to output all received data in standard formats such as RTCM and NMEA. The LD2 is exceptionally flexible and in most configurations overall operating status can be determined via the LED indicators and the LCD.

For more comprehensive status indication, the LD2 may optionally be equipped with on-board QC software **Verify DP** which has been optimised for DP operations. The software gives the user basic QC displays such as tracked satellite signal to noise ratio's, polar plot of satellites in view, current and predicted DOP levels, reference station information as well as Service subscription indicators and warning alarms. The operation of Verify DP software is documented in a separate manual.

VERIPOS transmit DGNSS corrections from geostationary satellites. High power transmissions can be received using a compact high-gain omni-directional spot antenna.

Low-power transmissions can only be received using a suitable stabilized dish antenna. If the vessel is fitted with an Inmarsat communication system this can generally be utilised by installing an interfacing kit.

Advanced yet robust, easy to install and operate, the Veripos LD2 is an outstandingly effective and flexible unit that ensures reliable reception of Veripos services, as well as producing superior positioning from metre to decimetre level accuracy.

Further information on the LD2 and related products can be found on the VERIPOS VOSS (details later in this section), including knowledge base, quick guides and FAQ's.

Where required, see the LD2 Installation manual, Verify DP Operations manual and Veripos Verify QC manual.

1.2 SCOPE AND SAFETY

This manual contains the information required for the operation of the Veripos LD2 unit. For information on the operation of Verify DP see the Verify DP Operations manual. Information on related products can be found in the Veripos Verify QC User manual.

Manuals are available on VOSS (Veripos Online support System) at: <http://help.veripos.com>

1.2.1 Safety

Safety is the responsibility of the individual carrying out the work and all persons involved in the operation.

- On arrival at the worksite contact the wheel house for a site specific safety induction
- Follow safety rules applying at the work site
- Obtain all permits relevant to the job prior to any work commencing
- Where necessary the safety check-list should be completed, if applicable

1.3 TARGET GROUPS

The target group for this manual are the operators of the Veripos LD2

unit.

1.4 CONTENTS

Chapter Contents

1. Introduction

This chapter specifies the purpose and target groups for the manual. It also contains list of used abbreviations and a specification of the document conventions.

2. Operation

This chapter describes the interfaces in detail on the front and back side of the LD2 unit, the initial start-up, menu structure and configuration of the system. It includes status and system test information.

3. Troubleshooting

This chapter describes routines for basic fault-finding in case of system malfunction.

4. Contact Information

This chapter contains information about how to contact the VERIPOS Helpdesk regarding technical or support issues. It also contains addresses to additional VERIPOS offices world-wide.

1.5 TERMS AND ABBREVIATIONS

A	Ampere
ADE	Above Deck Equipment
APEX/Ultra	Veripos High Accuracy Positioning System
BDE	Below Deck Equipment
BER	Bit Error Rate
bps	Bits Per Second
CoG	Course Over Ground
CR	Carriage Return
DGNSS	Differential GNSS
DGPS	Differential GPS
DOP	Dilution of Precision
DP	Dynamic Positioning
EGNOS	European Geostationary Navigation Overlay Service
GDOP	Geometry Dilution of Precision
GLONASS	Global Navigation Satellite System - Russian equivalent to GPS
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
HDOP	Horizontal Dilution of Precision
HF	High Frequency Radio used to transmit correction data
Hz	Hertz
KPH	Kilometers per Hour
LAN	Local Area Network

LED	Light Emitting Diode
LF	Line Feed
LNA	Low Noise Amplifier
L-band	Methods of transmitting correction data to mobile users
LCD	Liquid Crystal Display
LD2	Unit containing GPS card, demodulator and PC processor
MF	Medium Frequency Radio used to transmit correction data
MHz	Mega-Hertz
MPH	Miles per Hour
m/s	Meter per second
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
RMS	Root Mean Square
RoHS	Restrictions on the use of certain Hazardous Substances in electrical and electronic equipment.
RTCM	Radio Technical Commission for Maritime Services
SAL	Service Access Licence
SD	Standard Deviation
SNF	Signal Notification Form
SNR	Signal to Noise Ratio
Spotbeam	High Power L-Band Signal
Standard/Std	Veripos Single Frequency DGPS System
SV	Space Vehicle
TDR	Time Domain Reflectometer
TTL	Transistor-Transistor Logic
Type 01	Single Frequency Corrections
Type 15	Dual Frequency Correction
Ultra /APEX	Veripos High Accuracy Positioning Systems
USB	Universal Serial Bus
UTC	Coordinated Universal Time
V	Volt
VDOP	Vertical Dilution of Precision
VERIPOS	Global DGPS Service Provider
VGA Video	Graphic Array
VOSS	VERIPOS Online Support System http://help.veripos.com
W	Watt
WAAS	Wide Area Augmentation System
WEEE	Waste Electrical and Electronic Equipment

1.6 DOCUMENT CONVENTIONS

1.6.1 Typographical conventions

Italic text is used to emphasize certain parts of the information as well as in cross-references to other parts of the document.

Bold text is used for push-button commands in the keypad.

“Text within quotes” is used when display texts are mentioned in text

Monospace text is used for output strings from the device.

1.7 EQUIPMENT SUPPLIED WITH THE LD2 UNIT

The LD2 is supplied with documentation and equipment as agreed with the user.

Typically this will include:

- equipment packing list showing a list of the equipment supplied
- LD2 receiver variant
- LD2 manuals and reference material on CD
- antenna(s), coaxial, cables and connectors

Optionally depending upon the variant supplied:

- screen and keyboard/mouse for use with software e.g. Verify DP
- rack housing VERIPOS equipment
- connection equipment & cabling

To aid the user VERIPOS recommend Verichart software to plot regional operational coverage charts. Verichart can aid when selecting beams and stations.

It also provides azimuth and elevation information for geostationary satellites – useful for predictions. Verichart may be downloaded from VOSS

1.8 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 Section 4.

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.

1.9 VERIPOS ONLINE SUPPORT (VOSS)

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

VERIPOS recommend users 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: <http://help.veripos.com>

VOSS has comprehensive help and assistance that provides:

- updates on VERIPOS service availability and notifications
- knowledge base
- troubleshooter
- downloads
- online fault reporting.

1.10 ENABLING THE EQUIPMENT FOR USE

VERIPOS correction signals are provided as a chargeable service.

In order for the equipment to decode corrections and output positions it must be enabled.

This is achieved by sending a request for the unit to be enabled to the VERIPOS Helpdesk.

When not in use some contracts may allow for disabling the service.

The enable/disable procedure is detailed in the “Operation” chapter.

Note:

To use VERIPOS correction signals a contract between the user's company and the VERIPOS Operations department must be in place.

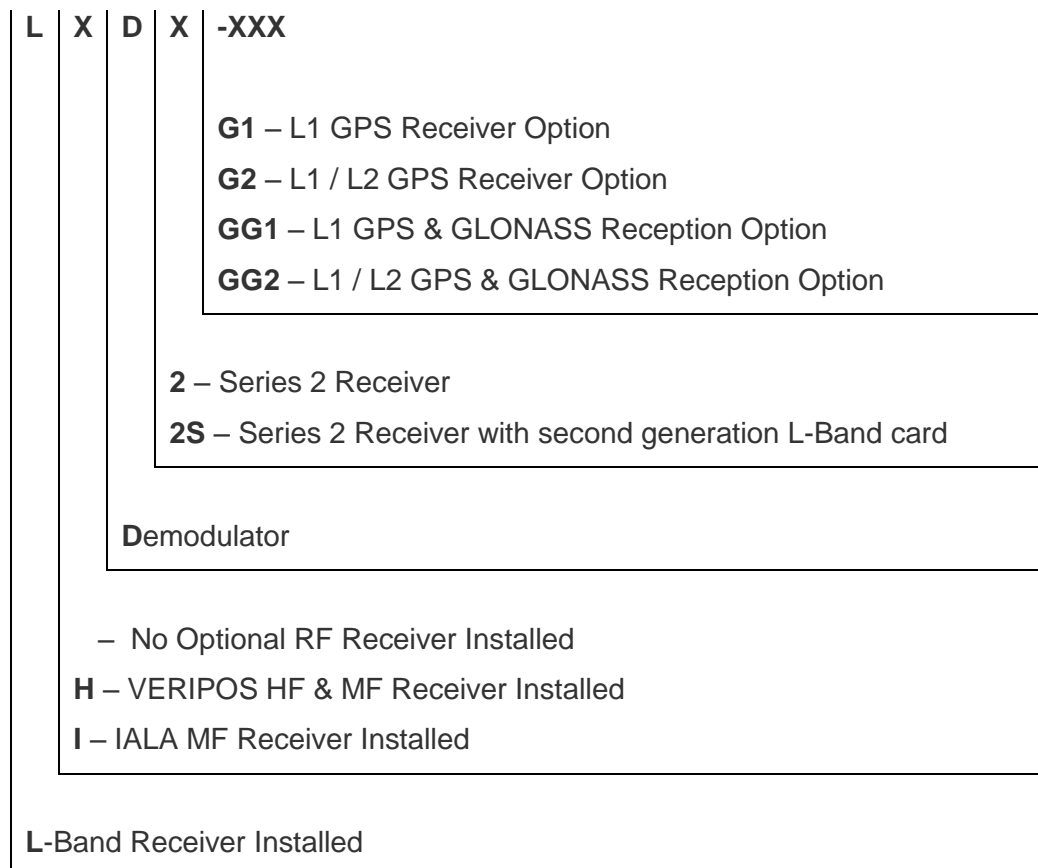
VERIPOS call this a service access license (SAL).

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

The Helpdesk is not authorised to issue a code unless an active SAL exists and its reference number can be determined.

1.11 SPECIFICATION OF THE LD2

The specification of the LD2 (typical) is given below.
 The LD2 is available in a range of variants.
 Options included in each unit are indicated by its model number:



i.e. an **LID2-GG2** mobile receiver is capable of L-Band, MF, L1 / L2 GPS and GLONASS reception.

Mechanical

Receiver size 19 inch rack mount x 1U height x 32 cm depth.
 Weight 5 kg / 11lb.
 Display 2 line x 20 character back lit liquid crystal display (LCD).

Electrical

Input voltage 85 to 264 VAC.
 Power consumption 20 W.
 Fuse 250 V / 1A, anti surge 20 mm.
 IEC 60945 EMC certified.

Demodulator

1525 to 1559 MHz input from L-band antenna or tapped.
 L-band output from Inmarsat B terminals.

Acquisition time from switch on typically <20 seconds.
 Re-acquisition time typically <10 seconds.

HF/MF Demodulator

2 channel HF/MF demodulator in the frequency band 1.6 to 3.5 MHz.
 RTCM output.
 Compatible with VERIPOS standard HF and third party HF/MF transmissions.

Data Interfaces

5 x RS-232 ports

Port 1: NMEA output.
 Port 2: RTCM (primary).
 Port 3: Remote I/O, NMEA output in some LD2 configurations.
 Port 4: RTCM (secondary).
 Port 5: GPS I/O, NMEA

1 x VGA video output.
 1 x RJ45 LAN port with full network connectivity.
 1 x USB port.

Connections for optional external keyboard with touchpad or mouse.

Antenna

The GPS antenna is a right-hand circular polarised L-band frequency range with an integral low-noise amplifier.

The internal thread is 5/8" x 11 UNC (standard marine mount).

PC/104 board

300 MHz geode processor.
 256 Mb -SDRAM.
 512 Mb - 4 Gb Compact Flash card, depending on program being supported.

GNSS receiver

The following optional OEM GNSS card is installed in the LD2:

Topcon Euro 112T

40 Channel, all in view, L1/L2 GPS, L1/L2 GLONASS and WAAS.
 Advanced multipath mitigation.
 Raw data output (code and carrier).
 Low signal tracking (down to 30 dbHz).
 2 x 1 PPS outputs (LVTTTL).
 Standard NMEA 0183 V2.1, 2.2, 2.3 and 3.0 outputs.

Differential remote RTCM V2.1, 2.2.
4 x bi-directional RS-232 serial ports up to 460800 bps.
Operating temp: -40 °C to +75 °C.
Power consumption: 2.7 W typical.

1.12 ESSENTIAL OPERATION TASKS

This manual provides the user with the information required for the configuration, operation and monitoring of the VERIPOS LD2 integrated mobile unit

The “Operation” chapter provide a description of each menu function. All LD2 configuration and monitoring is performed using the front panel two-line LCD and a 3-key switch pad using menu system.

The only additional controls are two toggle switches mounted on the rear panel.

The “Operation procedures” section of the “Operation” chapter provides step by step instructions for performing the most common tasks. It is recommended as a good starting point for new users or when commissioning an installation.

The procedures have been summarised in “LD2 Quick Guide” format to assist the user in performing common tasks, downloaded from Veripos VOSS.

VOSS is available at <http://help.veripos.com>

Topics covered include:

- Antenna connections
- Beam selection for receiving Veripos corrections

- Enabling the required VERIPOS services
- Use with Verify QC software
- Configuration of Serial ports including position output on P1
- Checks of Equipment status

1.13 DISCLAIMER

VERIPOS accepts no responsibility for any damage or injury to the system, ship or personnel caused by drawings, instructions or procedures not prepared by VERIPOS.

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All rights reserved. No part of this manual may be reproduced without prior written permission from VERIPOS.

Contents of this manual are subject to change without notice.

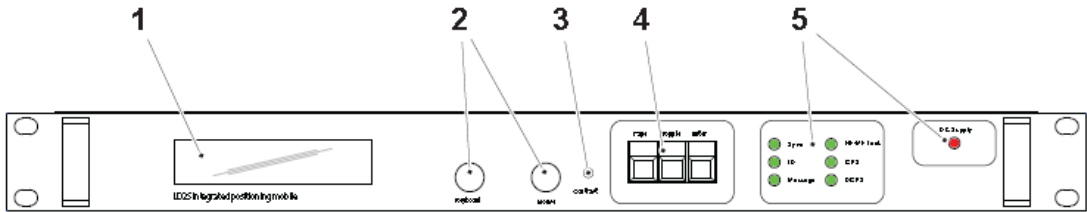
Every effort has been made to ensure accuracy of the information contained within this manual. Please advise VERIPOS of errors you may encounter. Thank you.

VERIPOS assume no responsibility for errors or omissions contained within this manual.

2. OPERATION

2.1 USER INTERFACE

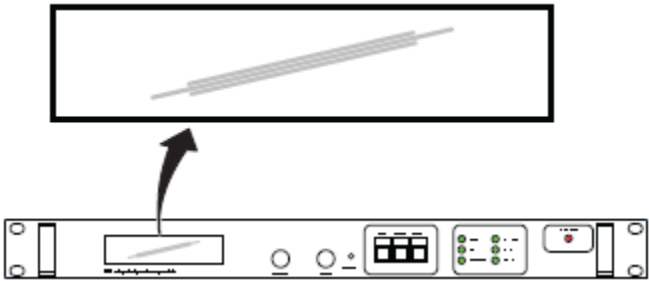
2.1.1 Front Panel



- 1 Back lit liquid crystal display (LCD)
- 2 Standard PS/2 ports
- 3 Contrast adjustment
- 4 User keys
- 5 Status LED's

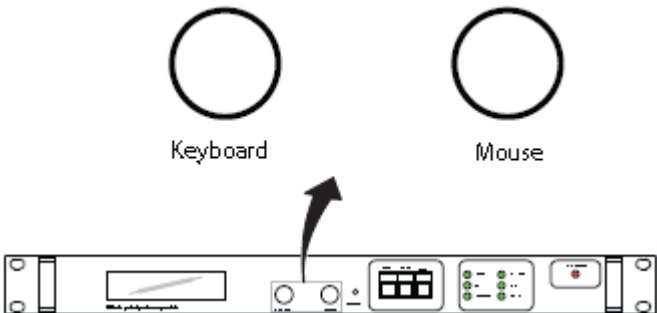
2.1.1.1 LCD

Two lines, up to 20 character each, with green backlight.



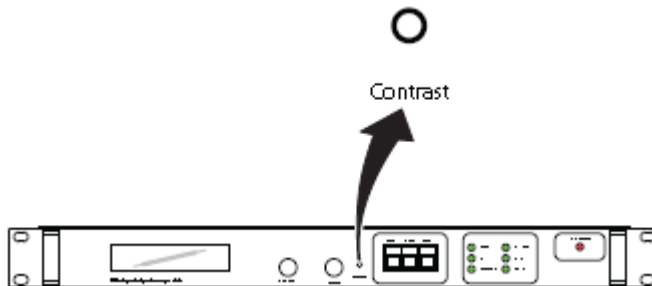
2.1.1.2 PS/2 ports

Standard PS/2 ports for the connection of optional keyboard and mouse.

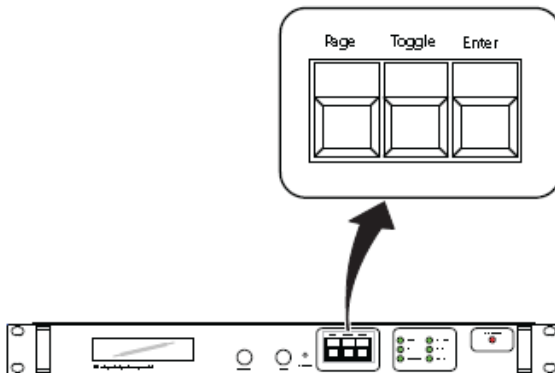


2.1.1.3 Contrast adjustment

A small flat headed screwdriver can be used to adjust the screen contrast as desired. Turn clockwise to increase.

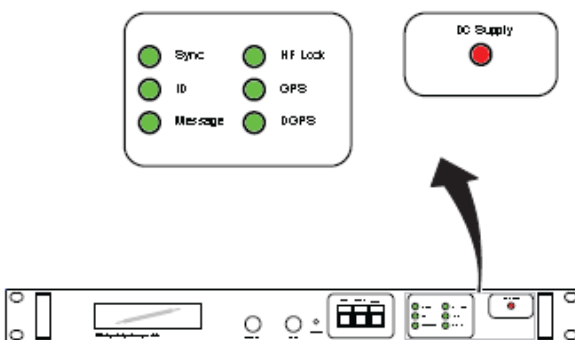


2.1.1.4 User keys



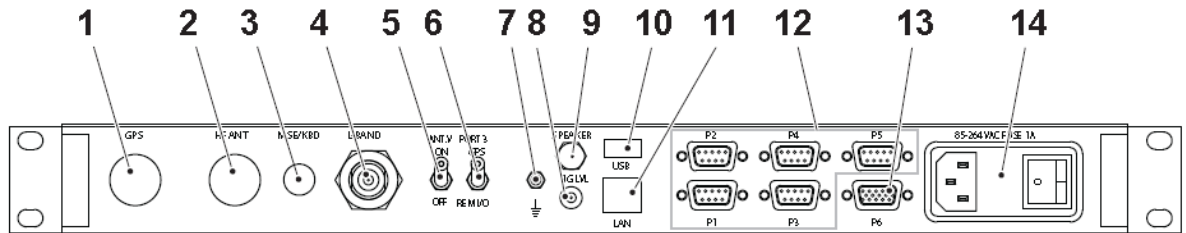
- Page key: Advances the display through the options in a menu level. After the last menu option in the current menu level, the display moves back to the entry point of that menu.
- Toggle key: Shows the range of data entries available in a menu
- Enter key: Displays the selected menu option, accepts a data entry and advances the display to the next data entry field.

2.1.1.5 Status LED's



- Sync: Illuminated when LD2 is locked onto the downlink beam.
- ID: Illuminated when LD2 is enabled for service. Flashing when LD2 is disabled. Off when LD2 has never been enabled.
- Message:: Not used.
- IF Lock: Present on older LD2's. Illuminated when using a 70 MHz antenna system and signal lock is detected in the internal upconverter. Not currently implemented. The IF lock LED is in the same location as that of the HF lock LED on more recent LD2's.
- GPS: Illuminated when the GNSS card is outputting a non differential GGA telegram through port 1. Flashing indicates the number of satellites used in the position computation. Can be intentionally switched off in some configurations/applications.

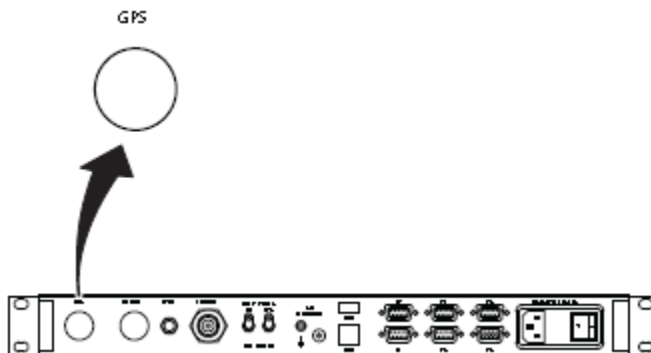
2.1.2 Rear Panel



- 1 GNSS antenna connector (TNC-type)
- 2 HF antenna connector (TNC-type)
- 3 Standard PS/2 port
- 4 L-band antenna connector (N-type)
- 5 Antenna voltage toggle switch
- 6 Port 3 I/O toggle switch
- 7 Grounding pin
- 8 Signal strength connector (SMA-type)
- 9 Speaker connector (phono-type)
- 10 USB port
- 11 LAN port RJ45-type)
- 12 5 x serial data ports (RS-232)
- 13 VGA display port
- 14 Power socket with on/off switch

2.1.2.1 GNSS antenna connector

Connect the GPS/GNSS antenna here. This is the antenna that is used to receive GPS/GNSS signals. Do not stress connector.

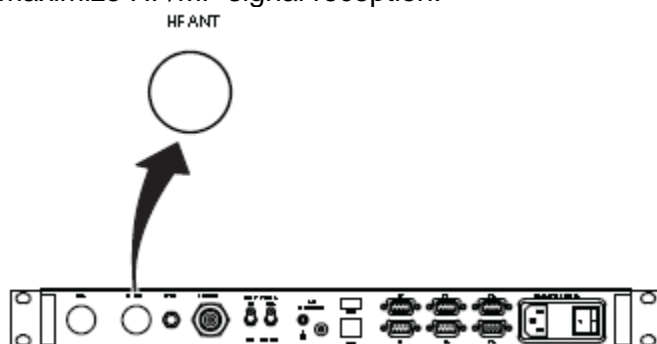


2.1.2.2 HF/MF antenna connector

This input is only present only where a HF/MF card is installed.

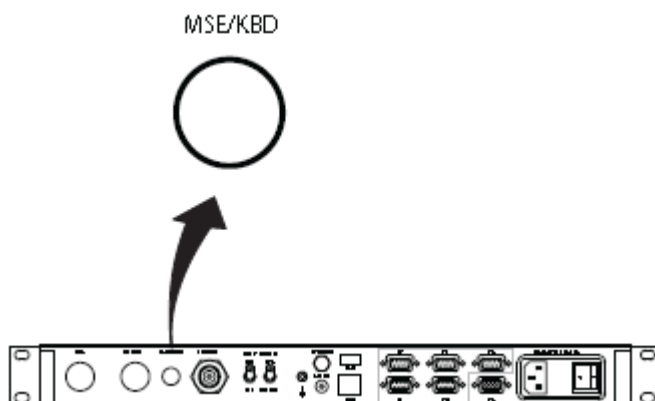
Not present on all LD2 variants.

If the LD2 variant is configured for an HF/MF system, connect the HF/MF antenna here. HF/MF systems require the HF/MF antenna and LD2 chassis to be earthed in order to maximize HF/MF signal reception.



2.1.2.3 PS/2 port

Standard PS/2 port for the connection of optional keyboard or mouse (requires PS/2 Y splitter).

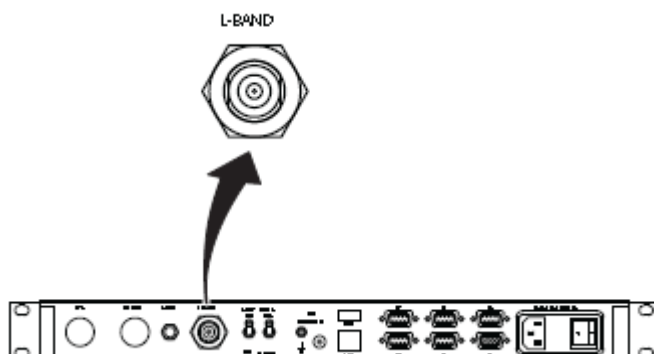


2.1.2.4 L-band antenna connector

Connect either an L-band omni directional spot beam antenna or the line feed from an Inmarsat system coupler (e.g. Narda, Rojone or Radiall). Some Inmarsat systems have a dedicated output that does not require the installation of a coupler.

In some cases the LNA feed should be switched off to prevent damage to vessel Inmarsat system. In the LD2S variant this switching is done in software – detailed in this manual.

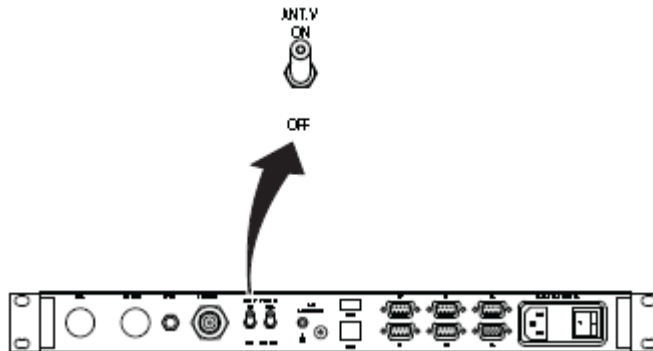
All coaxial cables should be 50W impedance.



2.1.2.5 Antenna voltage toggle switch

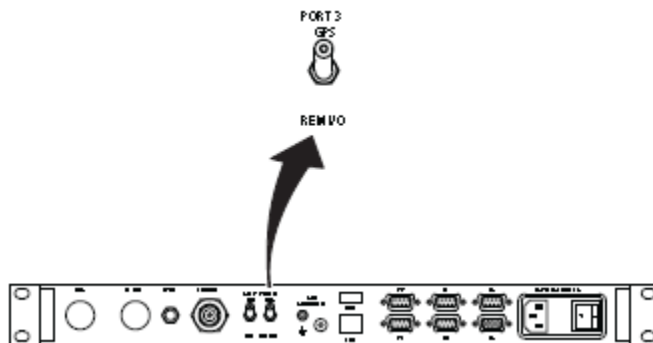
To prevent damage and disable the 5 VDC antenna LNA feed when connecting the LD2 variant to certain types of Inmarsat systems,,
 When using an omni-directional spot beam antenna the voltage should be enabled.
 Where the LD2 variant does not have the switch a DC block may be used.

Note:
 For LD2S variants this also needs to be enabled in the LD2 software.



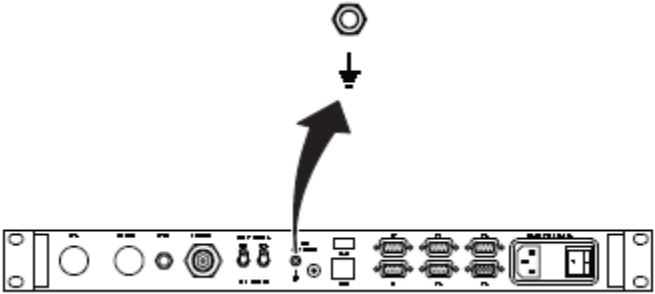
2.1.2.6 Port 3 I/O toggle switch

When the switch is in the GPS position, raw GPS data is output from the GPS card.
 When in the REM I/O position, either NMEA messages can be output or new firmware for the demodulator can be uploaded (depending on how port 3 is configured from the front panel).



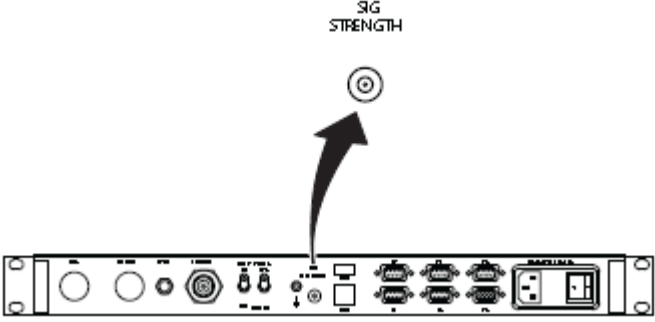
2.1.2.7 Grounding pin

The chassis of the LD2 variant should be connected to vessel ground and is important when using HF systems, where both the HF antenna and LD2 variant chassis should be grounded.



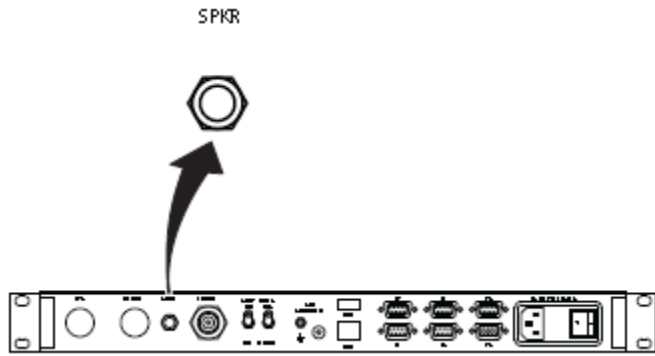
2.1.2.8 Signal strength connector

This is not used. (To provide a feedback line to a tracking dish type antenna such as a Minidome, Inmarsat systems do not usually require signal strength feedback).



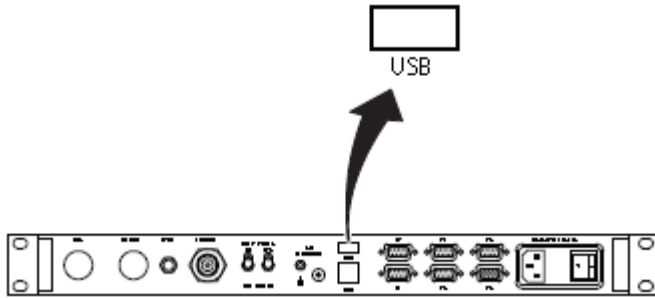
2.1.2.9 Speaker connector

Can be used in Verify DP applications, where an external speaker is required for the alarm.



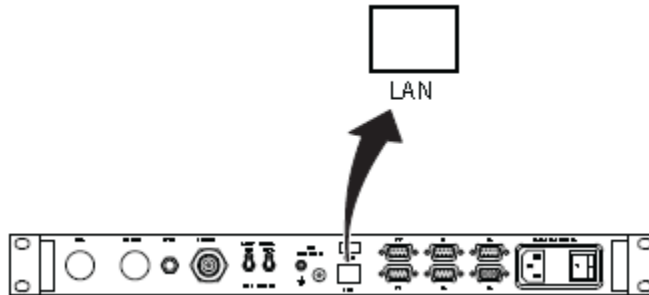
2.1.2.10 USB port

The USB connector can be used to input external data e.g. gyro.



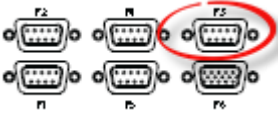
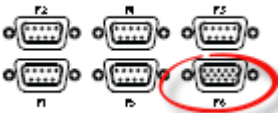
2.1.2.11 LAN port

Used to network the LD2 so that data can be broadcast over TCP/IP sockets.



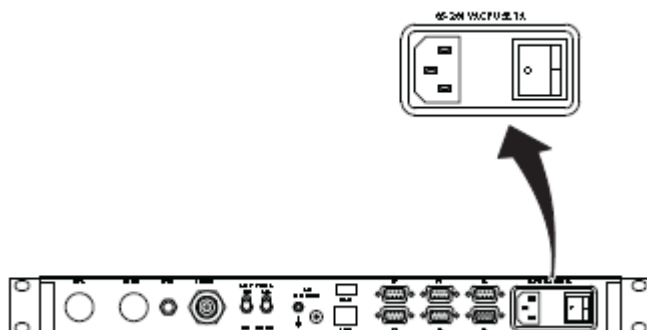
2.1.3 Serial ports and VGA connector

	<p>Port 1 – D9 Female</p>	<p>When set to “LOCAL”, port 1 is the primary NMEA output for position from the processor algorithm.</p> <p>When set to “GPS RX”, port 1 outputs a ZDA time message.</p> <p>A 1 PPS output can also be taken from P1 to use in conjunction with the ZDA message</p>
	<p>Port 2 – D9 Female</p>	<p>Port 2 is the primary RTCM output and is also used for internal ‘black box’ position solutions.</p> <p>The processor card is capable of utilizing 4 stations in this way (For Standard solutions).</p>
	<p>Port 3 – D9 Female</p>	<p>Port P3 is used for the remote control of the GPS Receiver and the Demodulator Board.</p> <p>GPS Gives Raw GPS out when the Port 3 switch on the back panel of the LD2 is in the GPS position.</p> <p>DEM (Demodulator) gives access to the Demodulator for Firmware upgrades when the switch on the back panel of the LD2 is in the REM I/O position.</p> <p>SKT (socket) allows for NMEA type messages to be output, when port B on the GPS LD2 has been configured to output such messages.</p> <p>OFF No data is output from the port.</p>
	<p>Port 4 – D9 Female</p>	<p>Port 4 is the secondary RTCM output</p>

	<p>Port 5 – D9 Female</p>	<p>Port 5 is the GPS I/O port. It is internally connected to Port A of the GNSS card. When the Port 5 setting is switched to "Remote", raw GNSS measurements are available on Port 5 for use with external positioning software such as Veripos' Verify QC.</p> <p>In this mode the GPS menu system becomes disabled and the LD2 processor stops calculating a position.</p> <p>When the Port 5 setting is switched to "Off", the GPS configuration menu's become active again and Port 5 becomes disabled.</p>
	<p>Port 6 – HD15 Female</p>	<p>This is the VGA port, used to connect an external monitor to the LD2.</p> <p>Only used when Verify DP is activated and in use.</p>

2.1.4 Power socket with on/off switch

The LD2 uses a standard IEC connector for power interfacing. The power interface has a built in fuse holder and power switch. Replacement fuse is 250V/1A anti surge 20 mm.



2.2 MAIN MENU STRUCTURE

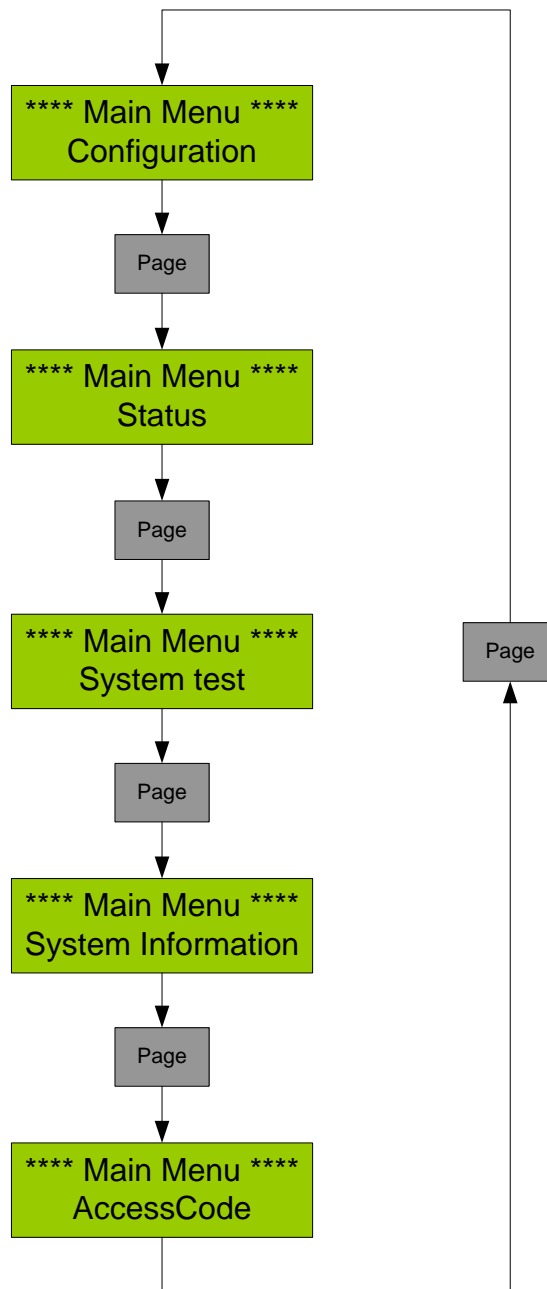
Nearly all LD2 configuration and monitoring is performed using the two-line LCD in conjunction with the 3-key switch pad and menu system. (Additional controls are by the two toggle switches mounted on the rear panel.)

The diagram below shows the top level menu. Menu map diagrams detailing the complete menu structure are in section 2.7.1 Menu structure.

Note:

*Repeatedly pressing the *Page* key, from anywhere within the menu structure, will return the user to the main menu.*

2.2.1 Main Menu



Press ***Page*** to step to the required section.
 Press the ***Enter*** key to access the sub-menu.

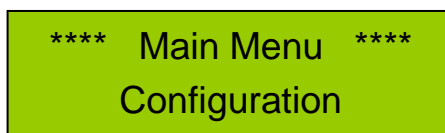
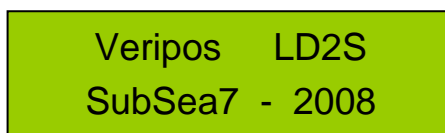
2.3 OPERATING PROCEDURES

2.3.1 Start LD2

2.3.1.1 Applying power

To power up the LD2 receiver, set the rocker switch (next to the power cable on the rear panel) to ON ("I") position. The red DC supply LED on the front panel and the LCD will both illuminate.

For the first few seconds after power up the LCD display will display the following (this can take 30 -60 seconds):



Note:

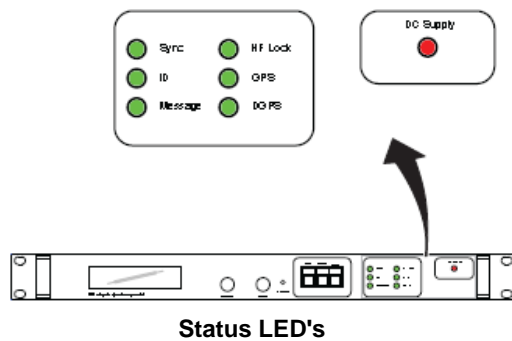
The first two screens will vary according to the LD2 variant in use.

The “**Main Menu / Configuration**” screen is the entry point for the unit’s menu system.

2.3.1.2 Checking unit status

After applying power, allow several minutes for the unit to acquire lock on any available GPS, L-band and HF/MF signals.

The front panel indicators should then be inspected to check the unit status:



2.3.1.3 Indications for a healthy system

Before use the LD2 must be set for the geographical location, to use the selected regional LBand beam and be enabled / configured for use with ships' systems.

- The **DC supply** indicator must be illuminated. This confirms that an AC supply is connected and that the DC power supply is operational.
- The **Sync** indicator must be illuminated. This confirms that the L-band card is locked onto the downlink beam from a communications satellite (receiving VERIPOS corrections.)
- The **ID** indicator must be steadily illuminated. This confirms that the unit is enabled (the indicator is off when the system is disabled).
- The **Message** indicator will normally be extinguished. Only illuminated if a message has been received from the VERIPOS Helpdesk.
- The **GPS** indicator should normally be illuminated. This confirms that the unit is receiving good GPS signals.

Note:

The GPS indicator reports the satellite status from a GGA telegram which the unit normally outputs through port P1. Flashing indicates the number of satellites used in the position computation.

*This telegram is present when using the default unit configuration **but may be disabled** if certain optional configuration settings are applied. So it is possible the indicator is extinguished even when good GNSS signals are present.*

- The **DGPS** indicator should normally be illuminated. This confirms that the unit is receiving good RTCM corrections.

Note:

This indicator reports the position correction status from a GGA telegram which the unit normally outputs through port P1.

*This telegram is present when using the default unit configuration **but may be disabled** if certain optional configuration settings are applied. It is therefore possible for the indicator to be extinguished even when good corrections are available.*

- The **HF/MF Lock** indicator should be illuminated if the unit is configured to receive HF/MF corrections and the vessel is in a location where adequate signals are available.

Note:

On early units this indicator is labelled "IF Lock". It is illuminated when using a 70 MHz antenna system and signal lock is detected in the internal upconverter.

If the indicators are as specified above then the antennas, cables and major components of the LD2 are all operational. If the unit has previously been configured for its current installation and geographical location, then it should be fully operational.

Note:

*If the installation has changed or the vessel has **moved to a new work area** then reconfiguration may be required, even if indicators are normal.*

2.3.1.4 Beam selection

In order to receive Veripos corrections, the LD2 LBand demodulator must be set to receive corrections over a line of sight satellite beam (channel) frequency for the work region.

This must be selected and working before enabling the LD2.

Vessels may have more than one LD2 system installed.

In most instances more than one beam with acceptable elevation will be available in the work area.

For best system redundancy the LD2 systems should normally be configured on different beams.

Refer to the table below and Global Coverage chart in the Appendix to select which beam you require to use. Updated copies of this information are available on VOSS.

Satellite	Longitude	Frequency (MHz)	Data Rate (bps)
98W	98W	1539.9025	1200
AORW	54W	1539.8925	1200
25E	25E	1539.8825	1200
AORE	15.5W	1539.9825	1200
IOR	64E	1539.9025	1200
143.5E	143.5E	1539.9925	1200
POR	178E	1539.9425	1200

When changing location or in areas where satellite footprints overlap, it may be necessary for the user to change to a different satellite Channel (or Beam). Sixteen channels have been allocated of which seven satellite channels have been pre-stored. This allows the user to select an appropriate channel for a region.

Beam cover regions are summarised below;

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

PPP services

For reference the table below lists the ULTRA, ULTRA², APEX and APEX² service ID's across all beams (satellites). For updated information see VOSS online.

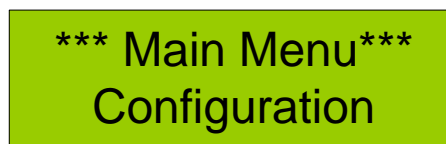
Service	Station ID	NMEA Station ID
Ultra	68	0068
Ultra ²	68 + 75	0268
APEX	81	0081
APEX ²	81 + 82	0281

Note 1: The Station IDs are displayed on the Veripos Unit user interface, the NMEA Station IDs appear on the output NMEA message.

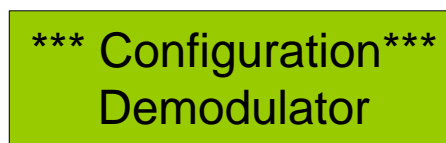
Note 2: Currently Ultra² is **only** available with Verify-QC.

To select a beam:

From the main menu press ***Page*** key until Main Menu Configuration is displayed:



Press ***Enter*** key to access the next menu level this will display the below screen:



Press ***Enter*** key to access the next menu level this will display the below screen

*** Demodulator***
 Channel Select

Press ***Enter*** again to access the downlink channel table:

Channel Select
 01. AOR(E)

Now Press the ***Toggle*** key to step through the available downlink beams.
 When the desired beam is displayed, press ***Enter***. This will move the cursor to the right hand side of the screen and the letter N will be displayed:

Channel Select
 07. 98WEST N

To change which beam corrections are being received, press the ***Toggle*** key.
 This will change the character from an N to a Y. Follow with ***Enter*** to confirm the change.
 The screen will now display:

Channel Select
 >07. 98WEST

The > indicates that this is the selected beam.
 After selecting a Channel / Beam it is good practice is to check the lock status and signal quality.

2.3.1.5 Signal status

The signal status gives information on the quality of the signal and signal lock of the selected down link. To check the status of the downlink beam, from the main menu press ***Page*** until the screen displays:

**** Main Menu ****
 Status

Press ***Enter*** and the screen will display:

```

***      Status      ***
      Demodulator
  
```

Press ***Enter*** again, followed by ***Page*** and the screen will show:

```

**      Demodulator      **
      Signal Status
  
```

Press ***Enter*** to access the Signal Status page:

```

98WEST  3.5V  E-7
◆◆◆◆-000610Hz ID:R
  
```

This display is for an **LD2** unit

or

```

98WEST    39.0dB-Hz
◆◆◆◆ -000610Hz ID:V
  
```

This display is for an **LD2S** unit

The displays show the following information:

- a) The text at the left of the top line (**98WEST**) shows the name of the selected beam (satellite). The possible options are: AORE, AORW, POR, IOR, 25E, 143.5E and 98W and are selected depending on your work region. See Cover chart (Appendix).
- b) The remainder of the top line shows the signal quality.
 1. The **LD2** displays a signal voltage (**3.5V**) and the BER (**E-7**).
 Possible signal voltages are: 0.0v to 3.5v.
 Acceptable values are: 2.0V to 3.5V
 Possible BER (Bit Error Rate) values are: E-0 to E-7.
 Acceptable values are: E-5 to E-7.
*Note: It is important to monitor the BER values.
 It is sometimes possible to have high signal strength but a poor BER.*
 2. The **LD2S** displays signal strength (**39.0dB-Hz**) in dB/Hz.

- c) The left of the bottom line shows the lock status (◆◆◆◆)
 For correct operation, all four diamonds must be displayed.
 (See below for Diamond displays and meanings.)
- d) The centre of the lower line shows the frequency offset (-000610Hz).
 This will typically show values in the range +/- 3000Hz.
- e) The right of the lower line shows the service ID (ID-R or ID-V)
 For correct operation this is ID-R for an **LD2** and ID-V for an **LD2S**.

*Note: Possible displays for the lock indicator are shown below.
 For correct operation, all four diamonds must be displayed.*

- ◆ **Reference Lock** – Indicates that the internal synthesiser is locked and is independent of the received satellite signal.
- ◆◆ **Symbol Lock** – Indicates that symbol lock has been acquired.
- ◆◆◆ **Carrier Lock** – Indicates that carrier lock has been acquired.
- ◆◆◆◆ **Frame Synchronisation** – Indicates that frame synchronisation has been acquired.

*Note:
 If the beam setting is incorrect for the work region it is likely that other settings will require re-configuration.*

Where there is a variation on your LD2 from the correct working status, please check the following;

Change beam

If the beam shown on the status screen is not correct for the current location it must be changed.

Investigate L-band input problem

If the status display shows that the correct satellite is selected then there may be a problem with the L-band input signal.

Refer to the “Troubleshooting” section in this manual.

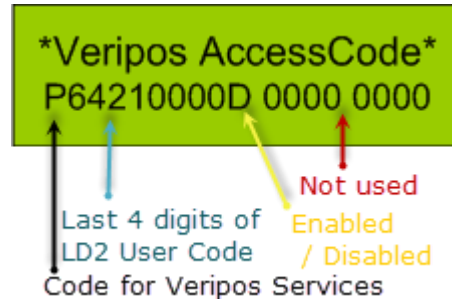
2.3.1.6 Enable and disable

Once a beam is being received to make Veripos corrections available for use, the LD2 needs to be enabled.

Contact the Veripos Helpdesk and provide the following information to request your LD2 unit is enabled over the air.

To determine status of the LD2:

Press **Page** until **Access Code** shows, then **Enter** to view current status:

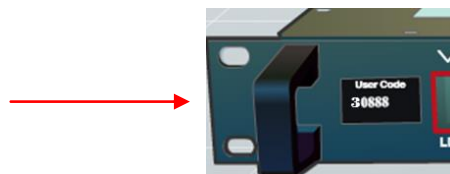


Where a “D” is shown at the end of the first alphanumeric row this indicates the LD2 is Disabled.

Where an “E” is shown at the end of the first alphanumeric row this indicates the LD2 is Enabled.

When communicating with the Veripos Helpdesk please provide the following information:

1. Service Access Licence number (**SAL**). This is the contract number for augmentation services provided by Veripos to you / your client and must be quoted when requesting service activation / deactivations
2. **User Code** for the IMU – this is the unique 5 code number printed on the IMU chassis



Provide the unique 5 digit User Code shown on the LD2 front panel (above).

3. The **Veripos Augmentation Service(s)** required – advise the Helpdesk of the name / type of service appropriate to your requirements and LD2 variant model (e.g. GNSS single or dual frequency, GPS and GLONASS capable, DGPS or PPP, etc.)

Once you have this information contact the Veripos Helpdesk to request unit activation, quoting your User Code and Service Access Licence (SAL) number.

To help with the request use a Service Notification Form from <http://help.veripos.com> when contacting the Veripos Helpdesk.

Provide the details requested and type of Service(s) you require, e.g. Veripos **Ultra** with **Verify DP**.

Veripos Helpdesk Current details:

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

For latest Helpdesk contact information please see VOSS (<http://help.veripos.com>).

2.3.1.7 Check enable status

The current unit status can be determined from the **ID** indicator on the front panel.

ID LED is **on and solid** LD2 variant is **enabled**

ID LED is **off** LD2 variant is **disabled**.

2.3.1.8 LD2 checklist for front lamps

The following lists reasons and actions to ensure a working system.

- **DC supply** indicator extinguished.

No output voltage from internal supply unit – see “Troubleshooting” section.

- **Sync** indicator extinguished.

The L-band card is not locked onto the downlink beam – check demodulator status as detailed in a later section.

- **ID** indicator flashing.

The unit is disabled – enable the unit as detailed in a later section.

- **ID** indicator extinguished.

If the unit is an LD2S, the indicator will be extinguished when the power is switched on. It will not be illuminated until the unit locks to an L-band signal and the **Sync** indicator is illuminated (see comments above concerning **Sync**).

If **ID** is still extinguished when **Sync** is illuminated, or if the unit is an LD2, then there is probably an internal fault. Please call the VERIPOS Helpdesk and report the problem.

- **HF/MF Lock** indicator extinguished.

Not receiving HF/MF signals – see the “Troubleshooting” chapter.

- **GPS** indicator extinguished.

GPS reception problem or non-standard system configuration – check GPS status as detailed in a later section.

Note:

*If GPS status indicates good satellite reception then the GPS lamp indicator may be ignored,
 Where a GGA or GGX output string is not configured on port P1 the GPS lamp will not be illuminated.*

2.3.2 Antenna and LD2 settings for correction reception

The type of antenna attached to the LD2 will determine the beams which can be used:

- When using a spot omni-directional antenna any of the high power beams can be used.
- When interfacing to the vessel's Inmarsat communications system beam choice is limited to satellites which are supported by this system. See VOSS for further information.

2.3.2.1 LD2 antenna power

A spot omni-directional antenna requires a source of DC power for its low noise amplifiers (LNA). This is supplied by the LD2 via the L-band input connector.

Before applying power to the unit, ensure the "ANT.V" toggle switch on the rear panel (if fitted) is correctly set:

- **OFF** if the unit's L-band input is connected to the Inmarsat system
- **ON** if the unit's L-band input is connected to a spot antenna.

Note:

Toggle switches must be pulled slightly away from the panel before the switch position is changed.

WARNING

Damage may occur if the switch is set to "ON" when connected to an Inmarsat system. The spot antenna will not function if the switch is set to "OFF".

For **LD2S units only**

When using an LD2S there is also an antenna power menu function under "Configuration / Demodulator" used to set the "Antenna Power" ON or OFF.

When the toggle switch is set to **OFF** it over-rides the LD2S menu selection.

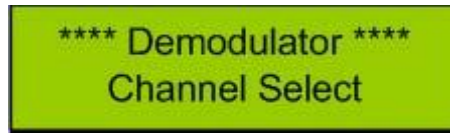
Antenna power should be turned **ON** when using an omni-directional spot antenna.

The following steps show how to change this setting in software.

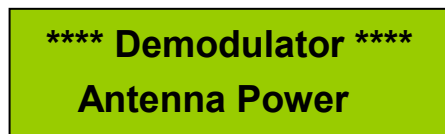
After selecting the channel press ***Page*** to return to the "**Channel Select**" menu:

For **LD2S units only** there is a menu item to set the Antenna Power OFF or ON.

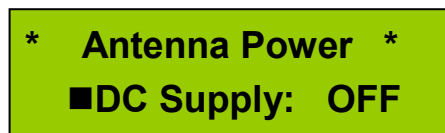
After selecting the channel press **“Page”** to return to the Channel Select Menu:



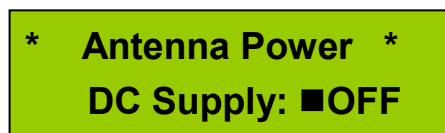
Press **“Page”** twice to advance to the Antenna Power menu



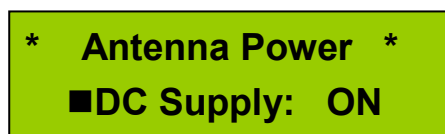
Press **“Enter”** to display the current status:



Note: The current status is displayed. This could be either OFF or ON.
 If a change is required, press **“Enter”** to move the cursor to the entry point:



Press **“Toggle”** until the required setting is displayed then press **“Enter”** to accept the change and return to the status menu.



Repeated press the **“Page”** key to return to the main menu.

2.3.3 Reference Stations

After confirming that the signal level is satisfactory, check the list of reference stations which are available from the selected beam. This will confirm the correct operation of the unit and verify that the user has selected the correct beam.

This section details how to do this.

Note:

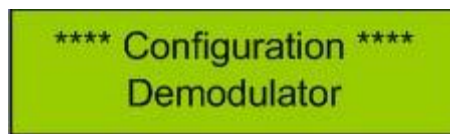
It may take up to 10 minutes for the unit to accumulate a full station list after selecting a new beam.

(Station data is not available until a Type 3 message has been received.)

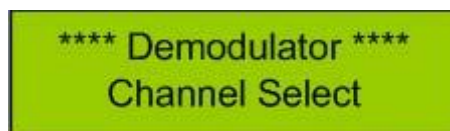
Repeatedly press the “**Page**” key until the following screen appears:



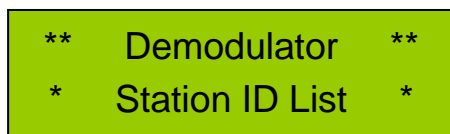
Press “**Enter**” and the screen changes to:



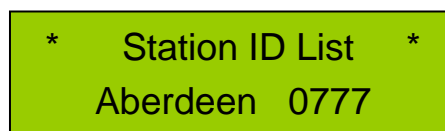
Press “**Enter**” and the screen changes to:



Repeatedly press “**Page**” until the screen changes to:



Press “**Enter**” and the screen changes to something like:



This screen displays the name of a station and its station ID number.

Pressing the “**Toggle**” key will cycle through a list of all available stations. The user should verify that the list includes the stations relevant to the work area.

Note:

Ultra and APEX corrections have a “station name” of “Veripos” and “00” as the first two characters of the ID.

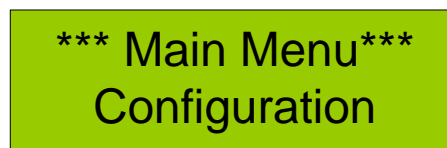
A fully populated list, including local stations confirms that the appropriate beam has been selected and that the unit is receiving RTCM data.

2.3.4 Channel 16 configuration

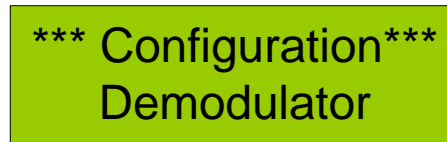
The LD2 firmware stores a list of the geo-stationary satellites which are used to deliver the VERIPOS correction data. It also stores the associated frequencies and data rates. The user normally selects a satellite by simply selecting its name from a list.

Channel 16 is included to provide the facility to manually enter satellite parameters. This is only necessary if changes are made to the satellite constellation after the firmware is issued.

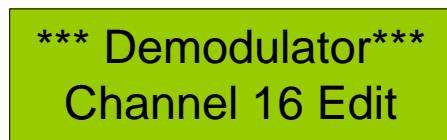
Repeatedly press the ***Page*** key until the screen below is displayed:



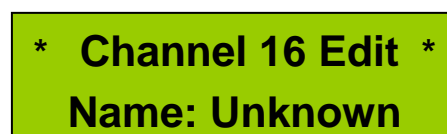
Press ***Enter*** key to display the screen below:



Press ***Enter*** key and then the **“Page”** key. This will display the screen below:



Press the ***Enter*** key to access the first screen in this sub menu as below:

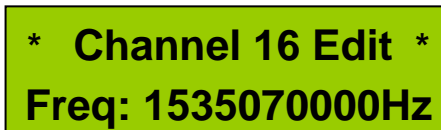


Press the ***Enter*** key to highlight first letter of the name. Use the ***Toggle*** key to step through the letters of the alphabet. When the correct character is displayed, press the ***Enter*** key. This accepts the character and steps on to the next letter.

A maximum of six characters may be entered.

Note: Example used is the update in 2007 (changed the name to “HP IOR”)

After the sixth letter, or blank, has been set, press the ***Enter*** key. The display moves on to the Frequency selection display shown below:



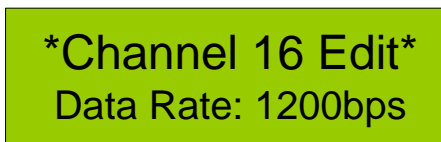
*** Channel 16 Edit ***
Freq: 1535070000Hz

Press the ***Enter*** key again and the first number is highlighted.

Using the ***Toggle*** and ***Enter*** keys as before to set the required frequency.

Note: For the June 2007 update, use the value shown above.

After the last number, has been set, when you press the ***Enter*** key the display moves on to the Data Rate display shown below:



Channel 16 Edit
Data Rate: 1200bps

Press the ***Enter*** key again and the data rate 1200 is highlighted.

Use the ***Toggle*** key, if required, to step through the options which are 600, 1200, 2400, and 4800. Once the required value is displayed, press the ***Enter*** key to accept it.

Note: The update in 2007 is used as an example.

This completes the configuration of the parameters in Channel 16

Repeatedly press the ***Page*** key to return to the main menu.

2.3.5 Channel 16 selection

Repeatedly press the ***Page*** key until the screen below is displayed:

*** Main Menu***
Configuration

Press ***Enter*** key to display the screen below:

*** Configuration***
Demodulator

Press ***Enter*** key to display the screen below:

*** Demodulator***
Channel Select

Press ***Enter*** again to access the downlink channel table:

Channel Select
01. AOR(E)

Press the ***Toggle*** key 15 times to step through the downlink beams to channel 16.

Note: The channel 16 name displayed will be that previously entered by the user.

Next press ***Enter***. This will move the cursor to the right hand side of the screen next to the letter N:

* Channel Select *
16. HP IOR N

Press the ***Toggle*** key to change the character from an **N** to a **Y** then confirm the entry by pressing ***Enter***. This will select channel 16 as the beam delivering the corrections. The screen will now display:

* Channel Select *
>16. HP IOR

The “>” symbol indicates that this is the selected beam.

Note: The channel 16 name displayed will be that previously entered by the user.

It is good practice after selecting a Channel to check the Demodulator Status. See the relevant section.

2.3.6 Checking GPS status

The GPS indicator on the front panel reports the satellite status from a GGA telegram which the unit normally outputs through Port 1. Flashing indicates the number of satellites used in the position computation.

This telegram is present when using the default unit configuration but may be disabled if certain optional configuration settings are applied. It is therefore possible for the indicator to be extinguished even when good GPS signals are present.

The GPS status may still be checked using the menu system, as detailed below:

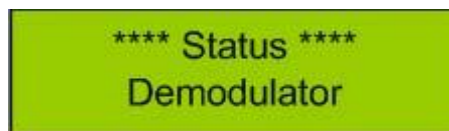
1. GPS Receiver Menu

Note: The Status/GPS Receiver sub-menus are only accessible when Port 5 is switched to OFF. If none of the sub-menus are available, see the section 2 for instructions for configuring P5.

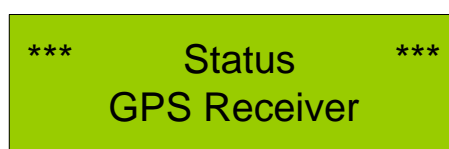
Repeatedly press “Page” until screen displays:



Press “Enter” and screen will display:



Press “Page” and screen will display:

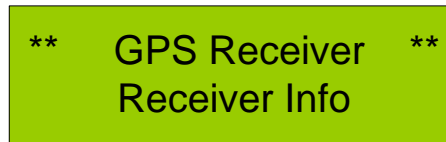


Press “Enter” to move to the Status/GPS Receiver sub-menus.

Repeatedly pressing “**Page**” will cycle through the sub-menus, as listed below. Pressing “**Enter**” in any sub-menu will display the associated parameters.

Checking “**Position**”, “**DOPs**” and “**SVs in View**” should be sufficient to confirm correct receiver operation.

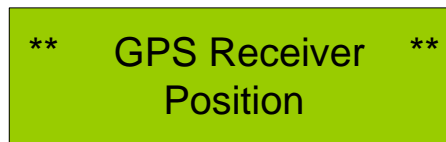
1.1. Receiver Information



Press the ***Enter*** key to view the status page. The information below is displayed:

- Model and Firmware version
- Serial Number
- Installed Options (*Not currently implemented*)

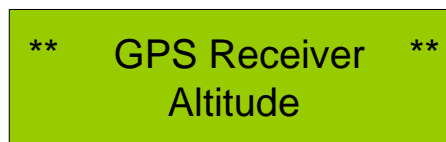
1.2. Position



Press the ***Enter*** key to view the status page. The information below is displayed:

- Lat
- Long.

1.3. Altitude



Press the ***Enter*** key to view the status page. The information below is displayed:

- Alt
- V.Vel (vertical velocity)

1.4. Course and Speed

```
** GPS Receiver **  
Course & Speed
```

Press the ***Enter*** key to view the status page. The information below is displayed:

- Course and Speed

1.5. Time (UTC)

```
** GPS Receiver **  
Time (UTC)
```

Press the ***Enter*** key to view the status page. The information below is displayed:

- UTC Time

1.6. DOP

```
** GPS Receiver **  
DOPs
```

Press the ***Enter*** key to view the status page. The information below is displayed here.

- PDOP
- HDOP
- VDOP
- TDOP

1.7. SVs In View

```
** GPS Receiver **  
SVs in View
```


Press the ***Enter*** key to view the status page. The information below is displayed here.

- PRN
- Signal to Noise (S/N)
- Azimuth (A/Z)
- Elevation (EL)

Press ***Toggle*** to page through all the SV's in view.

2. RECONFIGURING PORT P5

Port P5 must be OFF before the GPS receiver status information can be displayed on the LD2. See Section 4 for details.

Warning: Depending on system configuration, setting P5 to OFF may disrupt the operation of external equipment such as Verify QC. This change should NOT be made during vessel operations whilst the external equipment is in use. The original setting should also be re-instated once the status of the GPS receiver has been checked.

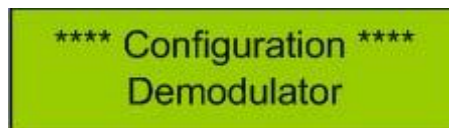
Note: If Verify QC is installed and operational, it will display any necessary GPS status information – it should not be necessary to use the LD2 status menu.

Port 5 may be disabled as follows: -

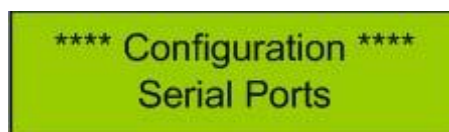
Press ***Page*** until the screen displays: -



Press ***Enter*** and the screen will display: -



Press ***Page*** twice and the screen will change to: -



Press ***Enter***, then press ***Page*** four times to display the Port 5 setup: -

```
P5: GPS I/O  REMOTE
>GPS Menu disabled<
```

Press ***Toggle*** to change the Port 5 output to: -

```
P5: GPS I/O  OFF
```

Press ***Enter*** to disable the output.

Note:

The same procedure may be used to set the port back to "REMOTE" when status checks are completed.

2.3.7 Configure RTCM output ports

2.3.7.1 Port P2

RTCM data is output from the LD2 on ports P2 and P4. The data string configured on port P2 is also used internally when computing positions for output on port P1.

All stations available in the demodulator station list (see above) are potentially available for output. However the output port configuration makes provision for each reference station to be individually enabled or disabled.

RTCM reference stations on P2 are enabled.

RTCM reference stations on P4 are all switched off.

VERIPOS recommend when using P4 that only the required RTCM stations are enabled.

Note:

Care should be taken when changing Beam as **all RTCM Reference stations on P2** will be switched **on** and **all RTCM stations on P4** will be switched **off**.

The final selection of reference stations must be made by reference to the system receiving the corrections.

A full station list contains stations which are too far from the work area to provide usable corrections.

VERIPOS recommend a maximum range of 2500 Km.

If the external system has sufficient intelligence (as with Verify QC), it will automatically exclude distant stations and weight the data from the remaining stations according to range and other factors.

If the external system has less intelligence, the user should enable the closest stations and disable the remainder.

In the extreme case, some GPS receivers can accept RTCM corrections but cannot differentiate between stations. (i.e. they have no multi-reference capability).

For these receivers, only a single reference station should be enabled. (Enabling multiple stations will generate position noise since the receiver will compute fixes, in turn, from each individual reference station.)

VERIPOS PPP services Ultra and APEX have no range limitations and may be used in any location.

The corrections are in a VERIPOS proprietary format however, and can only be decoded by VERIPOS systems.

When the LD2 is enabled for a PPP Service the user should **always enable the PPP service ID on the output port connected to Verify QC.**

The corrections are in a VERIPOS proprietary format and can only be decoded by VERIPOS systems. When the LD2 is enabled for Ultra service the user should always enable the Ultra ID on the output port connected to Verify QC.

The same Station ID's are used across all satellite beams;

Service	Station ID	NMEA Station ID
Ultra	68	0068
Ultra ²	68 + 75	0268
APEX	81	0081
APEX ²	81 + 82	0281

Global and regional coverage charts are available on the VERIPOS online support site (VOSS) at: <http://help.veripos.com>

VERIPOS also provide "Verichart" software which enables the user to generate a chart showing the best beams and reference stations for the exact location of the worksite. This software is provided with new systems and may also be downloaded from VOSS.

VERIPOS recommend that this software is installed during commissioning so that it is available during operations.

*Note: By default both P2 and P4 are configured to output RTCM at a baud rate of **9600**. It is recommended that the user leaves these settings unchanged. Displays will then be as shown in the following illustrations.*

These only show the procedure for enabling/disabling stations.

If connecting to an external system which requires different settings for baud rate etc., the user should refer to the more detailed explanation in the main body of the manual.

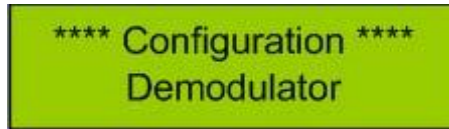
Port P2 is configured as follows:

Repeatedly press “Page” until the screen shows:




**** Main Menu ****
 Configuration

Press ***Enter*** and the screen will display:



**** Configuration ****
 Demodulator

Press ***Page*** twice and the screen will change to:



**** Configuration ****
 Serial Ports

Press ***Enter*** followed by ***Page*** to display the Port 2 setup:



P2: RTCM(P) DNLINK
 █ 9600 STN: 505 N

The cursor defaults to the baud rate.

Press ***Enter*** twice to move the cursor to the reference station ID number:



P2: RTCM(P) DNLINK
 9600 STN: █ 505 N

Press ***Toggle*** to move through the list to the desired reference station ID number.

Press ***Enter*** to move the cursor across:



Press ***Toggle*** to change the N to a Y followed by ***Enter***.

The reference station will now be selected and the cursor will jump back to the reference station ID number:




Use ***Toggle*** again to move through the list until the next desired station ID is displayed. Use ***Enter*** ***Toggle*** ***Enter*** to select.

Stations can be deselected in the same way by toggling through the list and using ***Enter***, ***Toggle***, ***Enter*** to deselect the desired station.

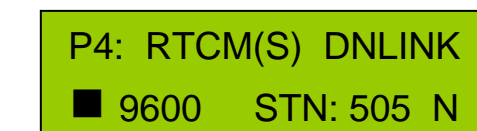
Configuring Reference Stations on Port P4

The procedure for configuring P4 is almost identical to that for configuring P2. The only difference is in selecting the port to modify.

From the following screen (see above):



Press ***Enter*** then press ***Page*** three times to display the Port 4 setup:



Continue as described (above) for P2

2.3.7.2 CONFIGURING POSITION OUTPUT FROM PORT P1

P1 on the LD2 has two output modes for NMEA messages: Local – where the onboard processor generates the NMEA message or GPS RX where the GPS card generates the NMEA message.

The following describes how to apply and when to use these modes.

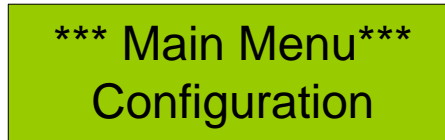
VERIPOS recommend by default a NMEA GGA position output is configured on port P1. This enables the correct operation of the front panel “GPS” and “DGPS” LEDs which provide the user with a useful indication of GPS status.

WARNING: Depending upon the local installation, port P1 may be used to output NMEA data to the user’s external equipment. This equipment may require a different output configuration. Caution must be exercised when making changes to P1 if the port is already in use.

*(Check whether any cable is attached to the P1 socket on the rear panel.)
 If in doubt, consult the VERIPOS Helpdesk.*

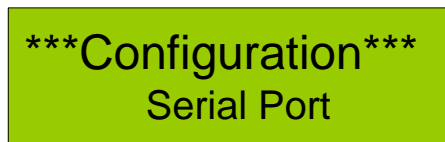
*Note: This port outputs RS232 data at a default rate of 9600 baud.
 The format is fixed with 8 data bits, no parity and 1 stop bit (8-N-1).*

Repeatedly press “**Page**” to reach the entry point of the main menu:



*** Main Menu ***
 Configuration

Press the ***Enter*** then press ***Page*** twice. The following screen is shown:



*** Configuration ***
 Serial Port

Press the ***Enter*** key to select the first page which is Serial Port P1.



P1:NMEA OUT GPS RX

This screen is used to select the source of the NMEA output message. The options are “GPS RX” or “LOCAL”. Press “Toggle” until the required option is displayed then press “Enter” to select it.

VERIPOS recommend using “LOCAL” as the default setting. “GPS RX” may be used if demanded by the survey specification. See notes below. Further advice from the VERIPOS Helpdesk.

Notes: When “GPS RX” is selected the NMEA position data is computed within the GPS receiver itself.

Where “LOCAL” is selected the NMEA position is computed in a separate processor within the LD2 using VERIPOS algorithms.

When in LOCAL mode, the computation uses the RTCM corrections configured on port P2. These corrections are derived from the stations enabled during P2 configuration.

Using “LOCAL” offers the following advantages:

- The VERIPOS algorithms compute a position based on the closest reference stations enabled on port P2. (Up to 4 stations are utilised.) The processor therefore computes the optimum position available from the selected stations, regardless of whether all stations are enabled or just a single station.

If the position is generated in the GPS receiver, the configuration of P2 is constrained by the multi-reference capabilities of the specific receiver installed. Some receivers specify a maximum number of reference stations; some only permit a single station. In the latter case enabling multiple stations may result in position noise since fixes will be generated in turn, from each individual reference station.

P2 is also used as the main RTCM output port so potential conflicts are much reduced by using the “LOCAL” mode.

- Various NMEA output strings may be configured for output on P1.

In “LOCAL” mode, strings may be easily selected using the LD2 menu system.

In “GPS RX”, different strings can only be selected by reprogramming the GPS receiver. This is accomplished by uploading configuration scripts. The receiver is initially configured to output only the ZDA string. If the user wishes to change this setting, it is advisable to contact the VERIPOS Helpdesk for assistance.

When in “LOCAL mode, the output baud rate is fixed at 9600 baud.

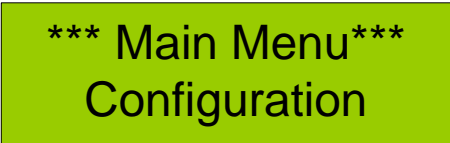
In “GPS RX” mode it is possible to change the baud rate but this requires reprogramming of the GPS receiver. If the user wishes to change this setting contact the VERIPOS Helpdesk for assistance.

2.3.7.3 Configuring the Strings output in “LOCAL” Mode

The NMEA Strings to be output on port P1 (in “LOCAL” mode only) are configured from the Configure/GPS menu.

Note: This menu structure exists for historical reasons. Despite the allusions to GPS receiver, it is actually configuring the PC104 processor.

Repeatedly press “**Page**” to reach the entry point of the main menu:



*** Main Menu ***
 Configuration

Press “**Enter**” followed by “**Page**” to display the GPS Receiver Configuration menu:



*** Configuration ***
 GPS Receiver

Press “**Enter**” then press “**Page**” 4 times to display the Port A Settings menu:



** GPS Receiver **
 Port A Settings

Press the ***Enter*** to access the first screen in the sub-menu which is shown below:



* Port A Settings *
 NMEA0/P:GGA 1.0

Press “**Enter**” to move the cursor to the centre of the screen (String selection mode).

Use the ***Toggle*** key to move through the list of available NMEA strings (see the table below). It is possible to output multiple strings from P1. Each string may be individually enabled or disabled.

To the right of each string ID, the display will show either “**OFF**” (indicating that it is disabled) or “**1.0**” (indicating that it is enabled for output at 1Hz, i.e. 1 set of data every second).

To change the status of the displayed string, press “**Enter**”. This will move the cursor to the right of the screen. (Rate selection mode).

Note:

*For the front panel “GPS” and “DGPS” indicators to be activated **either** a GGA **or** a GGX string must be enabled. Do not enable both of these strings – sue one or the other to match requirements of the receiving system.*

The number displayed to the right of the cursor is the output rate for the string.

To disable the string, press ***Toggle*** until “OFF” is displayed.

To enable the string, press “**Toggle**” until any other rate is displayed.

Press “**Enter**” to accept the entry and move back to the string selection mode.

Note:

NMEA messages are always output at 1 second intervals regardless of the rate selected. Select “OFF” to disable the message or select any rate to enable it at 1 second intervals.

Positioning messages	
Message type	Description
GGA	Position fix data which provide 3D location and accuracy data
GGX	GGA with a position accuracy at 7 decimal places
GLL	Geographic Latitude and Longitude
VTG	Velocity made good.
GSA	Includes the numbers of the satellites being used in the current solution and the DOP
GSV	Satellites in View shows data about the satellites that the unit might be able to find based on its viewing mask and almanac data
RMC	Position, velocity, time data
ZDA	Data and Time
GRS	GPS Range Residuals
GST	GPS Pseudorange Noise Statistics

These are described in detail in the Appendix NMEA Messages.

2.3.7.4 Configure to receive VERIPOS HF CORRECTIONS

An LD2 can only receive HF signals if the optional HF card is installed.

If any of the menus described in the following text are absent from the user’s LD2, this option is probably not installed. Contact the VERIPOS Helpdesk for further advice.

VERIPOS currently support HF stations in the North America and South America. Refer to VERIPOS Online Support Site at: <http://help.veripos.com>. updated with changes which occur after publication.

These HF stations are maintained by VERIPOS and offer standards of accuracy as for our reference stations. They are chargeable and encrypted to prevent unauthorised access.

In order to use the service the user must first obtain a decryption key to enter into his unit. This key is referred to as the C3 code. It is different for each region of operation as is unique for each individual LD2.

The C3 code must be obtained from the VERIPOS Helpdesk. In order to compute a code to match the specific unit, the user must supply the internal code (C2 code) for that unit.

This can be determined using the menu system.

The following steps are used to bring the unit into service:

- Determine the C2 code for each LD2
- Submit a request for a C3 code to the VERIPOS Helpdesk
- Select the appropriate HF station from the list displayed by the unit
- Enter the C3 code.
- Enable Decryption
- Check the signal status

1. Determine the Unit's C2 Code

From any point in the menu structure, repeatedly press *Enter* until the Main menu Status screen is displayed:

```

**** Main Menu ****
      Status
  
```

Press *Enter* then press the *Page* key twice to display:

```

*** Status ***
  HF/MF Receiver
  
```

Press *Enter* then *Page* to display:

```

* HF/MF Receiver *
  C2 Code
  
```

Press *Enter* to display:

```

* HF/MF Receiver *
  C2 Code:XXXXX
  
```

The five-digit number on the right of the bottom row is the unit C2 code which must be reported to the Helpdesk.

2. Request C3 code from the Helpdesk

The request should be submitted to the VERIPOS Helpdesk by email using the Signal Notification form (SNF). Fully completing this form ensures that all necessary information is available and avoids delays. A form may be downloaded from the VERIPOS Online Support Site at <http://help.veripos.com>. It is impossible to compute a C3 code unless the unit C2 code and the vessel's operating region are known.

Note:

Enable requests can also be submitted by telephone to the VERIPOS Helpdesk. Before calling refer to a Signal Notification form to ensure that all the required information is available.

Note:

The VERIPOS Helpdesk can only issue a C3 code if a Service Access License (SAL) exists which includes the supply of HF services. Licenses must be pre-arranged between the user's company and the VERIPOS Operations Department.

3. Select Station, Enter the C3 Code and Enable Decryption

Note: The HF/MF card can receive data on two channels. Each VERIPOS HF station transmits corrections on two different frequencies to enhance reliability. Therefore only one VERIPOS station may be selected.

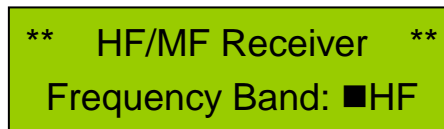
From any point in the menu structure repeatedly press *Enter* until the Main menu Configuration screen is displayed:



Press *Enter* then press the *Page* key three times to display:



Press *Enter* to display:



"Frequency Band" may initially display either "HF" or "MF".

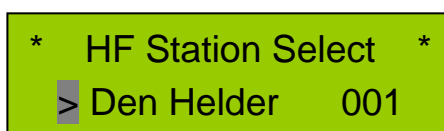
If "HF" is displayed, press *Page* to move to the screen below.

If "MF" is displayed, press *Toggle* to change the indication to HF then press *Enter* to accept the change.

Press *Page* to move to the screen below.



Press *Enter* to move to the station selection screen:



This screen displays a list of the VERIPOS HF stations, together with their station ID numbers. Repeatedly pressing *Toggle* scrolls through the list. If a station has previously been selected, it is identified by a chevron bracket (>) before its name.

To select a different station, repeatedly press *Toggle* until the required name is displayed. Press *Enter*. The cursor will move to the extreme right of the screen and an “N” will be displayed. Press *Toggle* to change this to a “Y” then press *Enter* to accept the selection.

The cursor will move back to the left of the screen and a Chevron bracket (>) will appear in front of the station name to confirm that it has been selected.

Press *Page* twice to move to the Station Details screen:



** HF/MF Receiver **
 Station Details

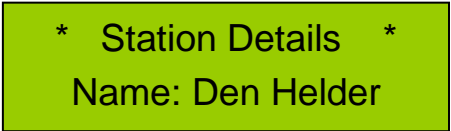
Press *Enter* to move to the Details display screen:



* Station Details *
 Den Helder 001

The station name should be the same as that selected above.

Press *Enter* to accept and move to the next screen:



* Station Details *
 Name: Den Helder

Most of the station details are fixed for VERIPOS stations.

Press *toggle* five times to move to the code entry screen:



* Station Details *
 C3 Code: *****

Press *Enter* to move the cursor to the first character of the six-digit code. Repeatedly press *Toggle* until the first character matches the first digit of the supplied code. Press *Enter* to accept the value and move to the next digit. Repeat this procedure until the complete six-digit code has been entered. After the last entry, the cursor will move back to the left of the screen and the code will be hidden (replaced by asterisks).

Press *Page* twice to move to the Decryption screen:

```

* Decryption *
  ■ Enabled
  
```

When using VERIPOS HF stations, Decryption must be enabled.
 If necessary, press *Toggle* to display “Enabled” then press *Enter* to accept.

This completes the entries. Repeatedly press *Page* to return to the Main Menu.

4. Check HF Status

From any point in the menu structure, repeatedly press *Enter* until the Main menu Status screen is displayed:

```

**** Main Menu ****
      Status
  
```

Press *Enter* then press the *Page* key twice to display:

```

*** Status ***
   HF/MF Receiver
  
```

Press *Enter* to display the Channel Status screen:

```

* HF/MF Receiver *
  Channel Status
  
```

Press *Enter* to access the sub menu:

```

Ch1: 01 1234 kHz
123bps 45dBuv/m67dB
  
```

Example of Status display

Use *Toggle* to switch between Channel 1 and Channel 2.
 For each channel, the display shows the frequency in use, the Bit rate (bps), the signal strength (dBuv/m) and the calculated signal to noise ratio (db)

2.3.8 Reconfiguring LD2 for a new location

After moving to a new geographical region, the following steps must be performed to reconfigure your system:

1. Each LD2 demodulator must be reconfigured to receive a local communications satellite. This is carried out using the push buttons and small LCD display on the demodulator front panel.

See relevant procedure.

2. Each LD2 demodulator must be reconfigured to enable the required reference stations on the relevant output port(s). (This must include the Ultra "Station" if the Ultra Service is used.) This is carried out using the push buttons and small LCD display on the demodulator front panel.

See relevant procedure

3. Verify DP software (if installed) does not require reference stations configuration. It will automatically select the nearest stations (up to 4 stations) and use them in its calculation. (The stations must be enabled in port P2, as indicated above.) Users will still need to reconfigure the local communications satellite.

Note:

Where the LD2 is used in conjunction with VERIPOS Verify QC software, this will also require configuration as follows:

The "RTCM inputs" on each Verify QC system must be reconfigured by selecting the appropriate "Beam" and "Stations".

The "calculations" on each Verify qc system must be reconfigured by selecting the appropriate "Stations".

See Verify QC manual for full details.

2.3.9 Determine LD2 firmware version

Some features of the LD2 vary according to the versions of firmware which are installed. The Veripos Helpdesk may ask the user to check which versions are installed on his system. This may be determined as follows:

From any location in the menu, repeatedly press the “Page” key until the display shows:

```
**** Main Menu ****
      Status
```

Press “Enter”. The display will show:

```
*** Status ***
  Demodulator
```

Press “Enter”: The display will show:

```
**** Demodulator ****
      Unit ID
```

Press “Page” twice. The display will show:

```
**** Demodulator ****
      S/W Versions
```

Press “enter”. **If the unit is an LD2**, the display will be similar to that shown below:

```
Demodulator: 1.0 2.1
Decoder:      1.0 7.0
```

If the unit is an LD2S, the display will be similar to that shown below:

```
Boot/Main: 1.11 1.1.1
Decoder:      2.40
```

Record the version numbers and report them to the Helpdesk.

2.3.10 Configuring a 1PPS output from the LD2

The LD2 provides a facility for outputting a 1pps signal to external equipment. This is typically used to provide accurate time synchronisation for third party navigation systems or multi-beam sonar.

The 1pps signal is derived directly from the internal GPS receiver and is output on pin 1 of port P1. The exact specification of the signal will vary according to the model of GPS receiver installed.

Depending upon the options specified when ordering the LD2; the internal GPS receiver may require an upgrade before it can output 1pps. If required, the upgrade is chargeable but may easily be performed in the field since it only requires a change of firmware.

If the user has suitable test equipment (e.g. oscilloscope), the 1pps output may be checked by directly observing the signal on pin 1 of port P1. (There are no switches or menu settings associated with this output.)

In case of difficulty, or for additional information, contact the VERIPOS Helpdesk.

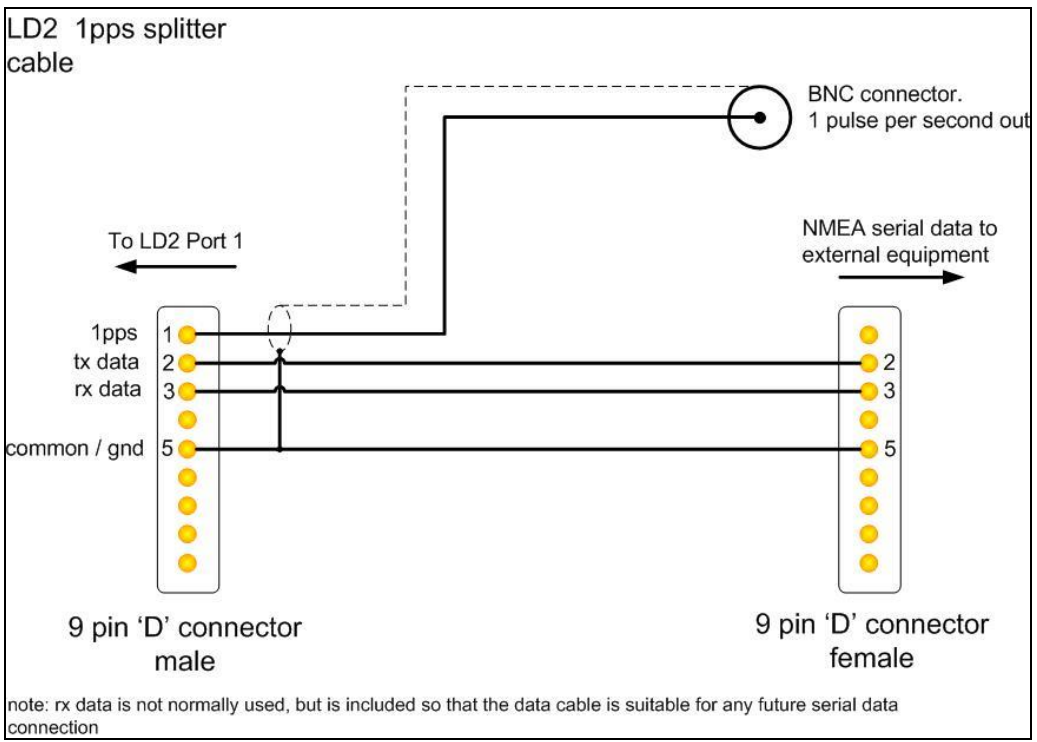
Note: The 1pps pulse is very narrow and the amplitude may be as low as 2.5 volts (depends on receiver model) so it will be difficult to observe on an oscilloscope.

Because of these characteristics, it is also very susceptible to degradation if it is wired using the same cable as the RS232 output which is also present on P1. VERIPOS strongly advise using a breakout harness and running the 1pps signal in a separate coaxial cable.

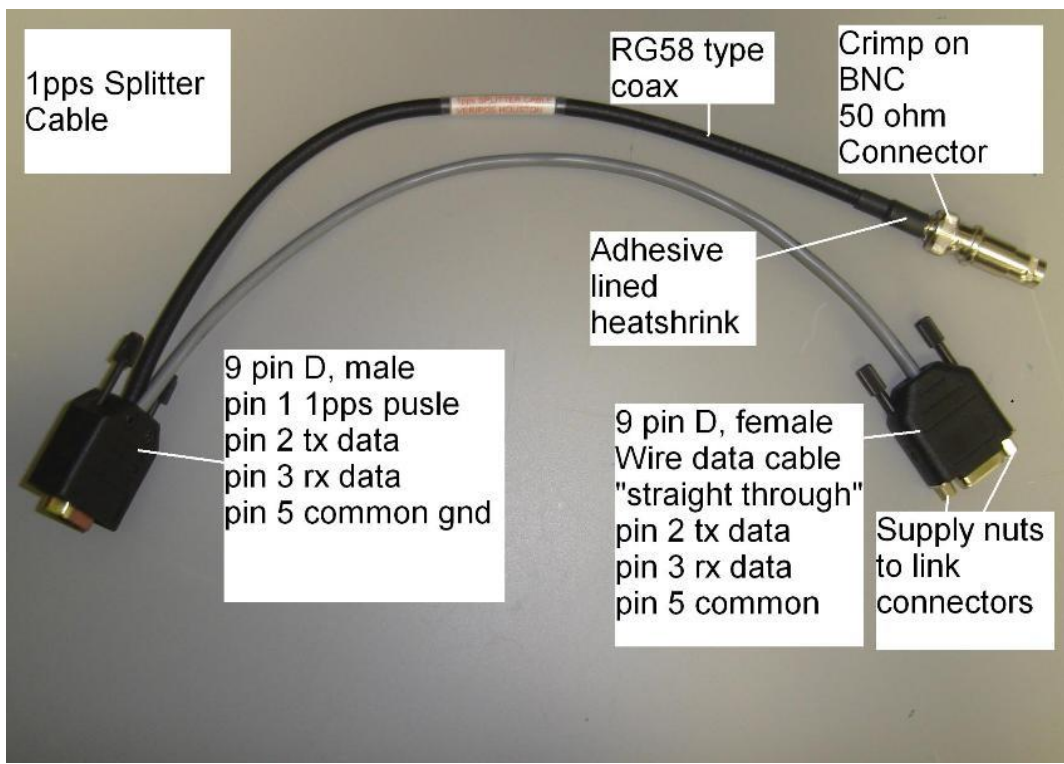
The harness may be purchased from VERIPOS or fabricated by the user, using the details below:

2.3.10.1 LD2 port P1 cable to output of a 1 pps pulse and NMEA ZDA

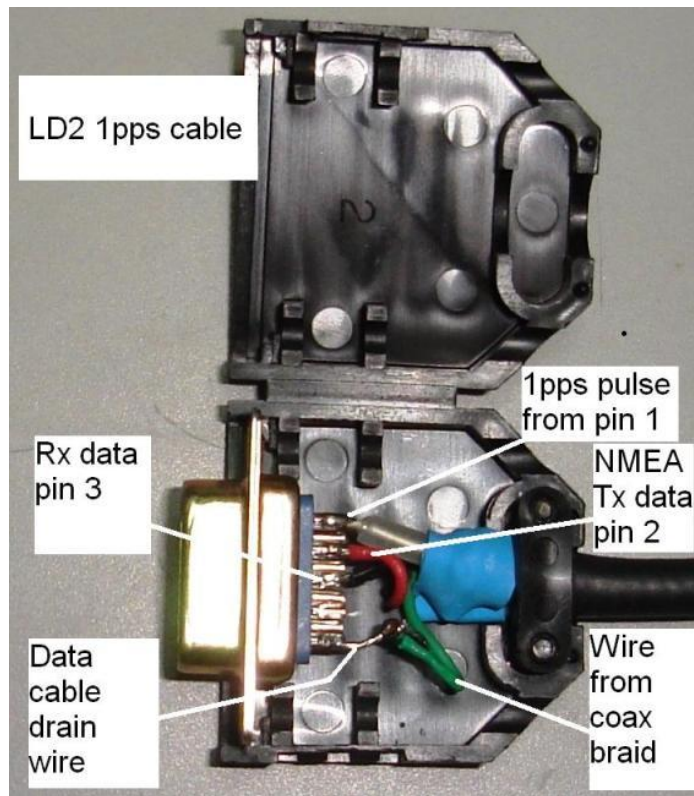
This diagram provides the details required to make a PPS/ZDA cable harness which can be connected to P1 of the LD2.



The following photographs are examples of a typical harness constructed from this circuit diagram.



Y-Cable for LD2

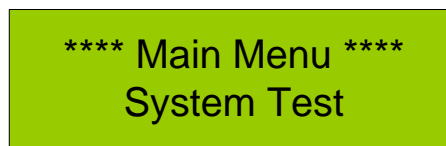


Connector for P1 on LD2

2.4 SYSTEM TEST

System Tests allow the user to check the operation of the front panel LCD display.

Access to System Tests is by pressing the *Page* key in the top level Main Menu until 'System Tests' is displayed. Then press the *Enter* key to show the following display:



Press the *Enter* key to initiate an internal self- test. The display changes to show progress through the test cycle.

2.5 SYSTEM INFORMATION

The system information has the following displays: current processor software version; controller software version; GNSS hardware on-board; and the IP address of the unit.

**** Main Menu ****
 System Information

2.5.1 PC/104 S/W

System Information
 PC/104 S/W

The PC/104 S/W gives software information on the PC/104 card and the controller firmware version number. When the above display is shown, Press the ***Enter*** Key to access the information.

** PC/104 S/W **
 LD2 Controller 5.93

2.5.2 Installed H/W

* System Information *
 Installed H/W

Note:

The user should only make changes if directed to do so by a VERIPOS engineer. Incorrect entries in this menu may render the unit inoperable.

The Installed Hardware menu is only for use by the VERIPOS workshop engineer to specify which optional GPS card and which HF card (HF+MF 3001 Card or Beacon SBX-4 Card) is fitted in the unit. Firmware uses entries to determine which menus should be displayed and what data formats should be used when communicating with the modules.

2.5.3 Host IP address

* System Information *
 Host IP Address

When the LD2 is connected to a network, the IP will be assigned by the network, provided it is a DHCP network, otherwise the LD2 unit will default to the IP **192.168.150.249**. The IP of the LD2 will be displayed in the screen below, to access this screen when the above screen is shown press the ***Enter*** key.

Host IP Address
 192.168.123.456

Where IP address of the LD2 must be changed – use the on-board Verify DP software. Refer to the Verify DP Operations manual and contact Veripos Helpdesk and for more information.

2.6 DETERMINE ENABLE STATUS

The current unit status can be determined from the “ID” LED on the front panel.

“ID” LED is on and solid LD2 is ENABLED

“ID” LED off LD2 is DISABLED

The indicator may be blank if the unit is an LD2S and no L-Band signal is received.

2.7 REQUESTING ENABLE / DISABLE

Requests for enable/disable codes should be made using the **Signal Notification Form (SNF)**.

This should be submitted by email to the VERIPOS Helpdesk helpdesk@veripos.com

A SNF form is available from the VERIPOS Online Support (VOSS) Web site: <http://help.veripos.com>

Once a request is accepted the LD2 will be enabled / disabled over the air.

Confirm status by referring to the Access code page.

Note:

After enabling the LD2 for “Verify DP” service the LD2 must be rebooted to activate the external monitor screen. Turn the power off for one minute, using the switch on the rear of the unit.

Some services are only capable of being used where the LD2 has specific hardware and software available.

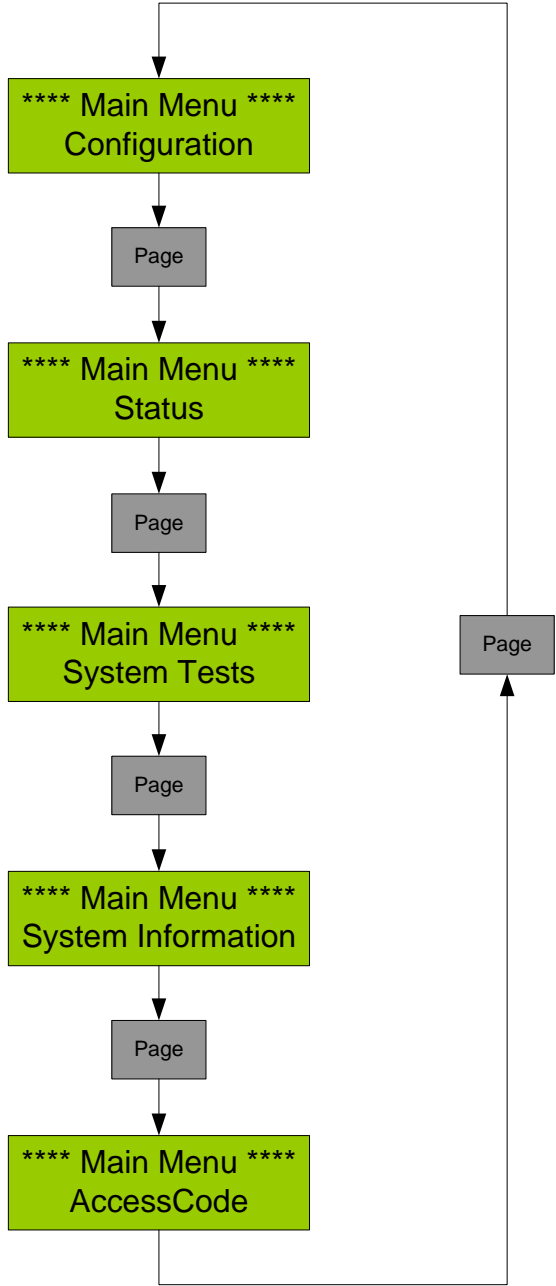
Enable requests can also be submitted by telephone to the VERIPOS Helpdesk. See Appendix for contact details. Before calling please refer to a Signal Notification form and ensure that all the required information is available.

VERIPOS provide a range of services which are available in combinations. When requesting an enable code the user must specify which services are required. A listing of VERIPOS services is given on the Signal Notification form. See VOSS for a copy of the form. Choice of services affects both pricing and system accuracy.

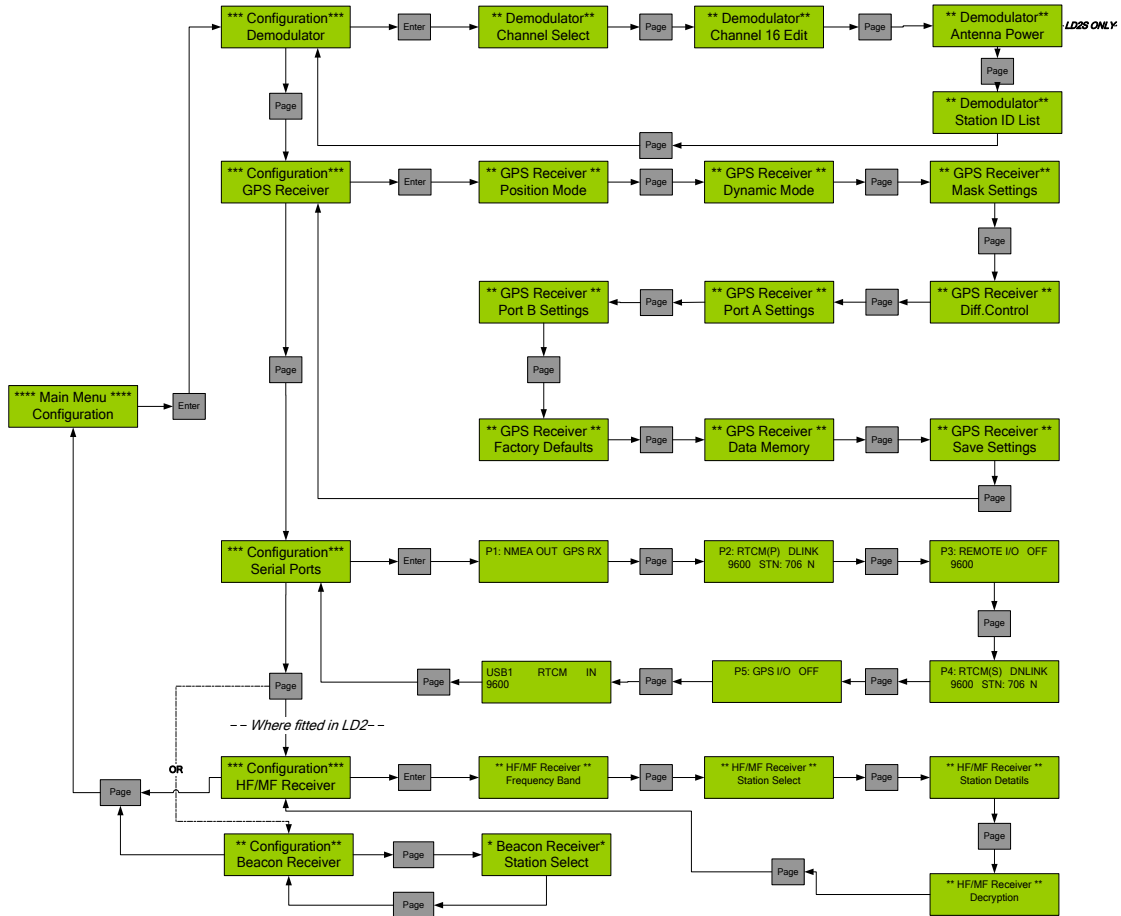
2.8 REFERENCE INFORMATION

2.8.1 Menu Structure

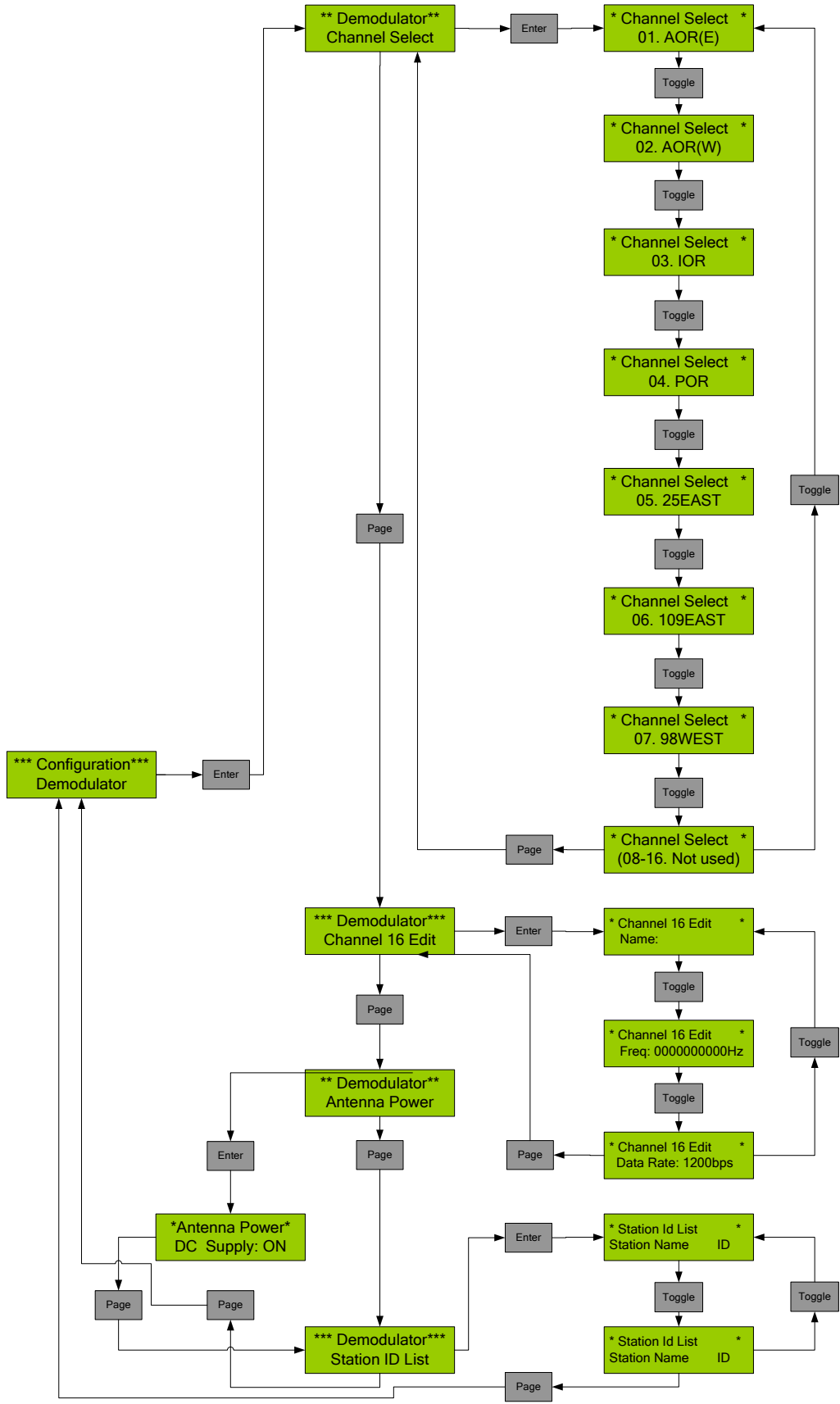
2.8.1.1 LD 2 Main Menu



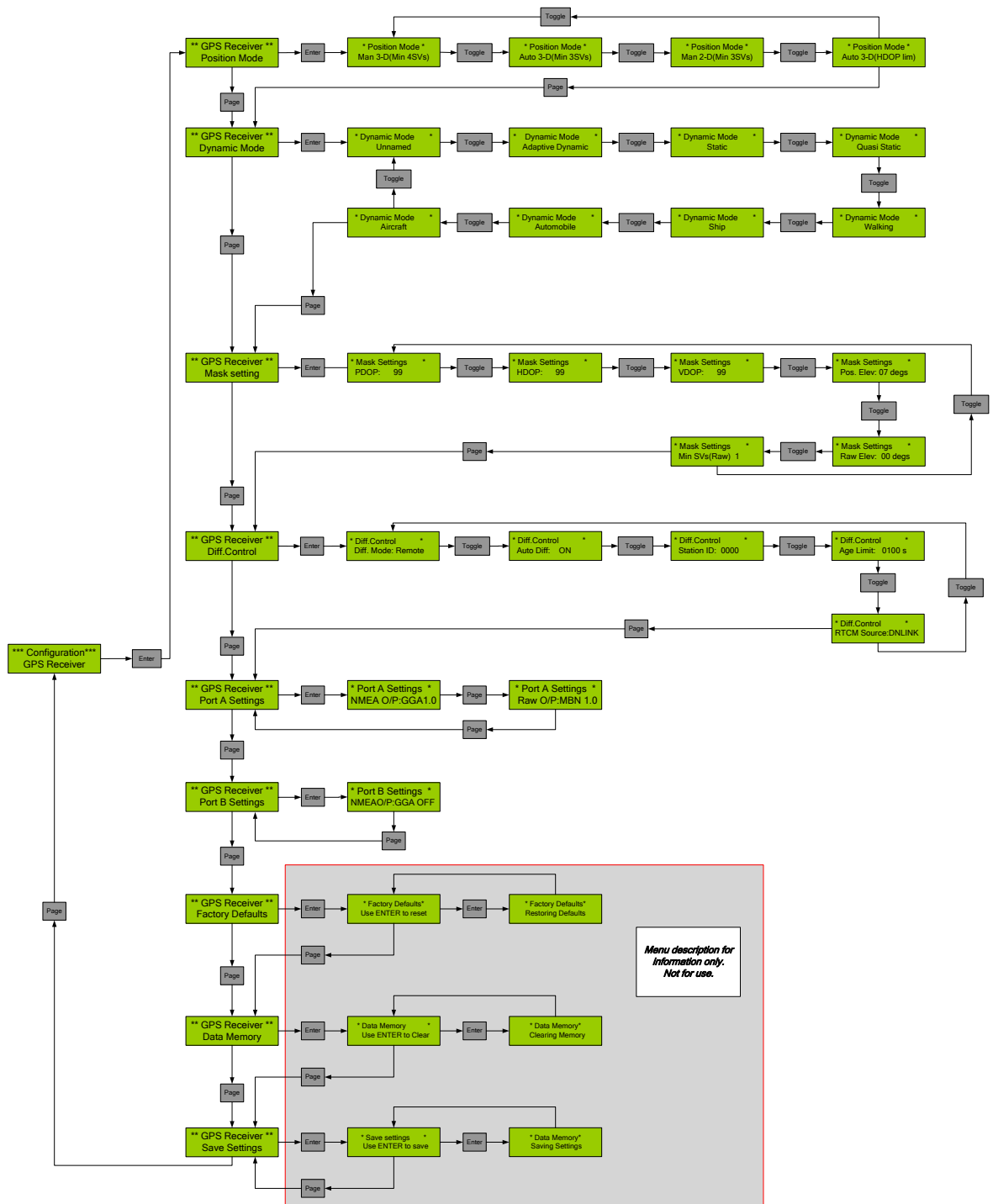
2.8.1.2 Configuration



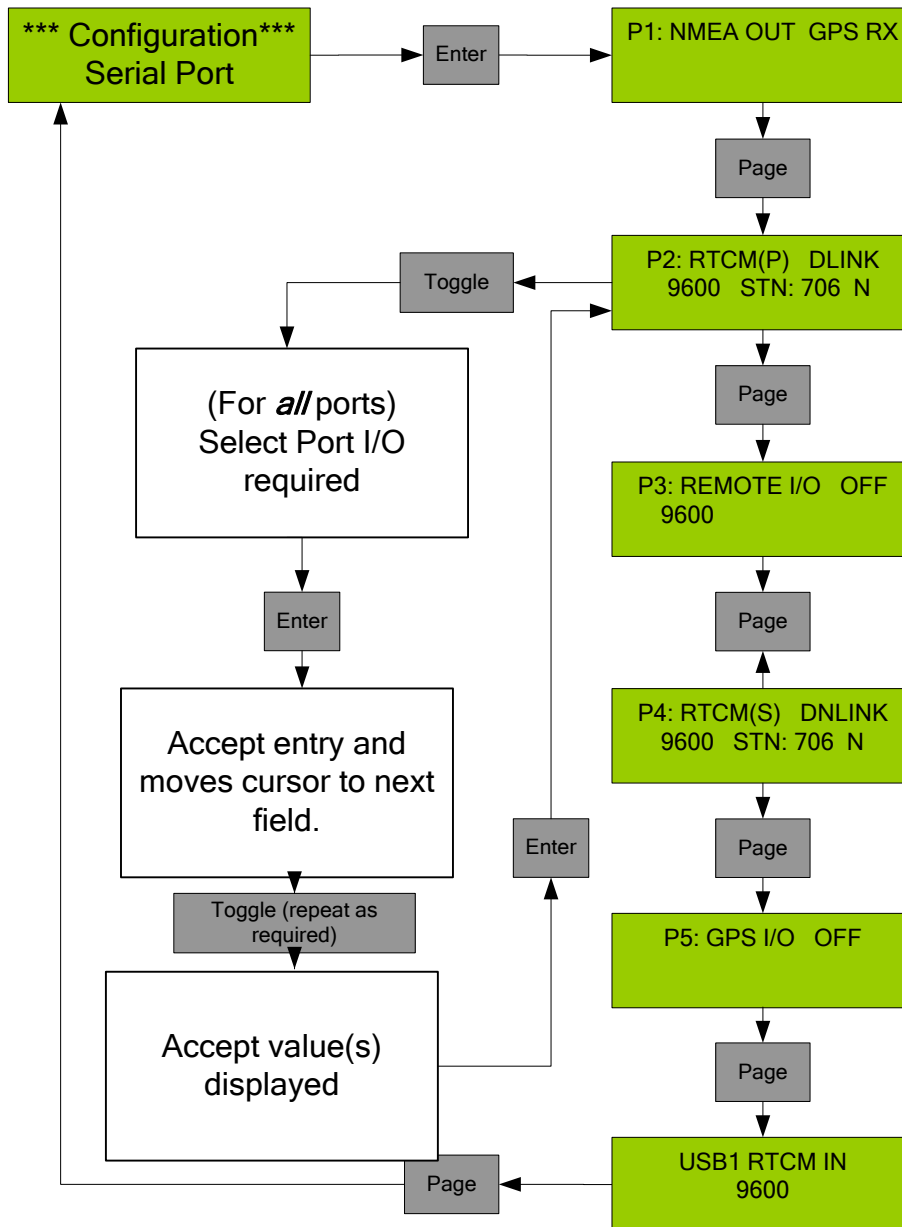
2.8.1.3 Configuration – demodulator



2.8.1.4 Configuration – GPS

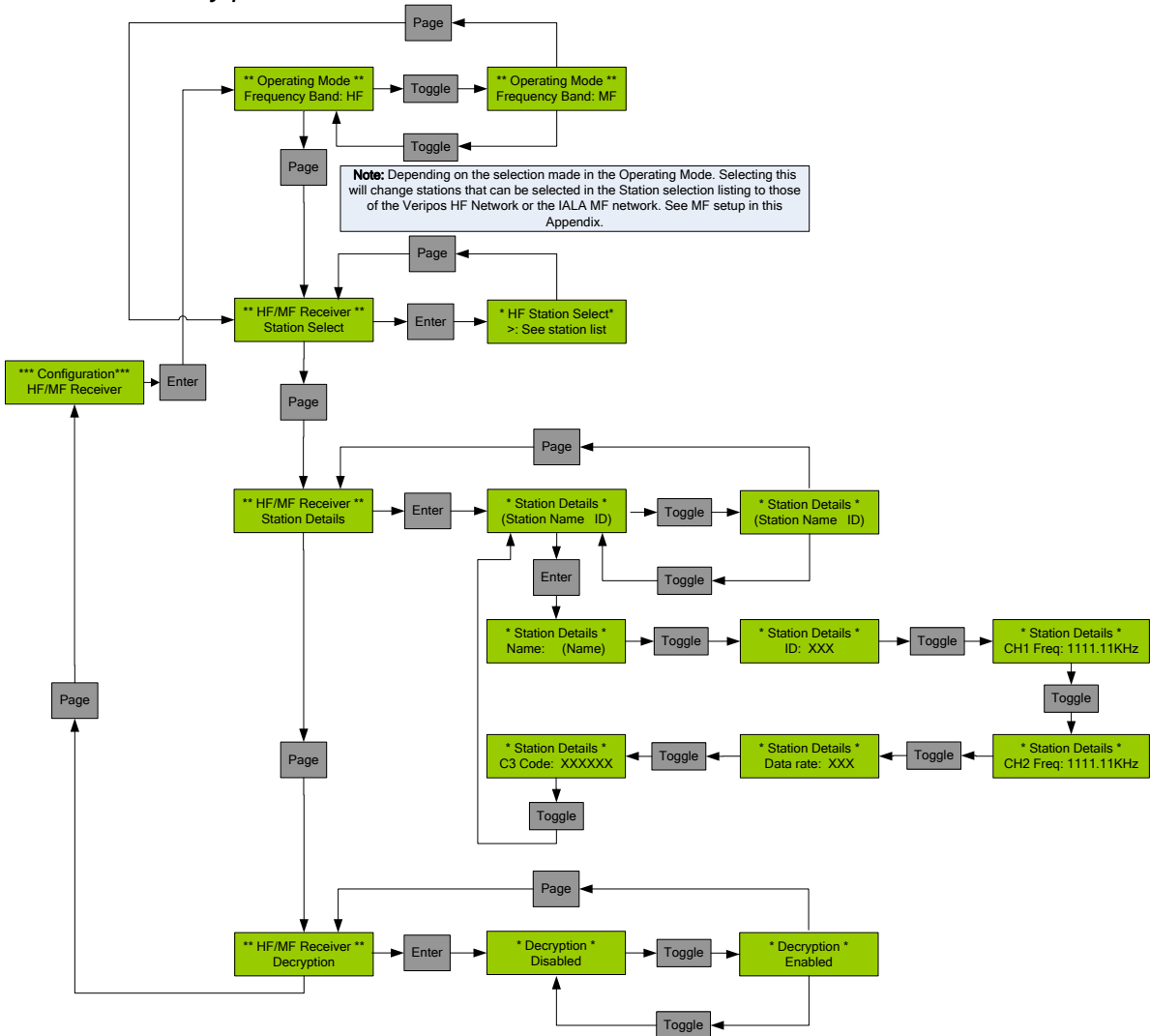


2.8.1.5 Configuration – serial port



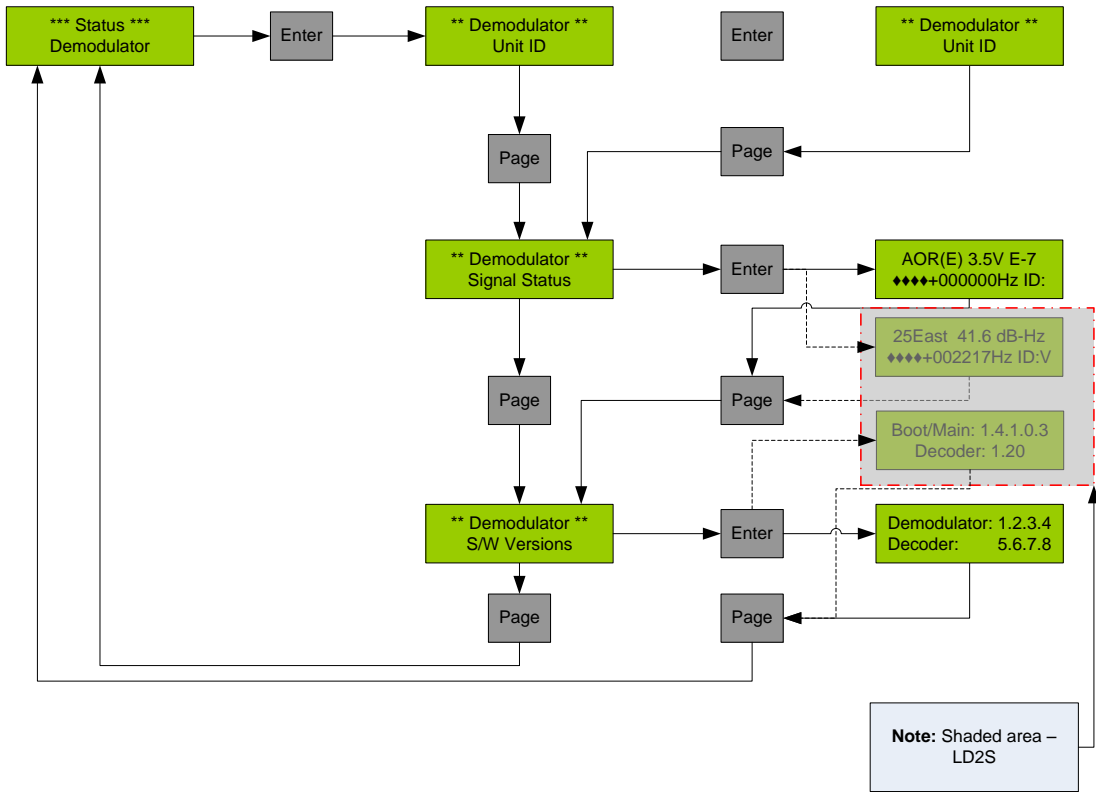
2.8.1.6 HF setup

Note:
 This menu is only present if the relevant HF card is installed in the LD2 Variant.



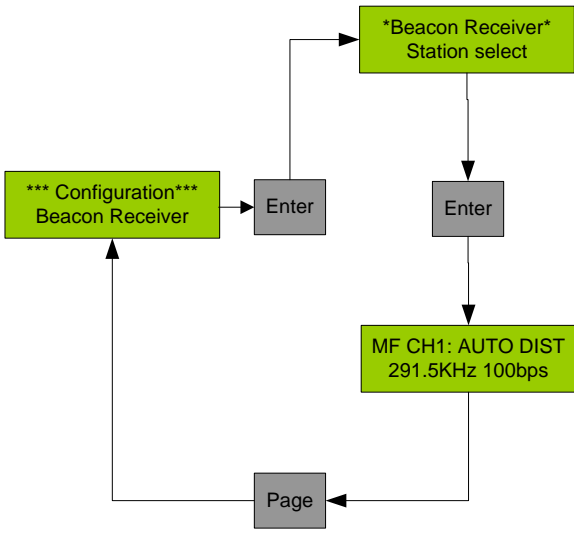
2.8.1.7 Configuration HF/MF receiver (MF setup)

Note:
 This menu is only present if the relevant MF card is installed in the LD2 Variant.

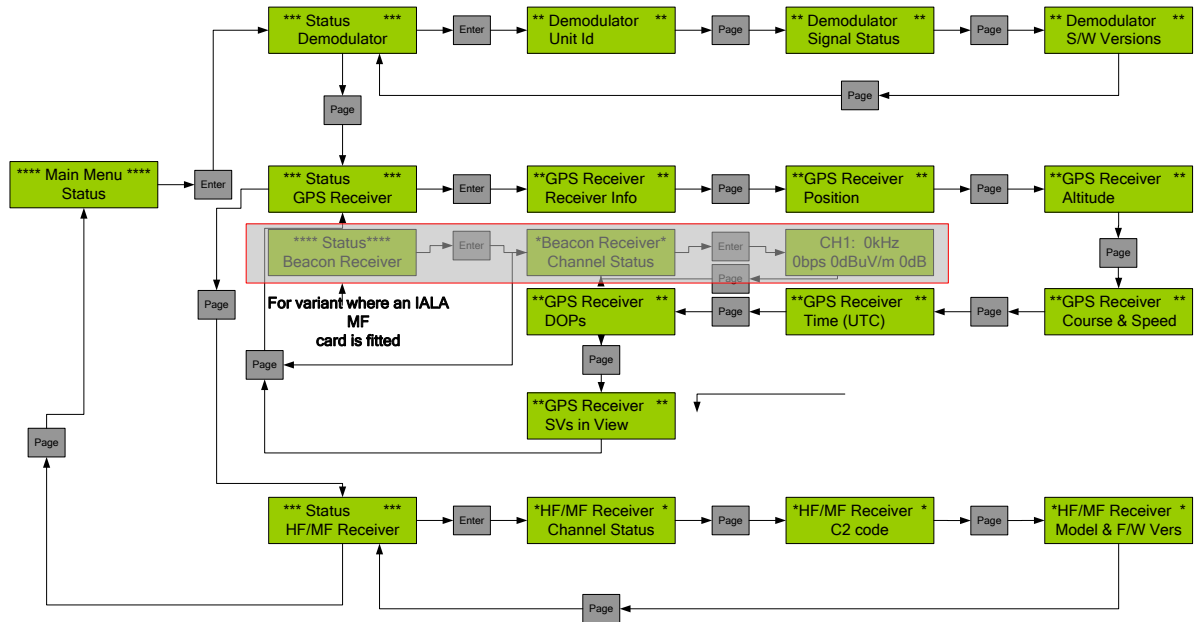


2.8.1.8 Configuration – Beacon receiver (MF)

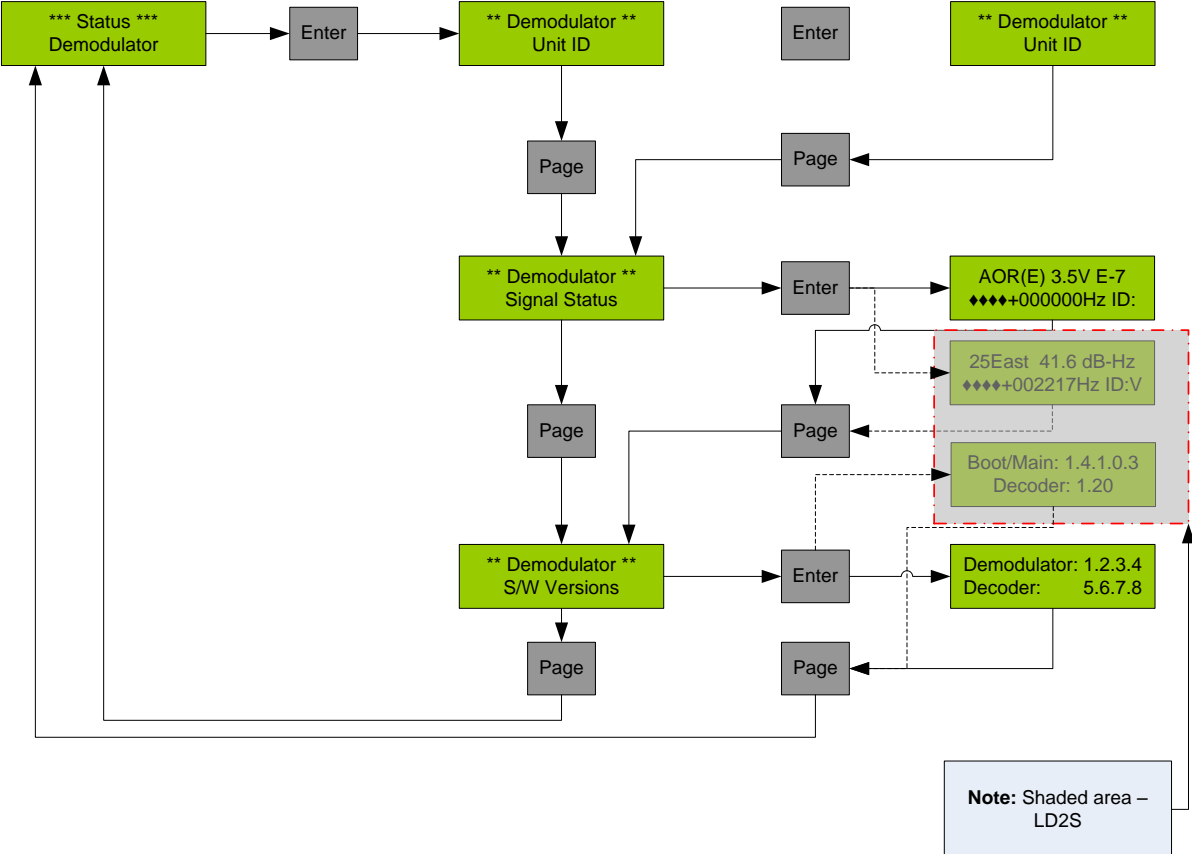
Note:
 This menu is only present if the relevant MF card for IALA is installed in the LD2 Variant.



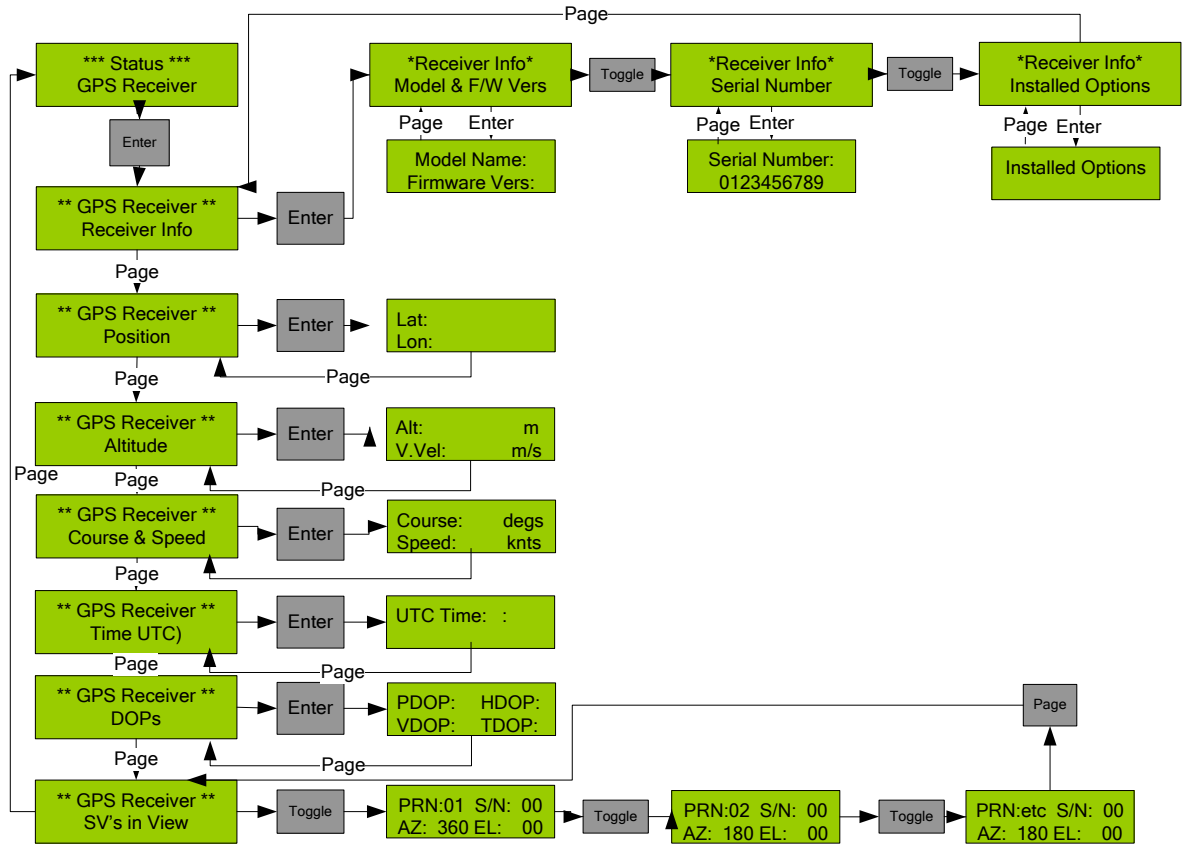
2.8.1.9 Status



2.8.1.10 Status – Demodulator

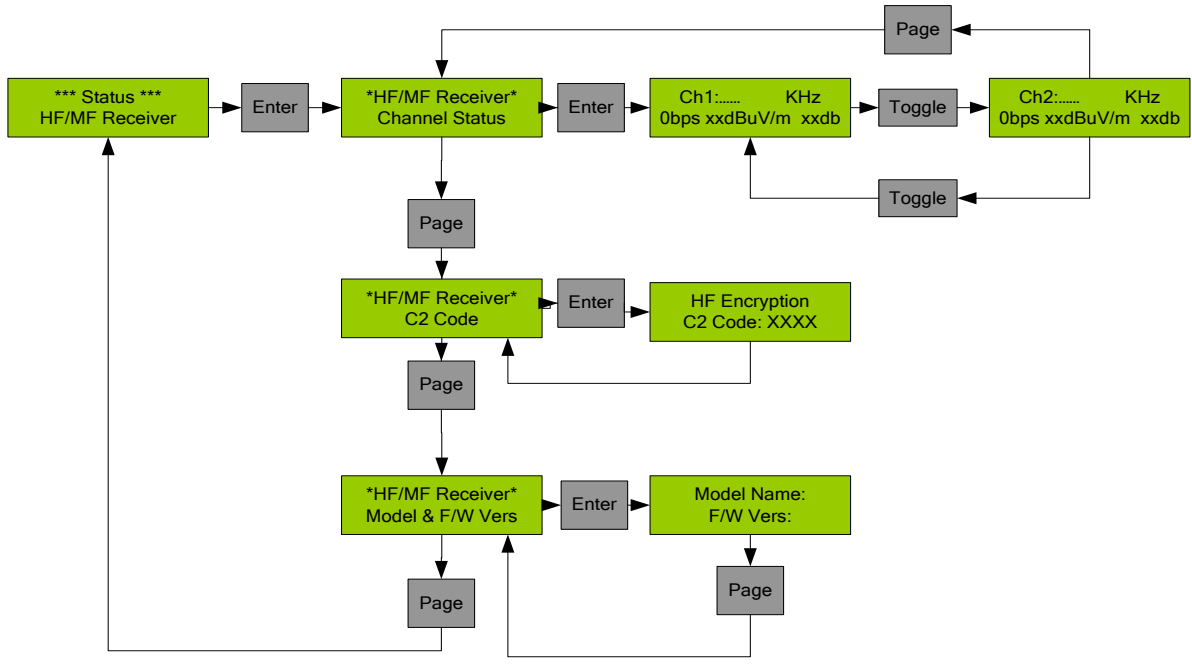


2.8.1.11 Status – GPS

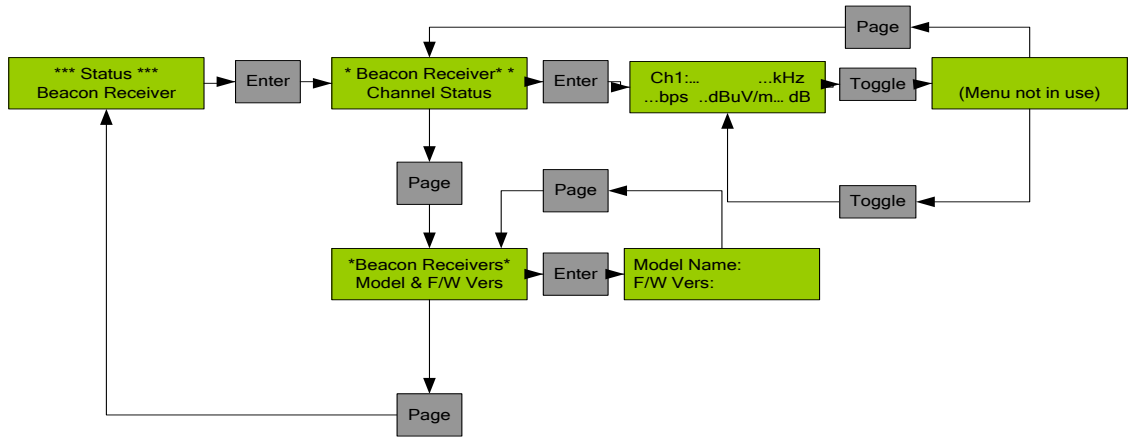


2.8.1.12 Status – HF/MF

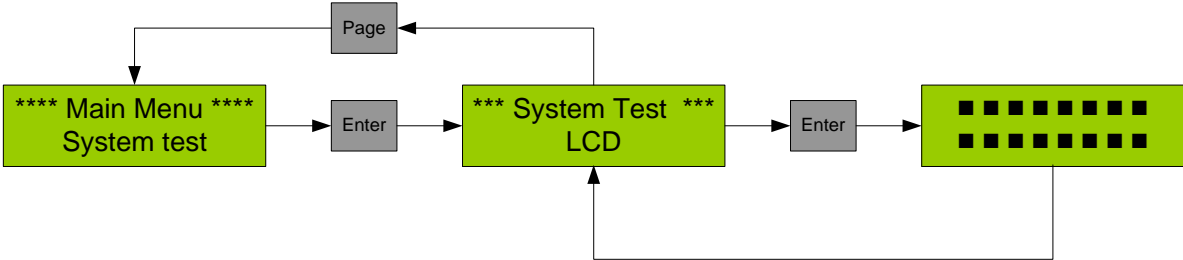
Menus are available for LD2 variant where HF/MF card installed.



2.8.1.13 Status – Beacon (MF)

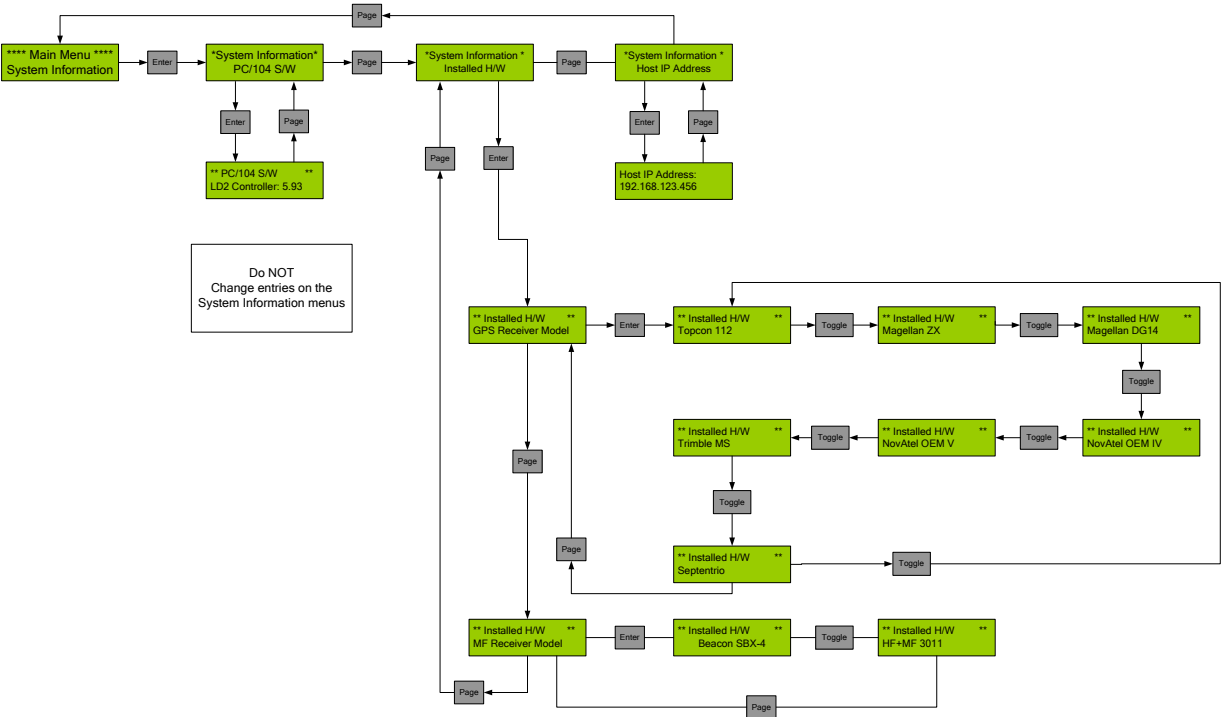


2.8.1.14 System Test



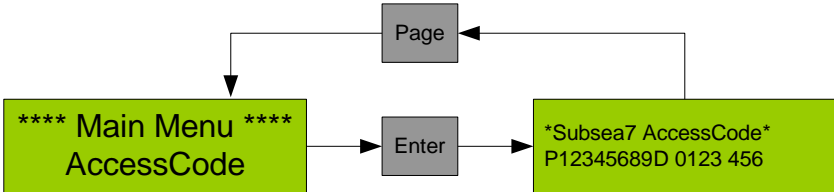
2.8.1.15 System Information

WARNING:
 Do **NOT** make changes to entries in these menus.



2.8.1.16 Access Code

Refer to this Manual and LD2 Bridge Card on VOSS for Enable / Disable procedures over the air.



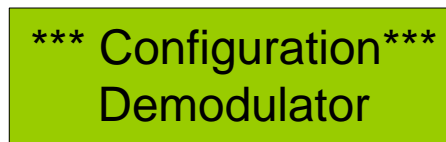
2.9 CONFIGURATION MODE

The configuration menu allows the user to setup the different components of the LD2: Demodulator, GNSS Receiver, Serial Ports and HF/MF Receiver. The Menu Maps are detailed earlier in this section.

To access the Configuration Menu, press the ***Page*** key until Configuration is shown in the Main menu, then press the ***Enter*** key.

2.9.1.1 Demodulator menu

From the Main Menu, Configuration Screen, access the Demodulator function by pressing the ***Enter*** key. The following screen is shown:



This provides access to three sub menus which will allow selection of the Satellite beam (channel) used to receive the VERIPOS corrections. The “User Defined” sub menu allows a channel frequency to be entered manually.

2.9.2 Channel Select

VERIPOS correction signals are broadcast from seven geo-stationary satellites:

Satellite	Longitude	Frequency (MHz)	Data Rate (hns)
98W	98W	1539.9025	1200
AORW	54W	1539.8925	1200
25E	25E	1539.8825	1200
AORE	15.5W	1539.9825	1200
IOR	64E	1539.9025	1200
143.5E	143.5E	1539.9925	1200
POR	178E	1539.9425	1200

VERIPOS Satellite Downlinks

When changing location or in areas where satellite footprints overlap, it may be necessary for the user to change to a different satellite Channel (or Beam). Sixteen channels have been allocated of which seven satellite channels have been pre-stored. This allows the

user to select an appropriate channel for a region. (See Global Coverage chart in the Appendix.)

To select beam:

From the main menu press ***Page*** key until Main Menu Configuration is displayed:

*** Main Menu***
 Configuration

Press ***Enter*** key to access the next menu level this will display the below screen:

*** Configuration***
 Demodulator

Press ***Enter*** key to access the next menu level this will display the below screen

*** Demodulator***
 Channel Select

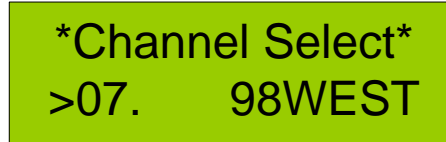
Press ***Enter*** again to access the downlink channel table:

Channel Select
 01. AOR(E)

Now Press the ***Toggle*** key to step through the available downlink beams. When the desired beam is displayed, press ***Enter***. This will move the cursor to the right hand side of the screen and the letter N will be displayed:

Channel Select
 07. 98WEST N

To change which beam corrections are being received press the ***Toggle*** key. This will change the character from an **N** to a **Y** and follow with ***Enter*** to confirm the change. The screen will now display:



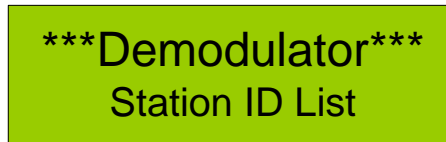
The chevron > indicates that this is the selected beam.

Good practice after selecting a Channel / Beam is to check the lock status and signal quality. See **Section 2.3** for checks.

2.9.2.1 Station ID list

Refer to the list on VOSS (<http://help.veripos.com>) for details of Veripos stations.

Press the ***Enter*** key to select the Station ID List.



Use the ***Toggle*** key to step through the available stations on the list.

Note:

After switching on the LD2 it may take up to 10 minutes for all reference stations accessible on the beam to become available for use in the LD2 Port setups. This is because the LD2 waits for the Type 3 message from each station before adding it to the list.

Types 3 messages are broadcast at approximately 10 minute intervals.

2.9.3 GPS receiver configuration

The GPS configuration menu allows the user to change various settings within the integral GPS receiver.

From the Configuration menu, use the ***Page*** button to move to the GPS Receiver screen. Press ***Enter***. The following screen will be displayed:

*****Configuration***
GPS Receiver**

This menu item provides access to the five sub menus which allow you to set parameters and options for the GPS Receiver. Press the *Enter* key to select the first sub menu.

If the user requires access to these menus it may be necessary to temporarily set P5 to OFF. See section 4.3

The following menus may only be accessed if Port P5 is set to OFF.

Before making changes the user should check what is connected to port P5.

Turning the port off will disrupt the operation of any external equipment which is attached.

If Port P5 is set to REMOTE these menus are disabled and the option to configure the GPS receiver via Remote I/O from Port P3 is also disabled.

2.9.3.1 Position mode

****GPS Receiver**
Position Mode**

Note:

At present these settings are not implemented in the LD2 and do not affect to the GNSS system.

2.9.3.2 Dynamic mode

****GPS Receiver**
Dynamic Mode**

Note:

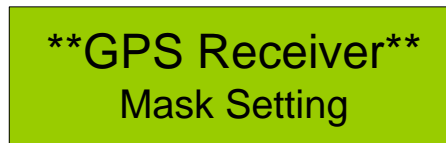
At present these settings are not implemented in the LD2 and do not affect to the GNSS system.

2.9.4 Mask settings

This allows the user to set the GPS Receiver parameters for the following parameters:

Mask parameter	LD2 Default setting
PDOP	99
HDOP	99
VDOP	99
Position Elevation Mask (PEM)	7
Raw Elevation Mask (REM)	0
Minimum SV's	1

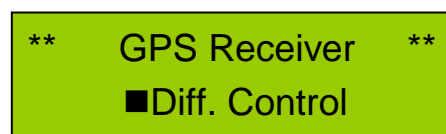
For reference the default settings are shown in the table above.



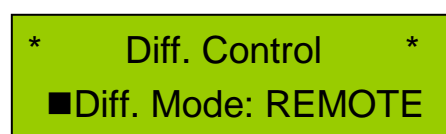
2.9.5 Diff control

This function is included for information only. In normal circumstances this function will not be used. It allows the user to communicate with the GPS Receiver and set the Diff Mode, Station ID, Correction Age Limit and determine the source of RTCM data.

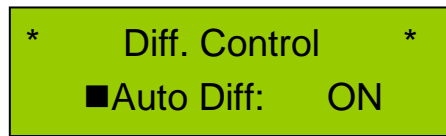
The first screen of this menu is as follows:



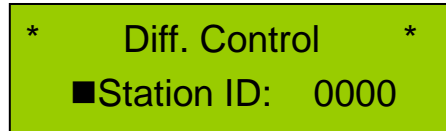
Pressing *Enter* displays the first sub-menu:



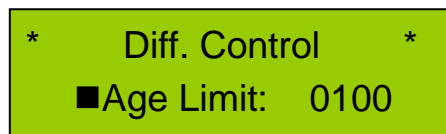
Pressing *Toggle* displays the second sub-menu:



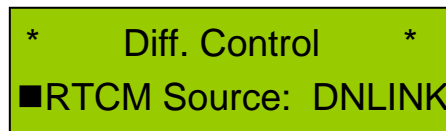
Pressing *Toggle* again displays the third sub-menu:



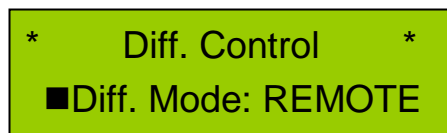
Pressing *Toggle* again displays the fourth sub-menu:



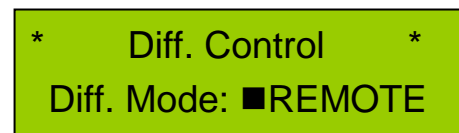
Pressing *Toggle* again displays the fifth sub-menu:



Within each of the above sub-menus, pressing *Enter* moves the cursor from the extreme left of the lower line to a position immediately to the left of the current value. For Diff Mode, the display changes as shown below:



to:



With the cursor at the entry point, repeatedly pressing *Toggle* cycles through the available options. Pressing *Enter* selects the displayed value.

Options for each sub-menu are:

Diff Mode:	REMOTE Off
Auto Diff:	On OFF
Station ID:	0000
Age limit:	0100
RTCM Source:	DNLINK REMOTE LOCAL

2.9.6 Port A settings

This function allows the user to set up the NMEA outputs from the LD2 which are output on serial port P1 and serial port P2.

Note:

For Port P1, these settings determine which NMEA strings are output when the port is configured in "LOCAL" mode. If the port is in "GPS RX" mode, the strings must be selected by directly programming the GPS receiver using script files.

The first screen of this sub-menu is as follows:



** GPS Receiver **
 Port A Settings

Press the ***Enter*** key to access the first screen in the sub-menu which is shown below:



* Port A Settings *
 NMEA0/P:GGA 1.0

Press **"Enter"** to move the cursor to the centre of the screen (String selection mode).

Use the ***Toggle*** key to move through the list of available NMEA strings (see the table below). It is possible to output multiple strings from P1. Each string may be individually enabled or disabled.

To the right of each string ID, the display will show either **"OFF"** (indicating that it is disabled) or **"1.0"** (indicating that it is enabled for output at 1 second intervals).

To change the status of the displayed string, press **"Enter"**. This will move the cursor to the right of the screen. (Rate selection mode).

The number displayed to the right of the cursor is the output rate for the string. To disable the string press ***Toggle*** until **"OFF"** is displayed. To enable the string, press **"Toggle"** until any other rate is displayed.

Press **"Enter"** to accept the entry and move back to the string selection mode.

Note:

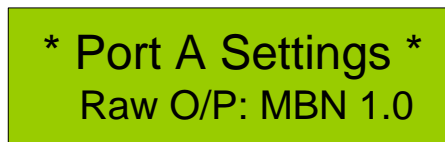
*NMEA messages are always output at 1 second intervals regardless of the rate selected. Select **"OFF"** to disable the message or select any rate to enable it at 1 second intervals.*

***Do not enable both GGA and GGX messages.
 The LD2 will output duplicate messages every second.***

Positioning messages	
Message type	Description
GGA	Position fix data which provide 3D location and accuracy data
GGX	GGA with a position accuracy at 7 decimal places
GLL	Geographic Latitude and Longitude
VTG	Velocity made good.
GSA	Includes the numbers of the satellites being used in the current solution and the DOP
GSV	Satellites in View shows data about the satellites that the unit might be able to find based on its viewing mask and almanac data
RMC	Position, velocity, time data
ZDA	Data and Time
GRS	GPS Range Residuals
GST	GPS Pseudorange Noise Statistics

NMEA position outputs (see Appendix for format information)

Press *Page* to move to the next menu:



The screen above allows the user to output Ashtech type position strings from Port 1 and Port 2 of the LD2.

2.9.7 Port B settings

This function allows the user to set up the NMEA outputs from the LD2 which are output on Port 3.

The first screen of this sub-menu is as follows:

```

** GPS Receiver **
  Port B Settings
  
```

Press *Enter* to access the setup menu:

```

* Port B Settings *
■ NMEA O/P: GGA OFF
  
```

Strings may be enabled or disabled in exactly the same way as described for Port A above.

2.10 SERIAL PORTS CONFIGURATION

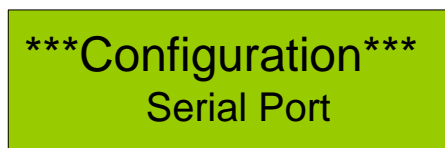
Note:

See Appendix – Quick Guide for serial port pin-out.

The Data Input/Output ports are all set up from the Serial Ports Menu.
 See the Appendix for Maps of the menus and earlier in this section for menu maps.

From the *Main Menu/Configuration* Screen, access the Serial Ports Configuration menu by pressing the *Enter* key followed by the *Page* key twice.

The following screen is shown:



This provides access to the six sub menus which allow the user to set the parameters and options for the six Serial Ports.

Note:

*There are five RS232 ports and one USB port.
 (USB port is omitted on some early LD2 units.)*

Press the ***Enter*** key to select the first page - Serial Port P1.

Note:

*Access the other ports from here by repeatedly pressing *Page*.*

2.10.1 Port P1 setup

Port P1 is used to output NMEA data.

The screen below is used to select the source of the NMEA output message.
 Options are “GPS RX” or “LOCAL”



Press “Toggle” until the required option is displayed then “Enter” to select.

VERIPOS recommend using “LOCAL” as the default setting. “GPS RX” may be used if demanded by the survey specification. See notes below. Further advice may be obtained by contacting the VERIPOS Helpdesk.

Note:

When “GPS RX” is selected the NMEA data is computed within the GPS receiver.

When “LOCAL” is selected, the NMEA position is computed by the LD2 PC104 processor using VERIPOS algorithms.

When in LOCAL mode, the computation uses the RTCM corrections configured on port P2. These corrections are derived from the stations enabled during P2 configuration.

When in “LOCAL” mode the output baud rate is fixed at **9600** baud.

In “GPS RX” mode it is possible to change the baud rate but this requires reprogramming of the GPS receiver. If the user wishes to change this setting it is advisable to contact the VERIPOS Helpdesk for assistance.

The user should now configure the NMEA output strings to be output from P1.

If “LOCAL” mode is selected, this is done using the GPS receiver port A configuration settings. Do not be confused by the menu name. Selections here configure the processor board not the GPS receiver. If “GPS RX” is required contact the VERIPOS Helpdesk for advice on configuring the GPS receiver..

Press the *Page* key to step to Port P2 Set Up

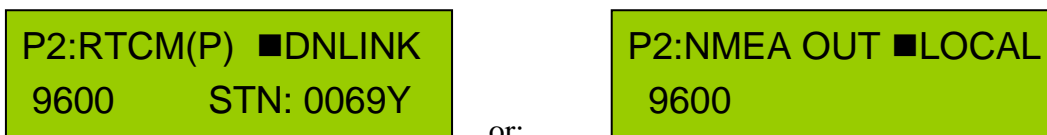
2.10.2 Port P2 setup

Port P2 can be used for RTCM output or for NMEA position output.

When used for NMEA positions, it outputs the same NMEA strings which are selected for port P1 (see above) but the baud rate can be changed.

RTCM output configuration is covered earlier in Section 2. This includes an explanation on how to choose which reference stations to enable.

Depending on the existing configuration the display may show either of the displays below:



Note that the cursor is positioned on the top line, allowing the output type to be selected. To change the output type, press *Toggle* until the required option is displayed then press *Enter* to confirm the choice.

It is necessary to select “RTCM DNLINK” first even when the port will be used for NMEA output.

Note:

RTCM settings are **not accessible** once the NMEA mode is selected so must be configured first.

When used for NMEA position output the RTCM output settings must still be configured, as these determine which RTCM correction messages are passed to the internal GPS receiver and internal processor. The internal processor uses an on-board algorithm to compute multi-reference DGNS and/or PPP (APEX or Ultra) solutions for output on P1 (in LOCAL mode) and for use in Verify DP.

Press ***Enter*** from the RTCM DNLINK display to move the cursor to the bottom line and enable baud rate selection:

```
P2:RTCM(P) DNLINK
  ■9600      STN: 0069Y
```

Use the ***Toggle*** key to step through the options which are:
 1200, 2400, 4800, 9600, 19,200 and 38,400.

Press the ***Enter*** key to confirm the selection.

String Format

Pressing the ***Enter*** key after selecting the Baud rate moves the cursor to the left of "STN:"

```
P2:RTCM(P) DNLINK
  9600      ■STN: 0069Y
```

The user can choose to terminate the RTCM output string with a LF or CR, (Line Feed or Carriage Return)

Press ***Toggle*** to display the CR status as shown below:

```
P2:RTCM(P) DNLINK
  9600      ADD CR  N
```

The final "N" indicates that CR is disabled.

Pressing ***Toggle*** again displays a similar screen for LF.

Pressing ***Toggle*** for a third time, reverts to the original (■STN: 0069Y) display.

To change the status of either CR or LF, press ***Enter*** from the appropriate screen. The cursor will move to the left of the final character. The ***Toggle*** key will then toggle the value between "Y" and "N". Press ***Enter*** to accept.

Note:

Option described above is omitted from variants of the LD2S.

When both entries are as required press *Toggle* to return to original (■STN: 0069Y) display. Now press *Enter* to move to the reference station selection point:

```
P2:RTCM(P) DNLINK
9600 STN: ■0069Y
```

Reference Stations

The default setup for Port 2 is to output all RTCM messages.

Note:

Only reference stations received from the L-Band input are available on P2 and P4. If the unit receives HF/MF corrections, these are only output on the Ethernet port. See port details in Section 2.

Select which of the available reference stations should be included in the RTCM data used for internal computations and also (where selected) output on port P2.

Note:

When using VERIPOS Ultra or APEX service a solution can only be computed if the Ultra / APEX "station" ID is enabled. Ultra and APEX are available worldwide, however the channel ID needs to match the beam selected.

The Ultra and APEX IDs are in Section 2.8 and see the VOSS.

Use ***Toggle*** to step through the available stations.

The stations have the suffix 'N' or 'Y' after the Station Number.

The character 'N' indicates that data for that station is being received by the unit but that it has NOT been selected for output on Port 2.

To output the data on Port 2 press the *Enter* key when that appropriate station is shown and then using the *Toggle* key to change from N (not selected) to Y (selected).

Press the *Enter* key to confirm the selection.

This completes configuration of the RTCM string as required for use by the internal processor.

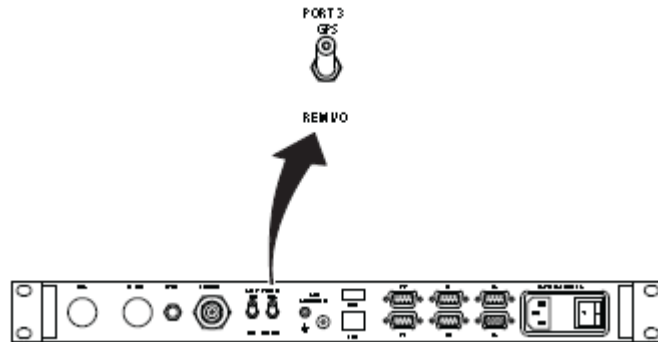
Where user requires a NMEA output from the port the output mode must now be changed - as detailed at the beginning of this section.

The screen will then show:

```
P2:NMEA OUT ■LOCAL
9600
```

If a different baud rate is required, press *Enter* to move the cursor to the second line of the display then proceed as detailed above for RTCM.

2.10.3 Port P3 setup



Port 3 on the LD2 can be used for multiple inputs and outputs.

```
P3: REMOTE I/O OFF
9600
```


Output Raw GPS

To output raw GPS data on port 3 the “Port 3” switch on the back of the LD2 must be in the “GPS” position. In this configuration the menu selections under P3 Setup have no effect.

Note that the back panel Port 3 switch is not fitted to earlier units.

Configure GPS Card

To configure the GPS receiver, the “Port 3” switch on the back of the LD2 must be in the “Remote I/O” position.

From the above display, repeatedly press *Toggle* until “GPS” is displayed then press the *Enter* key.

The cursor will move to the lower line of the display, which shows the baud rate. Repeatedly press the *Toggle* key until the required baud rate is displayed then press *Enter*.

The GPS receiver is configured via port 3 using the utility software provided by the manufacturer. This will vary depending on which type of receiver is installed.

Output NMEA messages

NMEA type messages can be output from port 3. The Port 3 switch on the rear of the LD2 must be in the “REM I/O” position.

The port P3 settings on the front panel should be set to “SKT”.

When the screen above is displayed use the *Toggle* key until “SKT” is displayed and press the *Enter* key.

To select the NMEA strings to be output see the “GPS Port B” setup in this section.

Input for External RTCM

External RTCM messages can be input from an external device into Port 3 for use within the Internal algorithms.

The Port 3 switch on the rear of the LD2 must be in the REM I/O position.

The P3 settings on the front panel should be set to SKT.

When the screen above is displayed use the *Toggle* key till “SKT” is displayed.

Press the *Enter* key.

Select the appropriate Baud rate by pressing the *Toggle* until the required Baud rate is displayed.

Press the *Enter* key. The cursor moves to the right hand side of the screen.

Press the *Toggle* key until “RTCM” is displayed, then press the *Enter* key to confirm the selection.

P3:Remote I/O SKT
9600 RTCM In

To output NMEA messages at the same time as input of external RTCM use a **Y-cable** to split the outgoing and incoming data. For cable details see the LD2 Installation Manual.

Input of Gyro data

When using Verify DP v2.0.5 or above, software Gyro messages can be input from an external device into Port 3 (also via the USB port – see later).
 Inputs are displayed using the **Verify DP** Target monitoring screen.

The “Port 3” switch on the rear of the LD2 must be in the “REM I/O” position.
 The P3 settings on the front panel should be set to “SKT” when the screen above is displayed. Use the *Toggle* key until “SKT” is displayed and press the *Enter* key.
 Select the appropriate Baud rate by pressing *Toggle* then press *Enter* key.
 The cursor moves to the right hand side of the screen.
 Press the *Toggle* key until “GYRO” is displayed then press the *Enter* key to confirm selection.

It is possible to output NMEA messages at the same time as inputting external gyro by using a Y-cable to split the outgoing data and incoming data.
 See the LD2 Installation manual.

Upload of new demodulator firmware

Note:

*Firmware upload should only be carried out by the VERIPOS workshop personnel.
 A different, more complex procedure is required for LD2S units.*

Using port P3 it is possible to upload new firmware to the L-Band demodulator card.
 Move the “Port 3” switch on the rear of the LD2 to the “REM I/O” position P3 and adjust settings on the front panel - set to “OEM”.

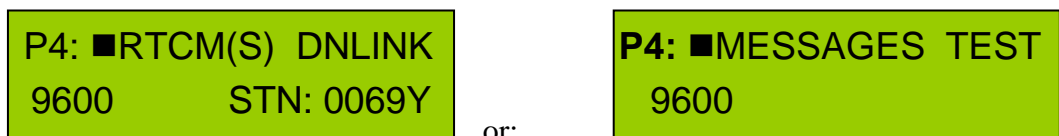
Firmware is uploaded using the VERIPOS OEM software.

2.10.4 Port P4 setup

The main function of port P4 is to output RTCM data.

It has the capability to output messages for use by Verify QC software and also by the VERIPOS workshop.

Depending on current configuration the entry screen may be either of the displays below:



Use *Toggle* to switch between these two displays

2.10.4.1 RTCM DLINK

RTCM output is configured from this display. Options to set baud rate, select string format (optional string terminators) and individual reference stations to be included/excluded.

The configuration procedure is identical to that used for port P2, as described earlier in this section.

Note:

Although the configuration procedure is identical to that used for P2 there is a slight difference in the way the ports operate.

*For P4, stations must be enabled manually. All stations on P4 are **off** by default.*

For P2, all stations are automatically enabled when a new beam is selected. (Exception is for older LD2 units.)

2.10.4.2 Messages

Press *Enter* from within the “MESSAGES” display to move the cursor to the right of “MESSAGES”.

Toggle key is used to step between options.

The options are: **TEST, MON, OFF, BCAST.**

Note:

*For LD2S units: Only the “MESSAGES TEST” option is available. Press *Enter* to move cursor directly to baud rate selection field.*

The purpose of each option is as follows:

TEST outputs diagnostic information concerning the demodulator performance (signal-to-noise ratio, bit error rate, frequency offset etc.). Messages are output at one-minute intervals and are mainly used to provide demodulator status information to VERIPOS Verify QC software.

MON outputs a proprietary message on Port P4 of the enabled or disabled status of all user codes. This is used for Network Control Centre monitoring purposes.

OFF Sets Port 4 outputs off.

BCAST outputs broadcast messages to a terminal or printer. The messages are transmitted by the VERIPOS Network Control Centre and provide information on the network status, e.g. any problems with reference stations, unhealthy satellites.

Pressing *Enter* accepts the displayed option and moves the cursor to the baud rate selection field.

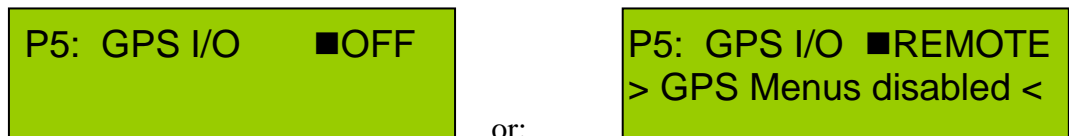
Baud Rate

Press *Toggle* to step through the options which are:
 1200, 2400, 4800, 9600, 19,200 and 38,400.

Press *Enter* to confirm the selection.

2.10.5 Port P5 set up

Port P5 is used for a direct external connection to the I/O port of the GPS Receiver Board. Depending on current configuration the entry screen may be either of the displays below:



Press the *Toggle* key to switch between “REMOTE” and “OFF”, then press the *Enter* key to select it.

Note:

Where REMOTE is selected for direct connection to the GPS Receiver via Port P5 the option to configure the GPS Receiver via the “Remote I/O Port P3” is disabled.

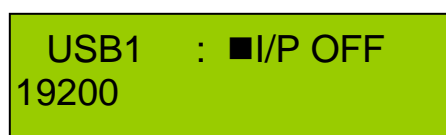
As shown in the above display the GPS menus are also disabled when REMOTE is selected.

*The port must therefore be **temporarily turned OFF** in order to configure NMEA outputs, configure the GPS receiver or check GPS status.*

2.10.5.1 USB set up

The rear panel USB connector may be used for inputting either external RTCM data or NMEA heading data from a gyro.

The gyro data is only used by the Verify DP software.



Pressing *Toggle* will step through the available options which are:
 I/P OFF, GYRO IN, RTCM IN

Pressing *Enter* will accept the displayed option and move the cursor to the bottom line to enable baud rate selection.

Pressing *Toggle* will step through the available options which are:
 1200, 1800, 2400, 4800, 9600, 19,200 and 38,400

Pressing *Enter* will accept the displayed option.

Note:

Because of inherent limitations on USB cable length a USB-to-Serial converter is usually required. These converters use a software driver. A specific model is required to ensure compatibility with firmware of the LD2 processor.

VERIPOS recommend the AMPLICON USB-232U.
 It requires no external power and is opto-isolated making it suitable for DP fits.

Full product details are available at:
<http://www.amplicon.co.uk/Data-Comms/product/RS232-USB-USB-232U-2948.cfm>

Contact the VERIPOS Helpdesk for advice and information.

2.10.6 HF/MF Beacon configuration

Depending on the variant model supplied the LD2 can be fitted with either of two cards to process HF/MF signals.

HF+MF 3001 Card is required when using VERIPOS HF stations.
 It can also be used with third party MF stations.
 or

Beacon SBX-4 Card is supplied for clients using the MF beacon network.

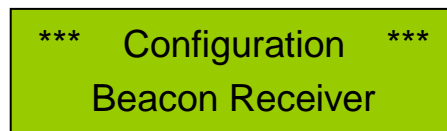
Note:
 The SBX-4 card cannot receive VERIPOS HF stations.

The LD2 will display configuration menus depending upon which card is installed.
 (Both of these are accessed from the Main Configuration menu – see menu maps in Appendix)



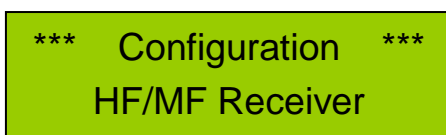
HF+MF 3001 Card

or:



Beacon SBX-4 Card

2.10.6.1 HF/MF card (HF+MF 3011)



Frequency band

Press ***Enter*** from the above menu to access the "Frequency Band" selection sub-menu:

NOTE:
 The three sub-menus can then be accessed by repeatedly pressing ***Page***.

```

** HF/MF Receiver **
Frequency Band: ■HF
    
```

Press *Toggle* to change between HF and MF

Select HF when using the VERIPOS HF station network.
Select MF when using third party MF corrections.

Press *Enter* to confirm the displayed option then *Page* to move to Station Select.

Station Select

```

** HF/MF Receiver **
Station Select
    
```

Press *Enter* to display the configuration sub-menu. Two different sub-menus are possible depending on the Frequency Band previously selected:

```

* HF Station Select *
> Den Helder 001
    
```

HF type display

or:

```

MF CH1: Auto Freq
299.5kHz 100bps
    
```

MF type display

Configuration in HF mode

In HF mode, a global list of VERIPOS HF stations will be displayed.
Repeatedly pressing *Toggle* cycles through the complete list.

Note: The HF/MF card can receive data on two channels. Each VERIPOS HF station transmits corrections on two different frequencies to enhance reliability. Therefore only one station may be selected.

The currently selected station (if any) is identified by chevron (>) preceding the station name.

To select a different station press *Toggle* until the station name is displayed and then press *Enter*. The cursor will move to the right of the screen and a flashing "N" will be displayed. Press *Toggle* to change this to a "Y" then press *Enter*. The selected station will be selected (>). Any previously selected station will automatically be deselected.

Configuration in MF mode

Note:

The HF/MF card can receive data on two channels.

It can therefore receive two independent MF stations.

The two MF channels are displayed on separate screens. Pressing *Toggle* from the opening screen switches between CH1 and CH2.

Each channel provides three options for selecting stations.

1. Auto Freq – Chooses the station with the strongest signal
2. Auto Dist – Chooses the two closest stations
3. Manual – allows manual selection of stations by entering frequency and data rate.

VERIPOS strongly recommend that both channels are set to Auto Dist since this has been found to provide the simplest and most reliable mode of operation.

To configure:

Press *Enter* to move the cursor to the first character of the mode name. Press *Toggle* until “Auto Dist” is displayed. Press *Enter* to confirm selection. Repeat for the other channel.

If the user wishes to use “Manual” mode, the frequency and data rate of the required station must be known. “Manual” is selected in a similar manner to “Auto Dist” but pressing *Enter* to confirm the selection moves the cursor to the bottom row of the display. The frequency and bit rate values must then be entered, using the *Toggle* and *Enter* keys.

HF/MF Station Details

Note: This menu is only displayed if the HF Frequency Band was selected.

**** HF/MF Receiver ****
Station Details

The Station Details menu displays a list of attributes associated with the VERIPOS HF reference stations.

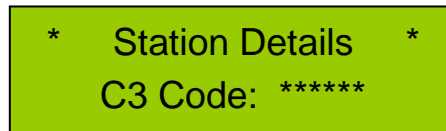
The C3 code is the decryption key required to decode the encrypted signals from the VERIPOS HF stations. Only the “C3 Code” may be changed by the user.

The remaining values are stored in the LD2 firmware and are displayed for reference only. Details are given in the Appendix.

Details are:

- Station Name
- Station ID
- Channel 1 Frequency
- Channel 2 Frequency
- Data Rate
- **C3 Code**

From the above screen to access the code entry screen:
 Press *Enter* then *Toggle* until the selected station is displayed.
 Press *Enter* then repeatedly. *Toggle* until the following screen is displayed:



The C3 code is obtained from the VERIPOS Helpdesk and is the decryption key required to decode the encrypted signals from VERIPOS HF stations.

Different codes are required for different stations.

In order for the Helpdesk to provide a C3 code, the user must supply the unique C2 code associated with his particular LD2.

Use the HF/MF Status Menu to obtain the C2 code as described in section 2.3.7.

INFORMATION ON SERVICE ACCESS LICENCE AND USE OF THE SIGNAL NOTIFICATION FORM

*Note: VERIPOS Helpdesk can only issue enable codes if a **Service Access License (SAL)** exists and the license number can be determined.*

Licenses must be pre-arranged between the user's company and the VERIPOS Operations Department.

Requests for enable/disable codes should be made using the **Signal Notification Form (SNF)**. This should be submitted, by email, to the VERIPOS Helpdesk at:

helpdesk@veripos.com

Blank forms are available from the VERIPOS Online Support Web site:

<http://help.veripos.com>

Note: If necessary, enable requests can also be submitted by telephone to the VERIPOS Helpdesk. See Section 4 for current contact details.

Before calling, please refer to a Signal Notification form (downloaded from VOSS) and ensure that all the required information is available.

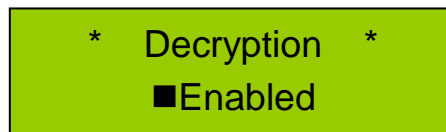
Enter a C3 code as follows:

From the above screen, press *Enter*. This moves the cursor to the first digit of the code entry field. Repeatedly press *Toggle* until the required character is displayed. Press *Enter* to accept the entry and move to the next digit. Repeat this process until the complete code has been entered.

Decryption

Note:

This menu is only displayed if the HF Frequency Band was selected. The MF option is a free service and no decryption is necessary.



Press *Toggle* to switch between “Enabled” and “Disabled”.
 Press *Enter* to accept the displayed option.

Note:

VERIPOS HF stations are encrypted using the C2 and C3 code.

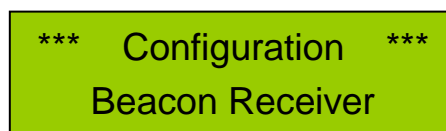
There are also free to air HF stations that do not use encryption.

If a free to air station is being used the Decryption needs to be switched to off.

VERIPOS cannot guarantee availability and system performance of third party stations as these are not controlled by VERIPOS.

2.10.7 Beacon receiver

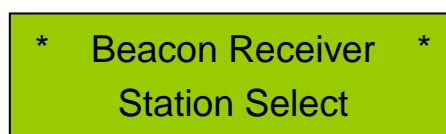
This menu will only appear if the optional Beacon SBX-4 Card is installed.



The Beacon Receiver is capable of receiving corrections from a single station in the MF IALA beacon network.

2.10.7.1 Station Selection

From the above screen, press *Enter* to display:



Press *Enter* again to display the configuration menu:

**MF CH1: AUTO DIST
 291.5KHz 100bps**

The Beacon receiver card has three modes of operation:

- Auto Distance - Selects the closest station to the users current location
- Auto Frequency - Selects Station with the strongest signal strength at user location
- Manual - Allows the user to enter the frequency and bit rate of a station

Note:

VERIPOS strongly recommend using “Auto Dist” since this has been found to provide the simplest and most reliable mode of operation.

This is configured as follows: Press *Toggle* until “Auto Dist” is displayed then press *Enter* to confirm selection.

If the user wishes to use “Manual” mode, the frequency and data rate of the required station must be known.

Press *Toggle* until “Manual” is displayed.

Press *Enter* to confirm the selection moves the cursor to the bottom row of the display.

The frequency and bit rate values must then be entered using the *Toggle* and *Enter* keys.

2.11 UNIT STATUS

The Status menu allows the user to view the systems operational parameters for the on-board components and system details.

The Menu structure and use are outlined in Section 2.3.1 to 2.3.4 and cover all main aspects of receiver cards and software of the LD2.

**** Main Menu ****
 Status

For summary details follow the instructions in these sections to determine LD2 status.

3. TROUBLESHOOTING

The equipment is designed and manufactured to exacting standards and, once installed and operated correctly, should provide prolonged trouble-free service.

This section of the manual is intentionally brief. VERIPOS understand the pressures on workers in the offshore industry and do not believe that a printed manual can provide adequate support if problems arise.

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

The Helpdesk is manned 24 hours per day, 365 days per year.
 Contact details are in Section 4.

The duty operator is trained to provide direct assistance with the most common queries and problems. In addition, he has recourse to a range of on-call engineers and technical staff who will provide support for more complex issues.

Except in emergency situations, VERIPOS recommend initial contact is made by email to the Helpdesk or by raising a fault ticket on the Web site. This will ensure that the users contact details and the basic description of the fault are correctly recorded.

Note:

Before calling the Helpdesk please refer to the information in this section.

To ensure a rapid response, the 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**
- **Current Access Code of LD2; User Code from front of LD2 variant**
- **Current status of the seven front panel indicators on the LD2**
- **Brief Description of other VERIPOS hardware and software installed**
- **Vessel's current operating region**
- **Vessel's status**

Is it alongside, in transit, in operation, or shut down due to fault?

- **History of fault.**

Is this a new installation which has not yet been fully commissioned?

Did a problem suddenly arise with a system which was previously working?

Did the system cease working after moving to a new region?

- **Description of fault**

As soon as the basic information has been received, the Helpdesk operator will raise a numbered fault ticket. This will record the time and date of the original contact and it will be updated with all subsequent communications. The user can access the ticket from the VERIPOS Online Support Site.

The fault ticket system ensures that all communications regarding the issue are readily accessible to all parties concerned. The ticket will remain open until the user confirms that the issue has been resolved to his satisfaction. Senior VERIPOS personnel regularly review all open tickets to ensure that all necessary assistance has been provided.

There are no user-adjustable controls or user-serviceable items within the receiver.

The following diagnostic procedures enable the user to carry out simple fault finding on the system.

3.1 POWER FAULTS

Fault	Reason	Remedy
All lamp indicators off, no backlight on display	On/Off Switch to OFF	Switch unit ON using switch on rear panel.
	Blown fuse.	Check units fuse on rear panel and replace fuse as necessary.
	Faulty supply	Check ac supply is available.
	Faulty power connector	Check continuity of the power lead. Replace or repair power cable as necessary.

3.2 ENABLE/DISABLE FAULTS

Fault	Reason	Remedy
“ID” lamp is extinguished (It should normally be illuminated, either solid or flashing)	For LD2S units only No L-band signal has been received since the unit was switched on.	For LD2S units, the “ID” indicator is not activated until L-band signals have been received. See section 3.3 for troubleshooting L-Band faults.
The unit has been enabled for Verify DP but the monitor remains blank	Unit requires a reset	Disconnect the power for one minute.

3.3 L-BAND SIGNAL FAULT

Fault	Reason	Remedy
SYNC indicator off	Unit requires a reset	Switch power OFF for 1 minute then switch back ON. Allow a few minutes for the unit to acquire synchronisation.
	The vessel has moved to a new region but the demodulator has not been re-configured	Check demodulator STATUS to determine current channel selected. (see procedures in Appendix) If not appropriate for region, select new channel (see procedures in Appendix)
	L-band signal is derived from vessel's Inmarsat. Inmarsat has lost lock or has switched to a different satellite	Check demodulator STATUS to determine current channel selected. (see procedures in Appendix) Verify that the Inmarsat is tracking the same satellite
	Antenna blockage	Visually check whether the path between the antenna and satellite is subject to blockage. This can easily occur when the vessel is in port or alongside a large structure. Blockage can also be caused by the vessel's own superstructure. This can usually be eliminated by changing heading.
	Interference	Investigate any source of L-band transmissions. Also high power transmissions of other frequencies. If possible, shut down possible sources to eliminate them.
	Ant. V toggle turned OFF when using SPOT antenna	Set toggle to ON. Warning: Do not set to ON when connected to Inmarsat.
	Antenna disconnected or inoperative	Visually check antenna and cable for possible damage. Check coaxial connections.

4. CONTACT INFORMATION

VERIPOS CONTACT INFORMATION

All initial contacts regarding technical or support issues should be addressed to the VERIPOS Helpdesk.

Where appropriate the Helpdesk will refer issues to the regional operations and engineering teams.

VERIPOS Helpdesk Telephone: +44 (0) 1224 965900


VERIPOS Helpdesk E-mail: helpdesk@veripos.com

VERIPOS Online Support Site (VOSS): <http://help.veripos.com>

Note:

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

UK Veripos office address:

	Veripos House, 1B Farburn Terrace, Dyce, Aberdeen. AB21 7DT Scotland UK
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For other sites visit www.veripos.com

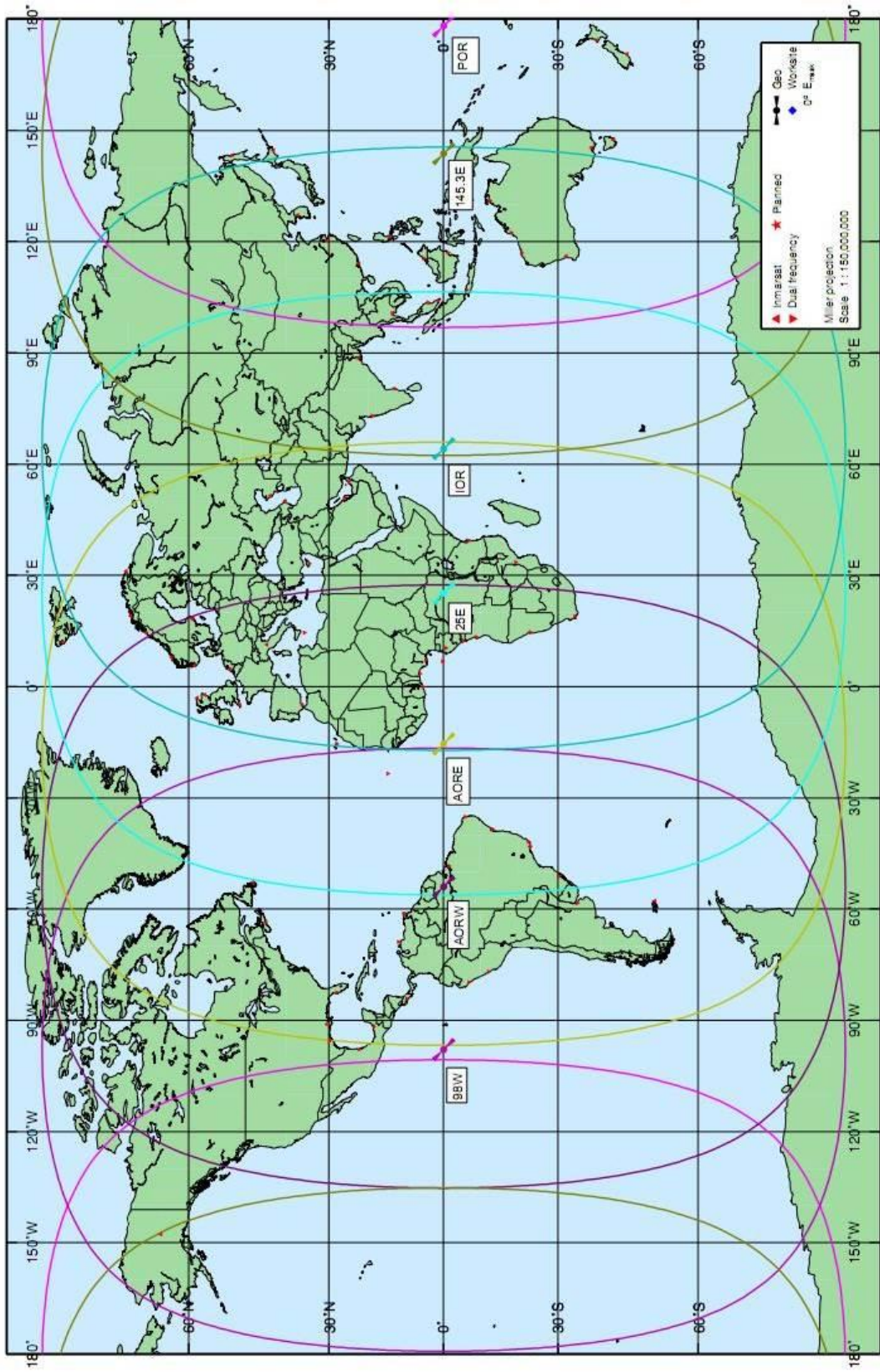
5. INDEX OF APPENDICES

- A VERIPOS COVERAGE CHART
- B NMEA MESSAGES
- C Remove Standard+ Service from LD2
- D LD2 Wiring Diagram
- E I/O PORTS, GYRO, RANGE AND BEARING INFORMATION
- F Requesting Veripos Service for the LD2 – Service Access Licence
- G Veripos Reference Stations
- H LD2 Quick Guide

A VERIPOS COVERAGE CHART

veripos 

DGPS Coverage Chart



B NMEA

The LD2 can be configured to output any of the following ten NMEA messages, either individually or in combination:

No	Type	Description
1	GGA	Global Positioning System Fix Data
2	GGX	Modified version of GGA
3	GLL	Geographic position, latitude / longitude
4	VTG	Course Over Ground and Ground Speed
5	GSA	GNSS DOP and active satellites
6	GSV	GNSS Satellites in view
7	RMC	Recommended minimum specific GNSS data
8	ZDA	Date and Time
9	GST	GPS Position Error Statistics
10	GRS	GNSS Range Residuals

Notes:

GGA is the standard positioning message containing essential fix data which provides 3D location and accuracy information.

GGX is similar to GGA but latitude and longitude are specified with increased accuracy (7 characters after the decimal point instead of 5). Because of the increased message length, some systems may be unable to decode it.

1. GGA

Essential fix data which provides 3D location and accuracy information.

\$GPGGA,123519,4807.038,N,01131.000,E,1,08,0.9,545.4,M,46.9,M,08,1004*47

GGA Data Message defined:

GGA	Global Positioning System Fix Data
123519	Fix taken at 12:35:19 UTC
4807.038,N	Latitude 48 deg 07.038' N
01131.000,E	Longitude 11 deg 31.000' E
Fix quality:	0 = invalid
	1 = GPS fix (SPS)
	2 = DGPS fix
	3 = PPS fix
	4 = Real Time Kinematic
	5 = Float RTK
	6 = estimated (dead reckoning) (2.3 feature)
	7 = Manual input mode
	8 = Simulation mode
08	Number of satellites being tracked
0.9	Horizontal dilution of position
545.4,M	Altitude, Meters, above mean sea level
46.9,M	Height of geoid (mean sea level) above WGS84 ellipsoid
08	Time in seconds since last DGPS update.
1004	DGPS station ID number
*47	Checksum data, always begins with *

If the height of the geoid is missing then the altitude should be suspect. Some non-standard implementations report altitude with respect to the ellipsoid rather than geoid altitude. Some units do not report negative altitudes at all. This is the only sentence that reports altitude.

2. GGX

Essential fix data which provides 3D location and accuracy information identical to the GGA string structure with increased accuracy in the Latitude and Longitude from 3 decimal points to 7 decimal points.

\$GPGGA,123519,4807.0381234,N,01131.0001234,E,1,08,0.9,545.4,M,46.9,M,08,1004*47

GGA Data Message defined:

GGA	Global Positioning System Fix Data
123519	Fix taken at 12:35:19 UTC
4807.0381294,N	Latitude 48 deg 07.038' N
01131.0001234,E	Longitude 11 deg 31.000' E
Fix quality:	0 = invalid 1 = GPS fix (SPS) 2 = DGPS fix 3 = PPS fix 4 = Real Time Kinematic 5 = Float RTK 6 = estimated (dead reckoning) (2.3 feature) 7 = Manual input mode 8 = Simulation mode
08	Number of satellites being tracked
0.9	Horizontal dilution of position
545.4,M	Altitude, Meters, above mean sea level
46.9,M	Height of geoid (mean sea level) above WGS84 ellipsoid
08	Time in seconds since last DGPS update.
1004	DGPS station ID number
*47	Checksum data, always begins with *

If the height of the geoid is missing then the altitude should be suspect. Some non-standard implementations report altitude with respect to the ellipsoid rather than geoid altitude. Some units do not report negative altitudes at all. This is the only sentence that reports altitude.

3. GLL

Geographic Latitude and Longitude is a holdover from Loran data and some old units may not send the time and data active information if they are emulating Loran data. If a GPS is emulating Loran data they may use the LC Loran prefix instead of GP.

\$GPGLL,4916.45,N,12311.12,W,225444,A,*31

GLL Data Message defined:

GLL	Geographic position, Latitude and Longitude
4916.46,N	Latitude 49 deg. 16.45 min. North
12311.12,W	Longitude 123 deg. 11.12 min. West
225444	Fix taken at 22:54:44 UTC

A Data Active or V (void)
 31 checksum data

4. VTG

Velocity made good.

GPVTG,054.7,T,034.4,M,005.5,N,010.2,K*33

VTG Data message defined:

VTG	Track made good and ground speed
054.7,T	True track made good (degrees)
034.4,M	Magnetic track made good
005.5,N	Ground speed, knots
010.2,K	Ground speed, Kilometers per hour
*33	Checksum

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.

5. GSA

GPS DOP and active satellites. This sentence provides details on the nature of the fix. It includes the numbers of the satellites being used in the current solution and the DOP. DOP (dilution of precision) is an indication of the effect of satellite geometry on the accuracy of the fix. It is a unitless number where smaller is better. For 3D fixes using 4 satellites a 1.0 would be considered to be a perfect number, however for overdetermined solutions it is possible to see numbers below 1.0.

There are differences in the way the PRN's are presented which can effect the ability of some programs to display this data. For example, in the example shown below there are 5 satellites in the solution and the null fields are scattered indicating that the almanac would show satellites in the null positions that are not being used as part of this solution. Other receivers might output all of the satellites used at the beginning of the sentence with the null field all stacked up at the end. This difference accounts for some satellite display programs not always being able to display the satellites being tracked. Some units may show all satellites that have ephemeris data without regard to their use as part of the solution but this is non-standard.

\$GPGSA,A,3,04,05,,09,12,,,24,,,,,2.5,1.3,2.1*39

Where:

GSA	Satellite status
A	Auto selection of 2D or 3D fix (M = manual)
3	3D fix - values include: 1 = no fix
	2 = 2D fix
	3 = 3D fix
04,05...	PRN's of satellites used for fix (space for 12)
2.5	PDOP (dilution of precision)
1.3	Horizontal dilution of precision (HDOP)
2.1	Vertical dilution of precision (VDOP)
*39	the checksum data, always begins with *

6. GSV

Satellites in View shows data about the satellites that the unit might be able to find based on its viewing mask and almanac data. It also shows current ability to track this data. Note that one GSV sentence only can provide data for up to 4 satellites and thus there may need to be 3 sentences for the full information. It is reasonable for the GSV sentence to contain more satellites than GGA might indicate since GSV may include satellites that are not used as part of the solution. It is not a requirement that the GSV sentences all appear in sequence. To avoid overloading the data bandwidth some receivers may place the various sentences in totally different samples since each sentence identifies which one it is.

The field called SNR (Signal to Noise Ratio) in the NMEA standard is often referred to as signal strength. SNR is an indirect but more useful value than raw signal strength. It can range from 0 to 99 and has units of dB according to the NMEA standard, but the various manufacturers send different ranges of numbers with different starting numbers so the values themselves cannot necessarily be used to evaluate different units. The range of working values in a given GSV string will usually show a difference of about 25 to 35 between the lowest and highest values, however 0 is a special case and may be shown on satellites that are in view but not being tracked.

\$GPGSV,2,1,08,01,40,083,46,02,17,308,41,12,07,344,39,14,22,228,45*75

Where:

GSV	Satellites in view
2	Number of sentences for full data
1	sentence 1 of 2
08	Number of satellites in view
01	Satellite PRN number
40	Elevation, degrees
083	Azimuth, degrees
46	SNR - higher is better for up to 4 satellites per sentence
*75	the checksum data, always begins with *

7. RMC

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

8. ZDA

The ZDA message is Date and Time.

\$GPZDA,hhmmss.ss,dd,mm,yyyy,xx,yy*CC

ZDA Data Message defined:

hhmmss	HrMinSec(UTC)
dd,mm,yyy	Day,Month,Year
xx	local zone hours -13..13
yy	local zone minutes 0..59
*CC	checksum

9. GST

The GST message contains Global Navigation Satellite System (GNSS) pseudorange error statistics.

\$GPGST,hhmmss.ss,a.a,b.b,c.c,d.d,e.e,f.f,g.g *cc

GST Data Message defined:

hhmmss.ss	UTC time in hours, minutes, seconds of the GPS position
a.a	Root mean square (rms) value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudoranges and differential GNSS (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)
*cc	Checksum

10. GRS

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>

GRS Data Message Defined:

hhmmss.ss	UTC time in hours, minutes, seconds of the GNSS position
x	Residuals (Mode)
x.x	Range residuals for satellites used in the solution, in metres
*hh	Checksum

Range residuals in meters for satellites used in the navigation solution^{1,2}.
 Order must match order of the satellite ID³ 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.

C REMOVE STANDARD+ SERVICE FROM LD2

Following the cessation of the Standard+ service, users are recommended to remove the Standard+ calculation from their LD2 / LD2S configurations.

This appendix outlines how to remove the Standard+ calculation from the LD2.

Users only enabled for the VERIPOS Standard or Standard² service do not need to disable Standard+ Service, However all other users should complete the following actions to remove Standard+ from their fall back solutions.

Users previously enabled for Standard+ as their highest service should enable their Veripos LD2 for the Veripos Ultra Service.

Remove Standard+ Calculation

This procedure stops the Standard+ corrections from being input into the VERIPOS algorithms within the LD2 unit. As a result ,he Standard+ calculation will not initialise

From any point in the menu structure repeatedly press *Page* until the **Main Menu Configuration** screen is displayed:

```

  **** Main Menu ****
  Configuration
  
```

Press *Enter* then press the *Page* key three or four times (depending if Beacon or HF/MF receiver is installed) to display:

```

  *** Configuration ***
  Position Solution
  
```

Press *Enter* to display:

```

  * Position Solution *
  Use STD Plus?      Y
  
```

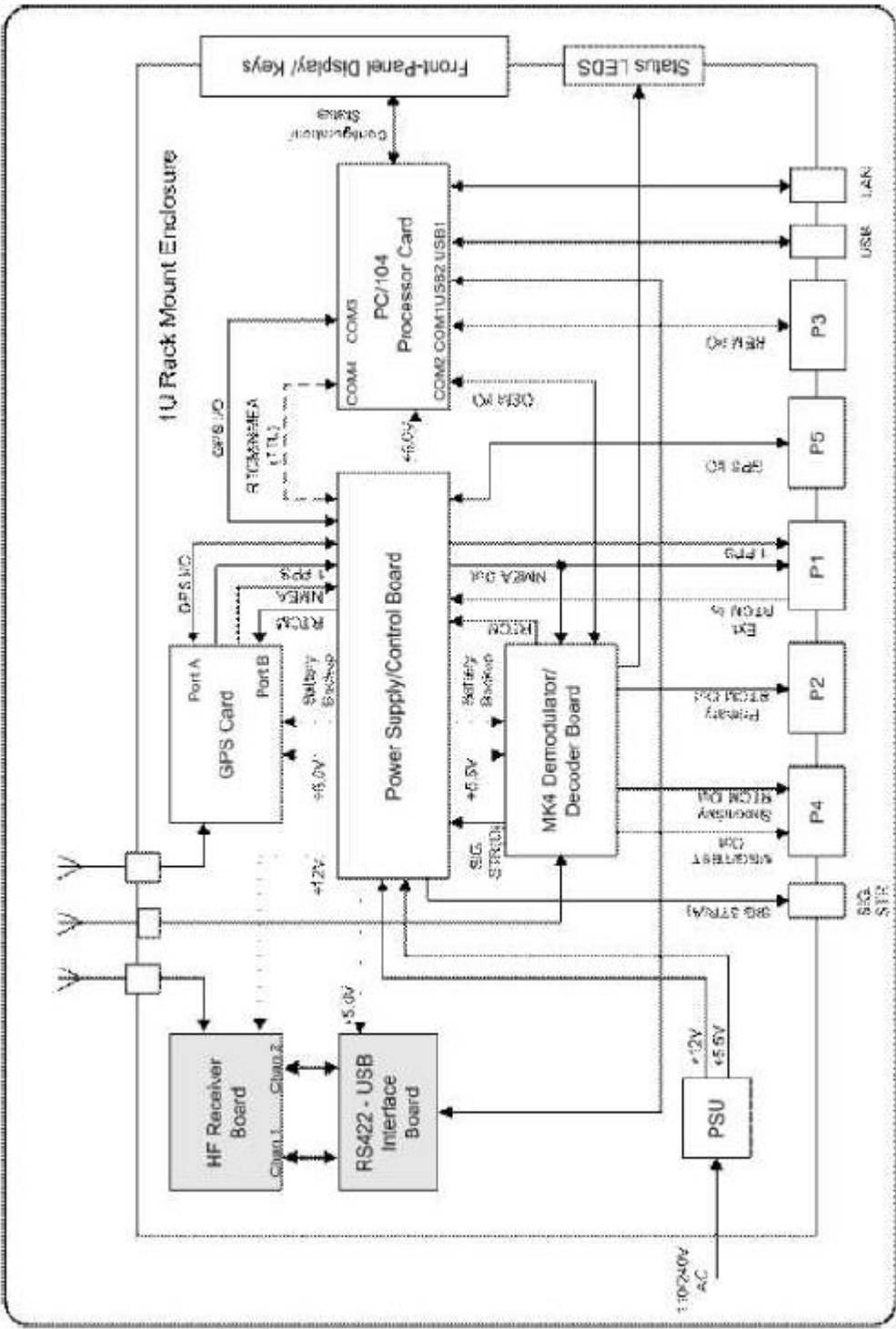
If "Use STD Plus? Y" is displayed press *Toggle* then press the * Enter * to change it to "Use STD Plus? N"

```

  * Position Solution *
  Use STD Plus?      N
  
```

Reboot the LD2 by cycling the power to the unit using the power switch on the rear panel.

D LD2 WIRING DIAGRAM



LD2 Wiring Schematic / layout

E I/O PORTS, GYRO, RANGE AND BEARING INFORMATION

This details the pin out details for the LD2 receiver connections.

Ports 1 to 5 on the rear panel are 9 Way D Type Female plus 1 x USB port.

Serial port connectors have performance characteristics for RS232.

LD2 I/O Ports

Ports	Type	Data on Pins
Port 1	RS – 232	1 1PPS out (GPS Rx / VERIPOS) 2 NMEA out (GPS Rx / VERIPOS) 5 Signal Ground
Port 2	RS – 232	2 RTCM out / NMEA out (Primary) 5 Signal Ground
Port 3	RS – 232	2 Remote I/O / NMEA out (VERIPOS) 3 Remote I/O in 5 Signal Ground
Port 4	RS – 232	2 RTCM Out (Secondary) 8 Message/Test out to Verify QC 5 Signal Ground
Port 5	RS – 232	2 GNSS out 3 GNSS in 5 Signal Ground
USB		Ext Gyro in /RTCM in
LAN	10BaseT	RJ45 convention) Port 4992 – Raw GPS Port 4993 – Port 2 messages Port 9013 – NMEA out on Port A Port 9015 – NMEA out on Port B

Notes:

1. Differential corrections are output in RTCM v2.2 compatible format. PPP solutions are output in a proprietary format.
2. The MF RTCM data is only available on the LAN on socket 5994, when selected on firmware versions 5.83 and above.
3. Where an Ethernet connection is used the IP address of the LD2 variant should be configured in the same domain as the connected computer.
4. **Port 4992** – only active if P5 is set to “OFF” and P1 is set to “LOCAL”.
5. Equipment re-boot off/on is required for LAN port changes to take effect.

Notes on use with Gyro / Range and Bearing

I/O configuration values to be used

Data	Address	Port
VDP Aux	127.0.0.1	5001
Gyro (HDT) Serial Port 3	127.0.0.1	4990
Gyro (HDT) USB	127.0.0.1	4997

F REQUESTING VERIPOS SERVICE FOR THE LD2 - 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 VERIPOS Operations.

The LD2 unit is enabled over the air by the VERIPOS Helpdesk. See **Section 4. Contact Information** for Helpdesk contact details.

When making an enable / disable request, please use a Signal Notification Form, downloaded from VOSS at <http://help.veripos.com>

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 the LD2.

Notes on enable codes for the LD2:

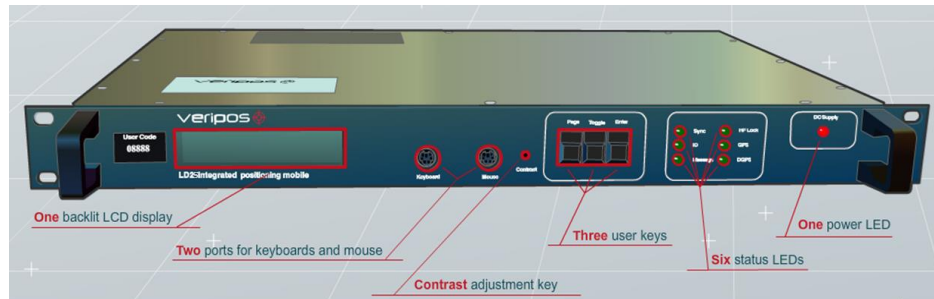
1. When using the LD2 with the on-board Verify DP software please request an enable for this software. Refer to the Verify DP Manual for software details.
2. When you require to use the **Veripos APEX (PPP) corrections ONLY**, please advise Helpdesk you only require to be enabled for APEX service, i.e. you will not be using Veripos Ultra corrections.
3. Some Veripos correction services are only available when specific hardware / GNSS card options are installed. For example a dual frequency enabled GNSS card and compatible antenna are required before PPP (APEX and Ultra) services may be used.

G VERIPOS REFERENCE STATIONS

Please refer to Veripos Online Support Service (VOSS) at <http://help.veripos.com> for the most up to date reference station lists and data.

H LD2 QUICK GUIDE

Below is a copy of the LD2 Quick Guide for users.
 The most up to date copy of this document can be downloaded from VOSS.



1. USE CABLES & ADAPTORS SUPPLIED:



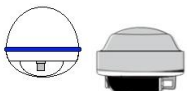

Antenna tails (L-band N-Type /GNSS TNC) to suit

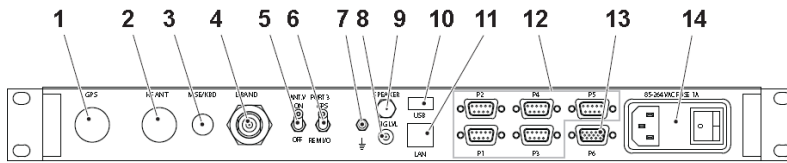
1 x AC power lead

Optional - DB9- DB9 serial output cables to suit configuration



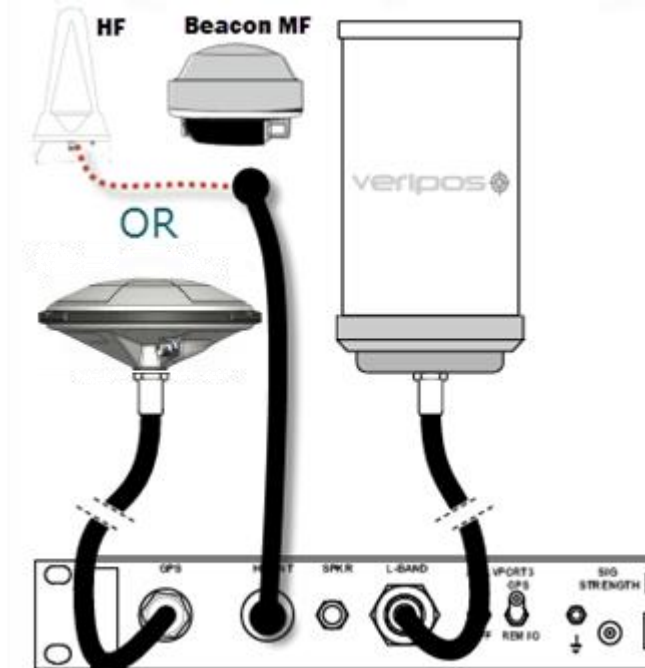
2. ANTENNAS: - SEE LD2 INSTALLATION MANUAL FOR MORE INFORMATION.

GNSS	<i>e.g.V460, GA530 AD491</i>	
L-Band	<i>e.g.90984, V86</i>	
MF Marine Beacon (Optional)	<i>e.g.CDA-3, A31</i>	
HF (Optional)	<i>DHM 5000</i>	

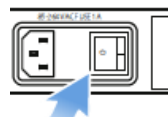


- 1 GNSS antenna connector (TNC-type)
- 2 HF antenna connector (TNC-type)
- 3 Standard PS/2 port
- 4 L-band antenna connector (N-type)
- 5 Antenna voltage toggle switch
- 6 Port 3 I/O toggle switch
- 7 Grounding pin
- 8 Signal strength connector (SMA-type)
- 9 Speaker connector (phono-type)
- 10 USB port
- 11 LAN port RJ45-type)
- 12 5 x serial data ports (RS-232)
- 13 VGA display port
- 14 Power socket with on/off switch

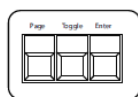
3. CONNECTING THE LD2 - MAKE CONNECTIONS TO THE LD2 AS SHOWN;



4. TURN ON LD2 POWER AT REAR AND WAIT UNTIL UNIT HAS INITIALIZED;



Use the front panel keys to navigate and set up the LD2 screen:



- Page key:** Advances the display through the options in a menu level. After the last menu option in the current menu level, the display moves back to the entry point of that menu.
- Toggle key:** Shows the range of data entries available in a menu
- Enter key:** Displays the selected menu option, accepts a data entry and advances the display to the next data entry field.

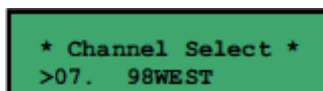
5. BEAM SELECTION

To use Veripos corrections the LD2 must be synced to a geostationary satellite beam. A more detailed description is in the LD2 Operations Manual.

Select a Veripos correction satellite beam for your vessel work area:

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

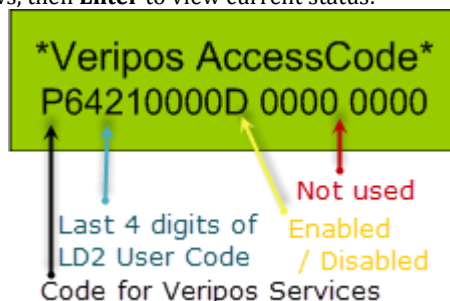
Press **Page** until **Main Menu / Configuration**
 Enter 1x to **Configuration / Demodulator**
 Enter 1x to **Channel Select. Enter.**
Toggle until beam required is shown, **Enter.**
Toggle from N to Y, **Enter.**
 > chevron shows beam in use.



6. ENABLE FOR VERIPOS CORRECTIONS

The LD2 needs to be synced to a regional beam before enabling.

Press **Page** until **Access Code** shows, then **Enter** to view current status:



- Service Access Licence number (**SAL**). This is the contract number for augmentation services provided by Veripos to you / your client and must be provided when requesting service activation / deactivations.
- **User Code** for the IMU – this is the unique 5 code number printed on the IMU chassis.
- The Veripos Augmentation Service(s) required – advise the Helpdesk of the name / type of service appropriate to your requirements and IMU

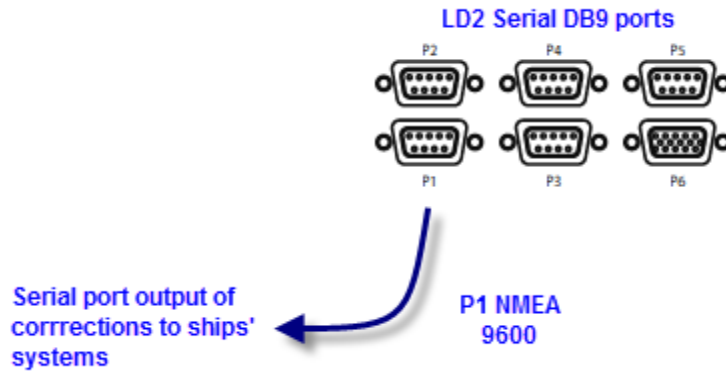
Once you have this information contact the Veripos Helpdesk to request unit activation, quoting your User Code and Service Access Licence (SAL) number.



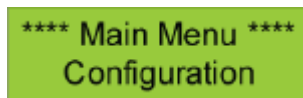
Provide the unique 5 digit User Code shown on the LD2 front panel (above).

You can download a Service Notification Form from <http://help.veripos.com> to use when contacting the Veripos Helpdesk. Provide the details requested and type of Service(s) you require, e.g. Veripos **Ultra** with **Verify DP**.
 Tel. +44 1224 965900 email: helpdesk@veripos.com

INTERNAL SOLUTION OUTPUT



To output NMEA data on P1:



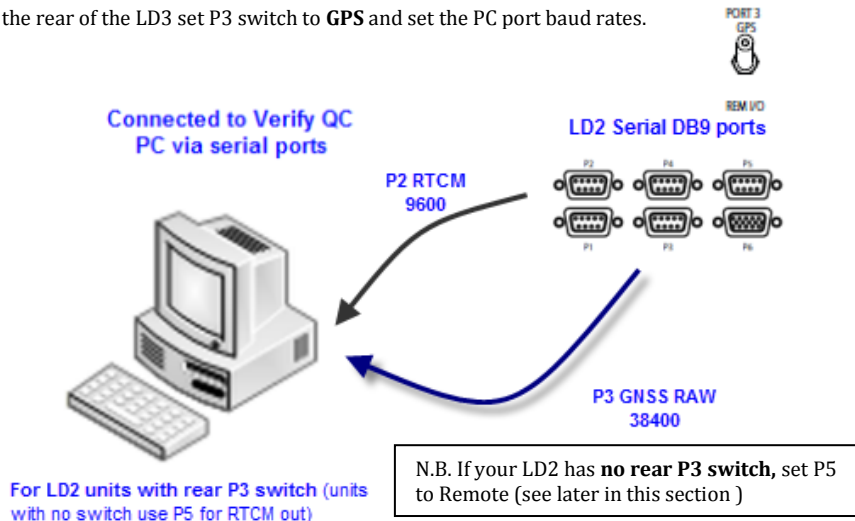
Go to Main **Menu/Configuration** and access the **Serial Ports** configuration menus by pressing **Enter** then **Page** twice. Set P1 to **Local**(using **Toggle then Enter**) - the P1 output will be generated by the LD2 processor and algorithms (as GGA). *If P1 is set to **GPS Rx** - the P1 output is generated by the GNSS card and will be a ZDA message, usually used in conjunction with a 1 PPS output harness.*

To amend Messages output from P1 (Local):

Configuration/GPS Receiver/ Port A Settings then toggle to show message options and use **Enter/Toggle/Enter** to add message strings required to the **P1 Local** output.

7. VERIFY QC SERIAL PORT SOLUTION OUTPUT (TYPICAL)

On the rear of the LD3 set P3 switch to **GPS** and set the PC port baud rates.



Serial ports

Serial ports are used to make connections to ships systems or Verify QC. You can view and amend baud rates, outputs or inputs, etc. by navigating to **Main menu / Configuration** screen & access the **Serial Ports** configuration menu by pressing the **Enter** key followed by the **Page** key twice.

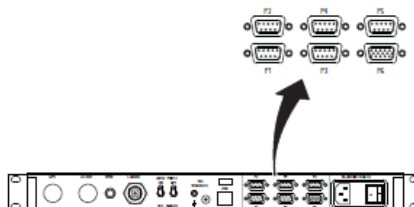
This provides access to the six sub menus which allow the user to set the parameters and options for all Port outputs.

- Qualifiers:
- Where P3 is set to **Remote** (not to **GPS**)
 - P2 and P4 used for output of RTCM messages

DB9 EIA232 Pin out

- 2 Received Data
- 3 Transmitted Data
- 5 Signal Ground

There are five RS-232 ports, one VGA output, one USB and a LAN port.



Port 1 – D9

When set to “LOCAL”, port 1 is the primary NMEA output for position from the processor algorithm. When set to “GPS RX”, port 1 outputs a ZDA time message. A 1 PPS output can also be taken from P1 to use in conjunction with the ZDA message.

Port 2 – D9

Port 2 is the primary RTCM output and is used for internal corrections by the processor algorithms.

The processor card is capable of utilizing 4 stations in this way.

Port 3 – D9



Port P3 is used for the remote control of the GPS Receiver and the Demodulator Board.

GPS Gives Raw GPS out when the Port 3 switch on the back panel of the LD2 is in the **GPS** (up) position.

DEM (Demodulator) gives access to the Demodulator for Firmware upgrades when the switch on the back panel of the LD2 is in the **REM I/O** position.

SKT (socket) allows for NMEA type messages to be output, when port B on the GPS LD2 has been configured to output such messages. It also is used for input of data of GYRO and xRTCM messages.

OFF No data is input or output from the port.

Port 4 – D9

Port 4 is the secondary RTCM output. N.B. By default all stations set to

OFF.

Port 5 – D9

Port 5 is the GPS I/O port. It is internally connected to Port A of the GNSS card. When the Port 5 setting is switched to "Remote", raw GNSS measurements are available on Port 5 for use with external positioning

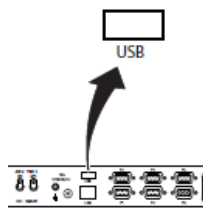
software such as Veripos' Verify QC.

In this mode the GPS menu system becomes disabled and the LD2 processor stops calculating a position. When the Port 5 setting is switched to "Off", the GPS configuration menu's become active again and Port 5 becomes disabled.

This is the VGA port, used to connect an external monitor to the LD2. Only used when Verify DP is activated and in use.

The **USB** port can be used to set inputs for **xRTCM** corrections or a **GYRO** compass heading input for display (using on-board Verify DP software)

Port 6 – HD15



8. CHECK LD2 STATUS

For the LD2 to provide a differential position and RTCM outputs, it must be locked to the correct communications satellite ("beam" or "channel") for the current vessel location.

To display which beam is selected, the strength of signal and the lock status.

Press **Page** until screen displays **Main Menu/Status**

Press ***Enter*** and screen will display:

Status /Demodulator

Press **Enter/Page/Enter** to access the **Signal Status** page

9. BEAM TABLE UPDATES

Veripos beam tables are updated for users over the air.

Where a unit has not been used for an extended period, customers may request a refresh for the LD2 from the Helpdesk or see the LD2 Operation Manual for **Channel 16 Edit** details.