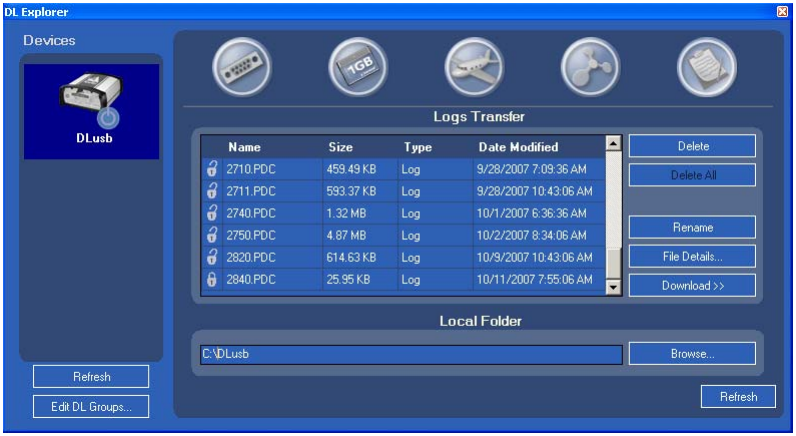

DL-V3
User Manual

DL-V3 User Manual

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website: http://www.novatel.com or write to:

NovAtel Inc.
Customer Service Department
1120 - 68 Avenue NE,
Calgary, Alberta, Canada T2E 8S5

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NovAtel Inc.

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2. PAYMENT: Terms are prepayment unless otherwise agreed in writing. Interest shall be charged on overdue accounts at the rate of 18% per annum (1.5% per month) from due date. To expedite payment by wire transfer to NovAtel Inc.: Bank - Hongkong Bank of Canada

777 - 8th Avenue S.W. US Account #788889-002
Calgary, AB, Canada T2P 3R5 Transit #10029-016

3. DELIVERY: Purchaser shall supply shipping instructions with each order. (Ship to and bill to address, NovAtel Quotation #, Preferred carrier and account #, Custom broker/freight forwarder including name and contact #) In the absence of specific instructions, NovAtel may select a carrier and insure Products in transit and charge Purchaser accordingly. NovAtel shall not be responsible for any failure to perform due to unforeseen circumstances or causes beyond its ability to reasonably control. Title shall pass to Purchaser when Purchaser has paid NovAtel all amounts due. Risk of loss, damage or destruction shall pass to Purchaser upon delivery to carrier. Goods are provided solely for incorporation into the Purchaser's end product and shall not be onward delivered except as incorporated in the Purchaser's end product.

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6. LIMITED WARRANTY AND LIABILITY: Warranty Period: Products - 1 year; Accessories - 90 days (in each case from the date of invoice). NovAtel warrants that during the Warranty Period that (a) the Product will be free from defects in material and workmanship and conform to NovAtel specifications;

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DL-V3	One (1) Year
GPSAntenna™ Series	One (1) Year
Cables and Accessories	Ninety (90) Days
Computer Discs	Ninety (90) Days
Software Warranty	One (1) Year

Date of sale shall mean the date of the invoice to the original customer for the product. NovAtel's responsibility respecting this warranty is solely to product replacement or product repair at an authorized NovAtel location, or in the case of software, provision of a software revision for implementation by the customer.

Determination of replacement or repair will be made by NovAtel personnel or by technical personnel expressly authorized by NovAtel for this purpose.

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There are no user serviceable parts in the NovAtel receiver and no maintenance is required. When the status code indicates that a unit is faulty, replace with another unit and return the faulty unit to NovAtel Inc.

Before shipping any material to NovAtel or Dealer, please obtain a Return Material Authorization (RMA) number from the point of purchase. You may also visit our website at http://www.novatel.com and select *Support* | *Repair Requests* from the top menu.

Once you have obtained an RMA number, you will be advised of proper shipping procedures to return any defective product. When returning any product to NovAtel, please return the defective product in the original packaging to avoid ESD and shipping damage.

Notices

The following notices apply to the DL-V3. For more information on emissions testing, please refer to the regulatory body in your geographic area. For example, in the US that is the Federal Communications Commission (FCC) and in Europe the Conformité Européenne (CE).

FCC NOTICES

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada

IMPORTANT: In order to maintain compliance with the limits of a Class B digital device, it is required to use properly shielded interface cables (such as Belden #9539 or equivalent) when using the serial data ports, and double-shielded cables (such as Belden #9945 or equivalent) when using the I/O strobe port.

WARNING!: Changes or modifications to this equipment not expressly approved by NovAtel Inc. could result in violation of Part 15 of the FCC rules and void the user's authority to operate this equipment.

CE NOTICE

The enclosures carry the CE mark.

WARNING: This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

"Hereby, NovAtel Inc. declares that this DL-V3 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC."

Lightning Protection Notice

What is the hazard?

A lightning strike into the ground causes an increase in the earth's potential causing a high voltage potential between the centre conductor and shield of the coax cable. Voltages directly applied onto the centre conductor "roll off" and arrive after the shield pulse producing a high voltage potential between the centre conductor and shield of the coax cable.

Hazard Impact

A lightning strike causes the ground potential in the area to rise to dangerous levels resulting in personnel harm or destruction of electronic equipment in an unprotected environment. It also conducts a portion of the strike energy down the inner conductor of the coax cable to the connected equipment.

Actions to Mitigate Lightning Hazards

See also *Figure 1* on *Page 18* while reading these guidelines:

1. Do not install the external antenna lines extra-building during a lightning storm.
2. It is not possible to avoid overvoltages caused by lightning, but a lightning protection device may be used to shunt a large portion of the transient energy to the building ground reducing the over voltage condition as quickly as possible.
3. Primary lightning protection must be provided by the operator/customer according to local building codes as part of the extra-building installation.
4. NovAtel recommends installing a secondary lightning protection device. The coaxial cable entering the building is connected to protective ground through the primary and secondary lightning protection.

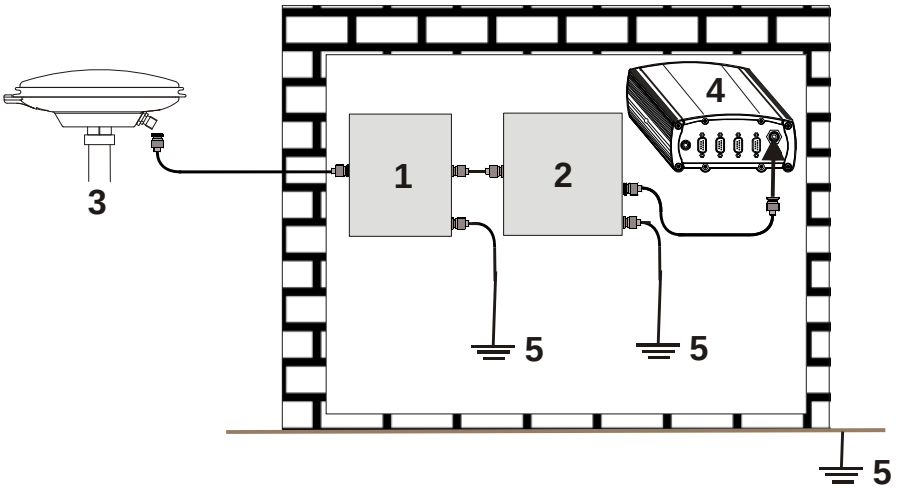


Figure 1: Primary and Secondary Lightning Protection

Reference	Description	Reference	Description
1	Primary Lightning Protection Device	4	OEMV Receiver
2	Secondary Lightning Protection Device	5	To Ground
3	External Antenna		

Electromagnetic Compatibility (EMC) and Safety

DL-V3 Regulatory Testing

- FCC, Part 15 Radiated Emissions, Class B
- EN 55022 Emissions, Class B
- EN 55024 Immunity
  - EN 61000-4-2 Electrostatic Discharge Immunity
  - EN 61000-4-3 Radiated RF EM Field Immunity Test
  - EN 61000-4-4 Electrical Fast Transient/Burst Test
  - EN 61000-4-6 Conducted Immunity
  - EN 61000-4-8 Magnetic Field Immunity
- EN 60950 Safety of Information Technology Equipment

WEEE Notice

If you purchased your OEMV family product in Europe, please return it to your dealer or supplier at the end of its life. The objectives of the European Community's environment policy are, in particular, to preserve, protect and improve the quality of the environment, protect human health and utilise natural resources prudently and rationally. Sustainable development advocates the reduction of wasteful consumption of natural resources and the prevention of pollution. Waste electrical and electronic equipment (WEEE) is a regulated area. Where the generation of waste cannot be avoided, it should be reused or recovered for its material or energy. WEEE products may be recognised by their wheeled bin label (). [1]

RoHS Notice

The DL-V3 is compliant with the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC. [1]

1. Please visit the NovAtel website at http://www.novatel.com/support/weee.htm for more information on WEEE and RoHS.

Customer Service

OEMV FIRMWARE UPGRADES

Firmware upgrades are firmware releases, which increase basic functionality of the receiver from one model to a higher level model type. When available, upgrades may be purchased at a price, which is the difference between the two model types on the current NovAtel GPS Price List plus a nominal service charge.

WINLOAD

Please refer to the *OEMV Family Installation and Operation User Manual* for instructions on how to use the WinLoad program to upgrade your PDC, PIC or OEMV-3 card.

CONTACT INFORMATION

Model upgrades are accomplished through NovAtel authorized dealers.

Contact your local NovAtel dealer first for more information. To locate a dealer in your area or if the problem is not resolved, contact NovAtel Inc. directly using one of the following methods:

Call the NovAtel GPS Hotline at 1-800-NOVATEL (U.S. & Canada), or 403-295-4900 (international)

Fax: 403-295-4901

E-mail: support@novatel.com

Website: http://www.novatel.com

Write: NovAtel Inc., Customer Service Dept., 1120 - 68 Avenue NE, Calgary, AB., Canada, T2E 8S5

✉ Before contacting NovAtel Customer Service regarding software concerns, please do the following:

1. Issue a FRESET command
2. Log the following data to a file on your PC/laptop for 30 minutes

RXSTATUSB	once
RAWEPHEMB	onchanged
RANGEB	ontime 1
BESTPOSB	ontime 1
RXCONFIGA	once
VERSIONB	once

3. Send the file containing the logs to NovAtel Customer Service, using either the NovAtel ftp site at ftp://ftp.novatel.com/incoming or the support@novatel.com e-mail address.

Foreword

Congratulations!

Congratulations on your purchase of the DL-V3, a GNSS receiver with exceptional flexibility.

NovAtel is an industry leader in state-of-the-art GNSS receiver design. We believe that our DL-V3 will meet your high expectations, and are working hard to ensure that future products and enhancements maintain that level of satisfaction.

This is your primary hardware and software reference.

Scope

This manual provides sufficient detail on the DL-V3 to allow you to effectively integrate and fully operate it. The information in this manual supersedes DL-V3-related information in the *DL-V3 Firmware Reference Manual*, the *OEMV Installation and Operation User Manual* and its *DL-V3 Addendum*.

After the addition of accessories, an antenna and a power supply, the DL-V3 is ready to go.

The OEMV-3 in the DL-V3 utilizes a comprehensive user-interface command structure, which requires communications through its communications (COM) ports. This manual describes the DL-V3-specific commands and logs, see Commands starting on *Page 81* and Logs starting on *Page 147*. Other supplementary manuals, available on the accompanying CD and on our website at http://www.novatel.com/support/docupdates.htm, aid you in using the other commands and logs available in the OEMV family of receivers. This includes the OEMV-3 card within your DL-V3.

DL Explorer is also described, see *Chapter 4* starting on *Page 56*. Integrated with the Control and Display Unit (**CDU**) software, these programs provide graphical user interfaces to the DL-V3 for logging, planning, transferring data files from the Compact Flash (CF) card to the PC/laptop, upgrading, and converting data types.

Prerequisites

The installation chapters of this document provide information concerning the installation requirements and considerations for DL-V3. To run the PC software supplied, your personal computer must meet or exceed this minimum configuration:

- Windows compatible mouse or pointing device and SVGA display
- USB requires Windows 2000, or Windows XP

Although previous experience with Windows is not necessary to use the *DL Explorer*, familiarity with certain actions that are customary in Windows will assist in the usage of the program. This manual has been written with the expectation that you already have a basic familiarity with Windows.

Conventions

Some simple conventions used in this manual are:

✉ This is a notebox that contains important information before you use a command or log.

- The letter H in the *Offset* columns of the commands and logs tables represents the header length for that command or log. Refer to the *OEMV Family Firmware Reference Manual* for ASCII and binary header details.
- The number following 0x is a hexadecimal number.
- Command descriptions' brackets, [ ], represent the optionality of parameters.
- In tables where values are missing they are assumed to be reserved for future use.
- Status words are output as hexadecimal numbers and must be converted to binary format (and in some cases then also to decimal). For an example of this type of conversion, please refer to the RANGE log in the *OEMV Family Firmware Reference Manual*.

  Conversions and their binary or decimal results are always read from right to left. For a complete list of hexadecimal, binary and decimal equivalents, please refer to the *Unit Conversion* section of the *GNSS Reference Book* available on our website at http://www.novatel.com/support/docupdates.htm.

See also *Section B.1, Syntax Conventions* on *Page 84* for more syntax when entering commands.

Chapter 1 Introduction

The DL-V3 is a high-performance GNSS receiver capable of receiving and tracking different combinations of GPS L1 C/A, L2C, L2 P(Y) and L5 code and carrier, GLONASS L1 and L2 code and carrier, and L-Band (CDGPS and OmniSTAR) on a maximum of 72 channels. SBAS support is standard and the DL-V3 adaptability offers multi-system, frequency, and size configurations for any application requirement. Refer to the *GNSS Reference Book* for an overview of each of the above signal types, available from our website at http://www.novatel.com/support/docupdates.htm. The DL-V3's front panel also features light emitting diodes (LEDs) for on the fly observations.

The DL-V3 is a triple-frequency GNSS receiver with integrated L-band capability but without the need for a separate board. It is GLONASS-enabled with measurements, full code and RTK positioning.

Once you connect the DL-V3 to an antenna and power supply, it begins operating as a fully functional GNSS system. *Figure 2* below shows the DL-V3 without an antenna or connecting cables.

Figure 2: DL-V3 Receiver

1.1 Models and Features

The DL-V3 is available in several different firmware models whose configurations may include other additional features. Some possible configurations can be seen in *Table 1*.

Table 1: DL-V3 Controller Models

Model Name	Firmware Feature
DL-V3-L1	L1-only
DL-V3-L1L2	L1/L2
DL-V3-RT20	L1 plus RT-20
DL-V3-RT2	L1/L2 plus RT-2
DL-V3-VBS	L1 plus OmniSTAR VBS, and CDGPS
DL-V3-HP	L1/L2 plus OmniSTAR HP/XP/VBS, and CDGPS

Table 2 lists the models, each capable of multiple positioning modes of operation:

Table 2: GPS Positioning Modes of Operation

Modes of Operation [a]	DL-V3 Model					
	L1	RT20	L1/L2	RT2	HP/XP	VBS
Single point	✓	✓	✓	✓	✓	✓
Pseudorange differential corrections	✓	✓	✓	✓	✓	✓
RT20 pseudorange and carrier-phase double differencing		✓		✓	✓	
RT2 pseudorange and carrier-phase double differencing:				✓	✓	
Post-processed RTK-type accuracy	✓	✓	✓	✓	✓	✓
OmniStar HP/XP					✓	
OmniStar VBS and CDGPS					✓	✓

a. For a discussion on *Positioning Modes of Operation*, please refer to the *OEMV Family Installation and Operation User Manual.*

1.2 OPERATING MODES

The DL-V3 can either be controlled by a host computer or be set up for stand-alone operation.

- *Controlled Operation:* A host computer can transmit logging parameters, receive collected data, and turn the DL-V3 on or off. Whenever the DL-V3 is connected to a power source (regardless of whether the DL-V3 is turned “on” or “off”), it detects if there is a host computer connected to one of its serial ports. If a host computer is found, and there is serial port activity from a host computer to the DL-V3, the DL-V3 powers up. If the DL-V3’s predefined POWERUP group, see also *Section 4.2.1, Receiver Groups* on *Page 57*, exists in the DL-V3, the DL-V3 runs the POWERUP group, otherwise the DL-V3 begins to search for satellites and waits for commands from the host computer.

✉ Only specific serial ports have wake-up capability on data activity. For example, the USB, Ethernet or *Bluetooth*® ports do not.

- *Stand-Alone Operation:* Once the DL-V3 receives configuration commands from a host computer, it operates according to these parameters. For example, data collection can be configured in advance by setting up a group to repeat continually.

Refer also to the *OEMV Family Installation and Operation User Manual* for information on receiver communications and operation.

Chapter 2 Installation and Setup

This chapter contains instructions and tips to set up your DL-V3 to create a GNSS receiver system.

2.1 Additional Equipment Required

In order for the receiver to perform optimally, the following additional equipment is required:

- A NovAtel GNSS antenna (user-supplied, NovAtel recommended)
- A quality coaxial cable, and interconnect adapter cable as necessary (user-supplied)
- A PC/laptop (user-supplied)
- A means of communicating between the DL-V3 and PC/laptop
  - Serial null-modem cable (included with the receiver, NovAtel part number 01017658), see *Figure 8, DB-9 Setup* on *Page 28*
  - USB cable (user-supplied), see *Figure 9, USB Setup* on *Page 28*
  - Ethernet crossover cable (user-supplied), see *Figure 11, Ethernet Setup* on *Page 29*
  - *Bluetooth* link (user-supplied), see *Figure 10, Bluetooth Setup* on *Page 29*

  ✉ Use a serial COM or USB connection to communicate with the receiver first. This will give you the ability to configure the PC/laptop and DL-V3 before Ethernet or *Bluetooth* use.
- A power supply (user-supplied)
- A power cable (included with the receiver)

CAUTION: When the DL-V3 is installed in a permanent location, such as in a building, it should be protected by a lightning protection device according to local building codes. See also *Warranty* on *Page 15*.

2.1.1 DL-V3 Setup

Complete the steps below to connect and power your DL-V3. See also *Figures 8* to *11* starting on *Page 28*.

1. Mount a GNSS antenna on a secure, stable structure with an unobstructed view of the sky from horizon to horizon, see *Section 2.1.7, Mounting the GNSS Antenna* on *Page 32*.
2. Ensure a CF card is in the slot behind the door on the front face of the DL-V3. Open, or secure, the door by turning the latch. See also *Section 2.2.6, DL-V3 Removable Compact Flash Memory Card* starting on *Page 39*.

✉ Once the CF card is installed, ensure that it is properly formatted, see *Page 39*.

3. Use a coaxial cable to connect the antenna to the *SAT ANT* port, see *Figure 3* below, which is found on the back face of the DL-V3. See also *Section 2.1.8, Connecting the Antenna to the Receiver* on *Page 32*.

Figure 3: Antenna Port

4. Establish a physical communication connection between the DL-V3 and the PC/laptop

   Either: Connect *COM1* on back of the DL-V3, see *Figure 4* below, to a DB-9 serial port on the PC/laptop

   or: Connect the USB port, see *Figure 4*, on the front of the DL-V3 to a USB port on the PC/laptop (first install the USB drivers available on the CD provided), see also *Section 2.2.2, Universal Serial Bus (USB)* starting on *Page 34*

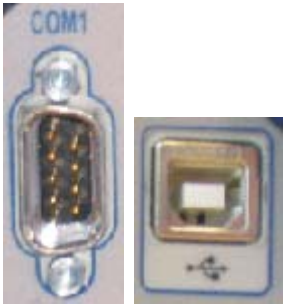


Figure 4: COM1 Port (left) and USB Port (right)

The following types of connection can be made after initial communication and configuration steps have been taken for either *Bluetooth* or Ethernet:

Either: Connect the Ethernet port, see *Figure 5* on *Page 27*, on the back of the DL-V3 to an Ethernet port on the PC/laptop. See also *Appendix D, Ethernet Configuration* starting on *Page 178*

or: Use *Bluetooth* communications, see *Figure 6* on *Page 27*. See also *Appendix E, Bluetooth Configuration* starting on *Page 195*

See also *Section 2.1.10, Connecting Data Communications Equipment* on *Page 33*.

Figure 5: Ethernet Port

Figure 6: *Bluetooth* Interface at the Top of the DL-V3

5. Line up the red mark on the power cable connector with the red mark of the *INPUT 9-28 V* connector, see *Figure 7* below, on the back of the DL-V3, and insert the power cable. See also *Section 2.1.9, Applying Power to the Receiver* on *Page 32*.

Figure 7: Power Port

6. Plug in the adapter and/or connect, turn on the power supply and press the button on the front face of the DL-V3. The power LED on the front of the receiver glows green when the DL-V3 is turned on and is properly powered.

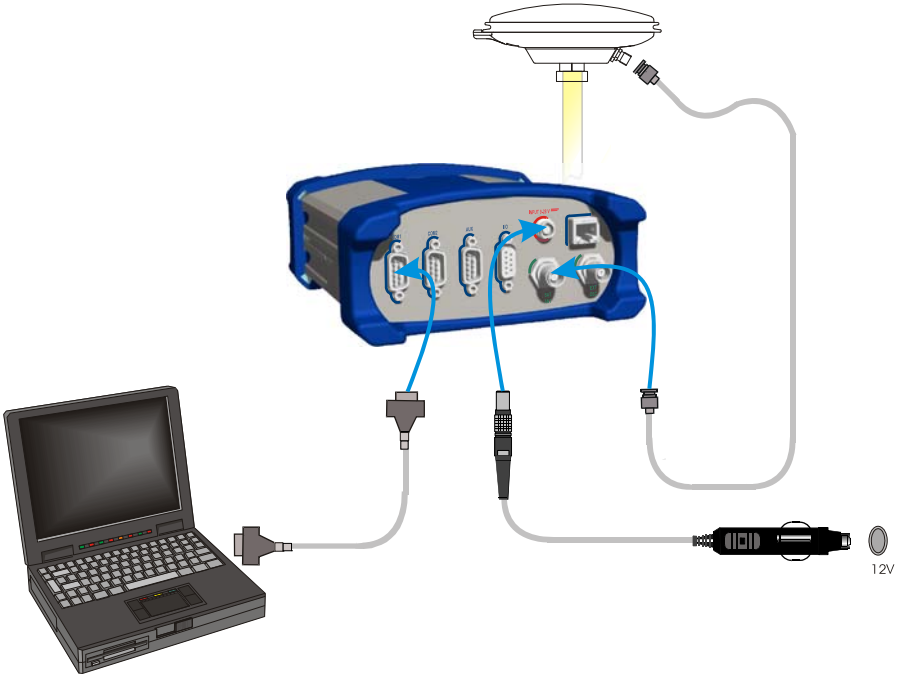


Figure 8: DB-9 Setup

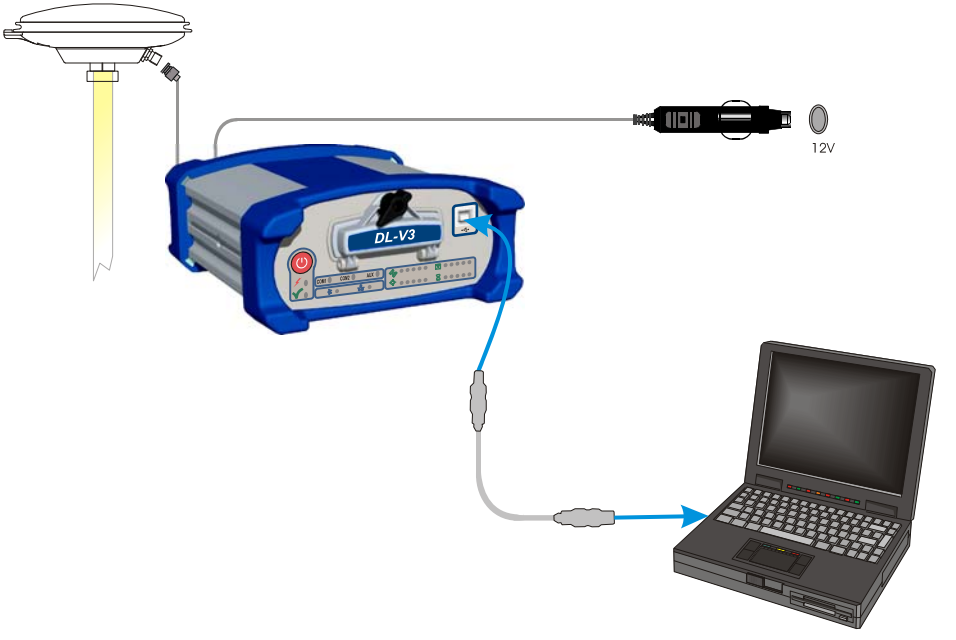


Figure 9: USB Setup

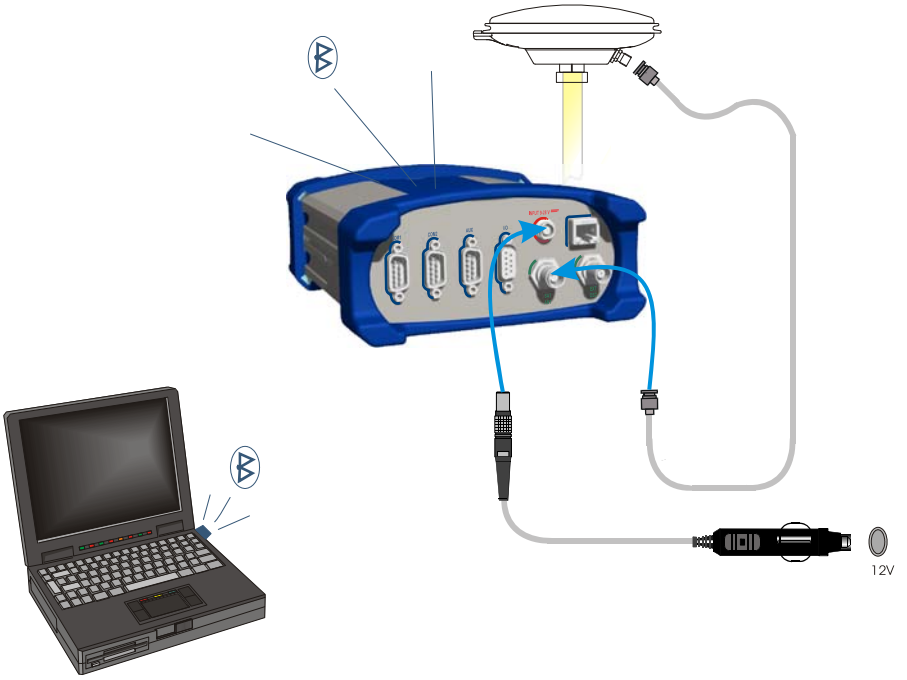


Figure 10: *Bluetooth* Setup

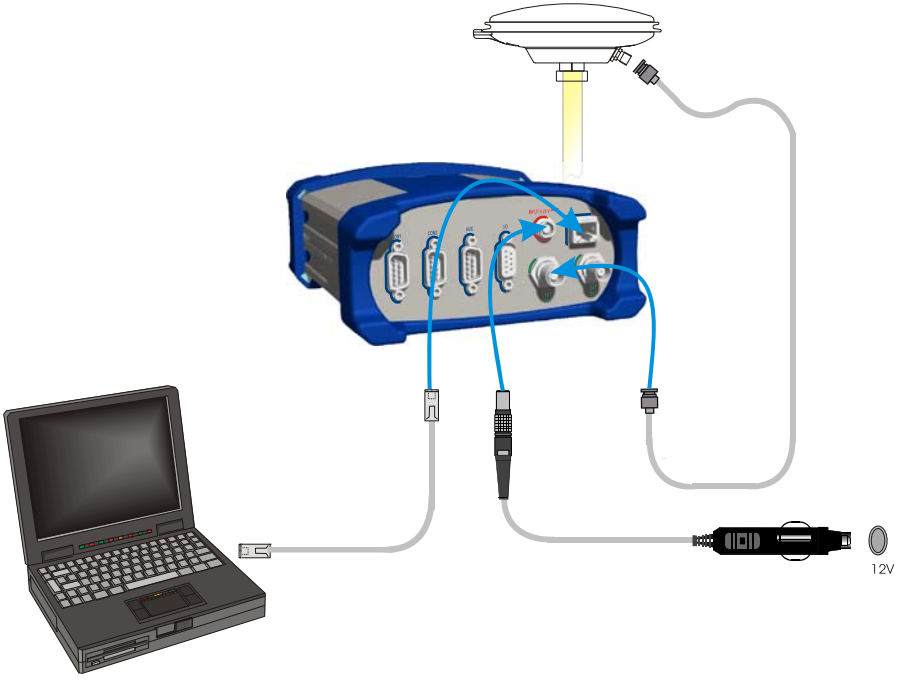


Figure 11: Ethernet Setup

2.1.2 Installing the PC Utilities

Once the DL-V3 is connected to the PC/laptop, antenna, and power supply, install NovAtel's PC Utilities. These include **CDU**, a graphical user interface program.

1. Start up the PC/laptop.
2. Insert the accompanying CD, see Figure x below, in the CD-ROM drive of the computer.
3. Select *Install the OEMV GPS PC Utilities* from the window that is automatically displayed. If the window does not automatically open when the CD is inserted, select *Run* from the *Start* menu and select the *Browse* button to locate *Setup.exe* on the CD drive.

Install the PC Utilities by advancing through the steps provided in the *NovAtel PC Utilities* setup program.

Figure 12: OEMV CD

2.1.3 Selecting a GNSS Antenna

An active antenna is required because its low-noise amplifier (LNA) boosts the power of the incoming signal to compensate for the line loss between the antenna and the receiver.

NovAtel offers a variety of single and dual-frequency GNSS antenna models, as indicated in *Table 3* on *Page 31*. All include band-pass filtering and an LNA. The GNSS antenna you choose will depend on your particular application. Each of these models offer exceptional phase-center stability as well as a significant measure of immunity against multipath interference. Each one has an environmentally-sealed radome. The ANT-532-C, ANT-533, ANT-534-C, ANT-536-C, ANT-537, ANT-538, GPS-702L, GPS-701-GG, GPS-702-GG, GPS-701-GGL and GPS-702-GGL are RoHS compliant.

Table 3: NovAtel GNSS Antenna Models

Models	Frequencies Supported	GPS	GLONASS
701, 511, 521, 536, 537	L1 only	✓	×
702, 532, 533	L1 and L2	✓	×
702L, 534	L1 and L2 plus L-band	✓	×
701GGL, 538	L1 plus L-band	✓	✓
701GG	L1 only	✓	✓
702GGL	L1 and L2 plus L-band	✓	✓
702GG	L1 and L2	✓	✓

2.1.4 Choosing a Coaxial Cable

An appropriate coaxial cable is one that matches the impedance of the antenna and receiver being used (50 ohms), and whose line loss does not exceed 10.0 dB. If the limit is exceeded, excessive signal degradation occurs and the receiver may not be able to meet its performance specifications. NovAtel offers a variety of coaxial cables to meet your GNSS antenna interconnection requirements, including:

- 5, 15, or 30 m antenna cables with TNC male connectors on both ends (NovAtel part numbers C006, C016 and C032 respectively)

Your local NovAtel dealer can advise you about your specific configuration. If your application requires the use of cable longer than 30 m, refer to the application note *RF Equipment Selection and Installation* on our website at www.novatel.com, or you can obtain it directly from NovAtel.

High-quality coaxial cables should be used because a mismatch in impedance, possible with lower quality cable, produces reflections in the cable that increase signal loss. Though it is possible to use other high-quality antenna cables, the performance specifications of the OEMV family receivers are warranted only when used with NovAtel-supplied accessories.

2.1.5 Power Supply Requirements

This section contains information on the requirements for the input power to the receiver. See *Appendix A, Technical Specifications* starting on *Page 72* for more power supply specifications.

WARNING: If the voltage supplied is below the minimum specification, the receiver will suspend operation. If the voltage supplied is above the maximum specification, the receiver may be permanently damaged, voiding your warranty.

The DL-V3 enclosure is supplied with a 12V power adapter with a built-in 3 A slow-blow fuse for use with a standard 12 V DC power outlet. You can choose to press the DL-V3 power button or wait for the power sequence, when it monitors the serial ports, as long as a valid voltage is present at the power supply input, see *DL-V3 Power Down and the Power Button* on *Page 33*.

If a different supply is desired, the table below provides the input range and type of connector required to mate with the enclosure's power connector. The supply should be capable of 5 W.

Table 4: Enclosure Power Requirements

Enclosure	Power Cable Connector Required	Power Input Range
DL-V3	4-pin LEMO socket connector [a] labelled *PWR*	+9 to +28 V DC

a. See *Appendix F, Replacement Parts* on *Page 200* for connector part numbers.

2.1.6 Mounting Bracket

A mounting kit is provided along with the DL-V3 to facilitate mounting the receiver to a surface.

✉ The mounting kits are not designed for use in high-dynamics/vibration environments. Contact NovAtel if your application needs the DL-V3 to be mounted in this type of environment.

To install the mounting bracket provided with the DL-V3, refer to the instructions provided with the mounting kit.

2.1.7 Mounting the GNSS Antenna

The DL-V3 has been designed to operate with any of the NovAtel single-frequency or dual-frequency GNSS antenna models. See *Section 2.1.3, Selecting a GNSS Antenna* on *Page 30* for more information.

When installing the antenna system:

- Choose an antenna location that has a clear view of the sky so that each satellite above the horizon can be tracked without obstruction. (Refer to the *Multipath* in the *GNSS Reference Book*).
- Mount the antenna on a secure, stable structure capable of safe operation in the specific environment.

2.1.8 Connecting the Antenna to the Receiver

Connect the antenna to the receiver using high-quality coaxial cable, as discussed in *Section 2.1.4* on *Page 31*.

The DL-V3 provides a TNC female connector, see *Figure 3* on *Page 26*, which can be connected to the antenna directly with any of NovAtel's coaxial cables.

2.1.9 Applying Power to the Receiver

Connect the power supply to the power port. For the DL-V3 you can choose to press its power button or wait for the power sequence, see *DL-V3 Power Down and the Power Button* starting on *Page 33*. See also *Table 4, Enclosure Power Requirements* on *Page 32*.

DL-V3 Power Down and the Power Button

DL-V3 incorporates a power button on its front, see *Figure 13* below. Pressing this switch, sends a signal to the microprocessor to turn on or off the GNSS receiver.

Figure 13: Power Button

The DL-V3 has a low-power mode called power-down mode. To enter this low-power mode, press the power button for at least three but no more than seven seconds, then release it. This is also the mode the receiver enters into after applying power. In the power-down mode, all logging is disabled.

While power consumption in power-down (sleep) mode is minimal, less than 10 mA, the DL-V3 is not completely off. If power conservation is important in your application, disconnect the power source from the DL-V3 when it is not in use.

Press the power button momentarily to turn the DL-V3 back on. Also, the DL-V3 monitors its COM1 and COM2 serial ports. Power-up is triggered on these ports by a DC level of at least +5 V on either RX or TX. The receiver does not detect activity on COM3. For example, if a key is pressed on a handheld data logger that is plugged into COM1 or COM2, the time required to come on is only a few seconds. However, it may require an additional few minutes to establish an initial time and position. During power-down and power-up time, the serial ports do not process data. You must wait until the receiver outputs an RXSTATUSA log with a BOOTOK message before typing any commands. Ensure that your host application (especially Windows) does not poll these COM ports periodically to cause an accidental power-up.

The automatic power-down feature is disabled when logging is in progress. However, if the power button is pressed while the DL-V3 is logging data autonomously, the DL-V3 saves any open data files and then goes into power-down mode.

An additional function of the power button is that it resets the DL-V3 if it is held depressed for at least 10 seconds. This system reset clears stored logging parameters and reverts to a factory configuration when the power button is released.

2.1.10 Connecting Data Communications Equipment

In order to communicate with the receiver by sending commands and obtaining logs, a connection to some form of data communications equipment is required. In the case of the DL-V3, your PC/laptop can also communicate with the receiver using the *Bluetooth* interface. The default configuration available is shown in *Table 5*, below, and its pin-out table is in *Appendix A* on *Page 76*.

Table 5: Default Serial Port Configurations

Receiver	COM1	COM2	COM3	AUX	USB
DL-V3	RS-232	RS-232	*Bluetooth* or Ethernet	RS-232	USB

DL-V3 COM3 Configuration

The DL-V3 COM1, COM2 and AUX ports are RS-232-only but its COM3 port has *Bluetooth*/ Ethernet configuration options.

You can switch between Ethernet and *Bluetooth* on COM3 using the APPCONTROL command, see *Page 85*. In the case of switching to Ethernet, power is automatically applied to it after switching. *Bluetooth*, on the other hand, may be in sleep mode. If *Bluetooth* operation is required, it must be put into active mode using the COMVOUT command, see *Page 87*. The Ethernet requires more setup configuration steps. These involve configuring serial, and network, parameters. See *Appendix D* starting on *Page 178* for details.

If the receiver is turned off, or power is removed, the Ethernet or *Bluetooth* mode on COM3 is returned to whichever mode was applied before power-down when it is powered up again.

2.2 Additional Features and Information

This section contains information on the additional features of the DL-V3, which may affect the overall design of your receiver system.

2.2.1 Strobes

A set of inputs and outputs provide status and synchronization signals. These signals are referred to as strobes. Not all strobe signals are provided on all receivers. However, for those products for which strobes are available, you may want to design your installation to include support for these signals.

Pin-out information can also be found in *Appendix A, DL-V3 Port Pin-Outs* on *Page 76*

2.2.2 Universal Serial Bus (USB)

The DL-V3 receiver, along with the accompanying NovAtel USB drivers for Windows 2000 and Windows XP, provides three virtual serial ports over a single USB 1.1 connection using USB D(+) and USB D(-) signals, with a dedicated USB port labelled  .

The three virtual serial ports, identified as USB1, USB2, and USB3, are available to existing Windows applications which use COM ports to communicate (for example, HyperTerminal and **CDU**). The NovAtel USB drivers assign COM port numbers sequentially following any existing ports on the PC/laptop. For example, if a PC/laptop has COM1 and COM2 ports, the NovAtel USB drivers assign COM3 to USB1, COM4 to USB2, and COM5 to USB3.

✉ Typically, a PC/laptop has several physical USB ports. The assignment of COM port numbers is tied to a USB port on the PC/laptop. This allows you to switch receivers without Windows assigning new COM ports. However, if you connect the receiver to a different physical USB port, Windows detects the receiver's presence on that USB port and assigns three new COM port numbers.

The NovAtel USB Configuration Utility installed with the NovAtel USB drivers allows you to change the COM port numbers assigned to the virtual serial ports. The USB drivers, along with installation

instructions, are available on the OEMV Family CD by selecting *USB Support* from the main menu. You can also check for updates to the drivers or release notes on our website at www.novatel.com.

CAUTION Do not connect USB ports if USB communications is not being used or you may risk damaging your receiver.

2.2.3 Status Indicators

LED indicators on the DL-V3 provide the status of the receiver. They represent these categories:

- Power
- Receiver Status
- COMs (COM1, COM2 and AUX)
- COM3
- Satellite Tracking
- Flash Card Memory
- Positioning Mode
- Occupation Time

Power

The power indicator glows orange when the receiver is powered and then glows green once the receiver has been turned on. See also *DL-V3 Power Down and the Power Button* on *Page 33*.

Status

The status indicator flashes orange when the receiver is first turned on. Under normal operation, this LED is off. If a status event occurs, the LED flashes orange again. See also to the chapter on Built-In Status Tests in the *OEMV Family Installation and Operation User Manual* and the *RXSTATUS* log in the *OEMV Family Firmware Reference Manual*.

Communication Ports (excluding COM3)

The top of the COM1, COM2 and AUX LEDs flash GREEN when transmitting data while the bottom of them flash AMBER when receiving data.

COM3

The COM3 section of the LED panel on the front of the DL-V3, has two LEDs:

- 1 for *Bluetooth* Mode
- 1 for Ethernet Mode

Only one mode may be used at a time on COM3. The active mode's LED flashes blue for *Bluetooth* and glows orange for Ethernet. If the receiver is turned off, or power is removed, the Ethernet or *Bluetooth* mode on COM3 is returned to whichever mode was applied before power-down when it is powered up again. See also *Appendix D, Ethernet Configuration* starting on *Page 178*.

Satellite Tracking

The LED that is glowing, and its color, corresponds to the number of GPS-only, or GLONASS and GPS-combined, satellites being tracked by the DL-V3, where the first LED to the left is #1, see *Table 6*:

Table 6: Satellite Tracking LEDs

LED#	# of SVs	LED Color
1	≤ 3	Red
2	4 or 5	Amber
3	6 or 7	Green
4	8 or 9	Green
5	≥ 10	Green

Flash Card Memory

The number of LEDs that are glowing, and their colors, correspond to the amount of memory left in the DL-V3's compact flash card, where the first LED to the left is #1, see *Table 7*.

✉ If all 5 flash card LEDs are flashing, it can mean that there is no compact flash card in the DL-V3, or that the card in the unit is not formatted (see *Section 2.2.6, DL-V3 Removable Compact Flash Memory Card* starting on *Page 39*).

Table 7: Flash Card Memory LEDs

# of LEDs	Capacity	LED Color
1	Capacity ≤ 20%	Red [a]
2	40% ≥ Capacity > 20%	Amber
3	60% ≥ Capacity > 40%	Green
4	80% ≥ Capacity > 60%	Green
5	Capacity > 80%	Green

a. This red LED can also mean that the card was not formatted, and placed in the receiver, when the receiver was powered off.

Positioning Mode

Which LEDs are glowing, or blinking, or off, and their colors, correspond to the DL-V3's current positioning mode. *Table 8, Positioning Mode LEDs* on *Page 37* shows the available positioning modes and their corresponding LEDs where the first LED to the left is #1, as you look at the DL-V3, and #5 is the furthest to the right. If the table cell shows the name of a color (red, amber or green) with a solid background, that LED is glowing solidly. The table cells that appear dim, behind their color name, indicate that the LED is flashing that color. The LED may also be off.

Table 8: Positioning Mode LEDs

Position Mode	Position Mode Detail [a]	1	2	3	4	5
Single Point	Autonomous (fixed height)	Amber	Off	Off	Off	Off
	Autonomous (3D)	Amber	Off	Off	Off	Off
Differential GPS	SBAS	Off	Green	Off	Off	Off
	CDGPS	Off	Off	Green	Off	Off
	DGPS	Off	Green	Green	Off	Off
OmniSTAR	VBS (searching)	Amber	Green	Off	Off	Off
	VBS (pulling in)	Amber	Green	Off	Off	Off
	VBS	Amber	Green	Off	Off	Off
	XP (searching)	Amber	Off	Green	Off	Off
	XP (pulling in)	Amber	Off	Green	Off	Off
	XP	Amber	Off	Green	Off	Off
	HP (searching)	Amber	Green	Green	Off	Off
	HP (pulling in)	Amber	Green	Green	Off	Off
	HP	Amber	Green	Green	Off	Off
RTK	Float (RT-20) [b]	Amber	Off	Off	Green	Off
	Float (RT-2)	Amber	Off	Off	Off	Green
	Fixed (RT-2)	Amber	Off	Off	Off	Green

a. If the table cell shows the name of a color (red, amber or green) with a solid background, that LED is glowing solidly. The table cells that appear dim, behind their color name, indicate that the LED is flashing that color. The LED may also be off.

b. If you have a GPS+GLONASS model, the same LED indication used for RT-20 GPS-only is used for RT-20 GPS + GLONASS. The LEDs show the total number of satellites used in the solution (GPS or GPS + GLONASS) without making a distinction between GPS and GLONASS. Check the *Constellation* window in CDU for details on the availability of GPS and GLONASS satellites. Refer also to **CDU**'s *Help* file.

Occupation Time

The LED that is glowing green corresponds to the DL-V3's occupation time gauge. The occupation time LEDs provide an indication of whether sufficient data has been collected for successfully post processing data for the indicated baseline. The LED that appears corresponds to the baseline length that you can process your data to, where the first LED to the left is #1. The occupation time gauge has the following values from left to right, see *Table 9:*

Table 9: Occupation Time LEDs

LED#	Baseline Length (km)	LED Color
1	≤ 5	Green
2	> 5 ≤ 10	Green
3	> 10 ≤ 15	Green
4	> 15 ≤ 20	Green
5	≥ 20	Green

2.2.4 External Oscillator

For certain applications requiring greater precision than what is possible using the on-board 20 MHz, voltage-controlled, temperature-compensated crystal oscillator (VCTCXO), you may wish to connect the DL-V3 to an external, high-stability oscillator. The external oscillator can be either 5 MHz or 10 MHz.

Operation consists of connecting a cable from the external oscillator to the DL-V3's BNC external oscillator port, labelled *EXT OSC* on the back of the DL-V3. See *Figure 14* below. The receiver does not have to be powered down during this procedure.

Figure 14: External Oscillator Port

Once the external oscillator has been installed, the EXTERNALCLOCK command (refer to the *OEMV Family Firmware Reference Manual*) must be issued to define the clock model (for example, cesium, rubidium or ovenized crystal). If the input clock rate is 5 MHz, the EXTERNALCLOCK command must be issued to change the 10 MHz default rate.

2.2.5 Antenna LNA Power

Receiver RF input gain requirements are easily met when using NovAtel antennas and coaxial cables. NovAtel antennas employ a built-in, low-noise amplifier (LNA), which typically provides 26 dB of gain to the received satellite signal. The power to the antenna LNA is provided through the center conductor of the receiver's RF port. To achieve the required input gain to the receiver, NovAtel coaxial cables have been designed to exhibit no more than 6 dB loss.

CAUTION NovAtel guarantees performance specifications only using NovAtel antennas.

2.2.6 DL-V3 Removable Compact Flash Memory Card

Data commands and logs can be recorded from the DL-V3 to a removable Compact Flash (CF) card. The need for a companion handheld data logger is avoided when continuous user interaction is not required, since the DL-V3 is capable of logging data according to pre-configured parameters without any user intervention. In applications when continuous user interaction is required, a simple handheld controller can be used with the DL-V3, as the controller does not require its own data logging memory. The reduced handheld data logger or controller requirement simplifies your system and reduce its total cost and power consumption. By default only a log group named *default* exists. A *powerup* group must be created to take advantage of the automatic functionality, refer to *Appendix B, Commands* starting on *Page 81* for more information.

WARNING: To minimize the possibility of damage, always keep the CF card cover closed and latched except when exchanging CF cards. **Do not change the card while logging is in progress. Data will be lost.** It is not necessary to turn the receiver off before inserting or extracting a CF card if you are not logging data.

An example of a 64 MB CF card is shown in *Figure 15* below.

Figure 15: 64 MB Flash Card

When you insert a CF card into the DL-V3, enter a DISK FORMAT command using the *Console* window in NovAtel's Control and Display Unit (**CDU**) graphical user interface software. Wait a few minutes and use the DL-V3 power button to turn it off and then on again. When power is returned, the DL-V3 should be able to recognize and use the CF card. For more information on **CDU** refer to its on-line *Help* file.

Data Logging

See *Section 3.4, Using the DL-V3* starting on *Page 51* to begin collecting data.

Collected data can either be transmitted to a host computer over a serial port, or stored on the CF card. If you choose to log data to the CF card, each logging session is stored in a single, unique file. These files can then be transferred to a host computer, for data analysis or other types of post-processing, by one of two methods:

- Transfer the data by means of serial communications, for example, *DL Explorer* in **CDU**
- Physically remove the CF card from the DL-V3 and insert it into the host computer, provided that it is also suitably equipped with a CF card port

See also the DL-V3 commands and logs, detailed in this manual.

Access Door

From *Figure 16, Compact Flash Card Door (shown with its latch in the open position)* on *Page 40*, you can see that the CF card access door is closed with a latch (reference **1** in *Figure 16*). As long as the latch is secured, it provides a water and dust-resistant seal around the CF card.

To open the CF card access door, turn the latch counter-clockwise, until it releases the door.

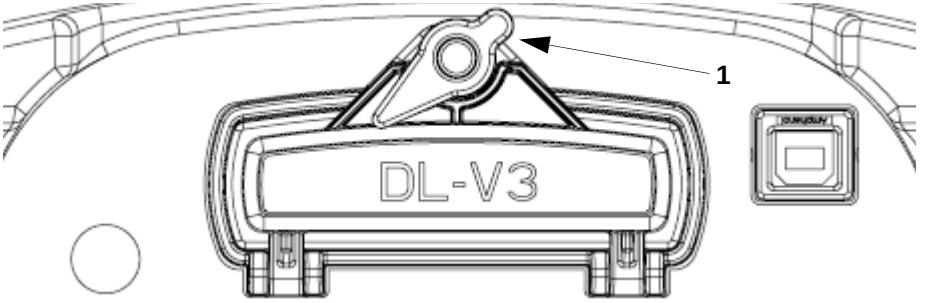


Figure 16: Compact Flash Card Door (shown with its latch in the open position)

To remove the CF card, unlock the access door. When the door is open, you can see an eject button to the left of the card. You must push this button to partially eject the card. Grasp the card and pull it all the way out.

WARNING: **Do not change the card while logging is in progress. Data will be lost.** It is not necessary to turn the receiver off before inserting or extracting a CF card if you are not logging data. See *Step 4, Stop the Data Logging* on *Page 51*.

To insert the card, ensure that it is correctly aligned before gently sliding it into the slot. When the card slides all the way in and locks in place, the eject button extends. If you attempt to insert the card incorrectly, it will not go all the way in, and the eject button will not extend. In this case, do not force the card! Remove it, orient it properly, and then insert it. After the card is locked in place, close the cover.

The data logging mechanism is designed to be robust and to endure power interruptions (and similar disruptive events) with minimum loss of data. In this situation, allow for your data to be possibly reduced by several seconds up to a maximum of five minutes. When possible, error messages are generated to identify problems as they arise. Refer also to the RXSTATUS log in the *OEMV Family Firmware Reference Manual.*

Card Choice

You have the flexibility of choosing the CF card with the storage capacity that is the most appropriate for your needs, based on the selected logging rate. This is discussed in greater detail in *Section 3.4, Using the DL-V3* starting on *Page 51*.

Take for example the case where you have to format and use a CF card (the DL-V3 comes with a 64 MB card but up to a 2 GB card is compatible):

✉ At least 1% of free space must be available on the CF card to open a log file. On a 64 MB disk, there is a 0.64 MB allowance for the file table.

Using CDU to Format the CF Card

1. Establish a physical communication connection between the DL-V3 and the PC/laptop. Either connect COM1 on the back of the DL-V3 to a DB-9serial port on the PC/laptop or connect the USB port on the front of the DL-V3 to a USB port on the PC/laptop.
2. Ensure the CF card is in its DL-V3 slot.
3. Launch **CDU** and open the DL-V3 configuration, refer to **CDU**'s on-line Help for details.
4. Select *DL Explorer* from the *Tools* menu in **CDU**. The *DL Explorer* window opens.
5. Click on the *CF Status* button in the *DL Explorer Window*:

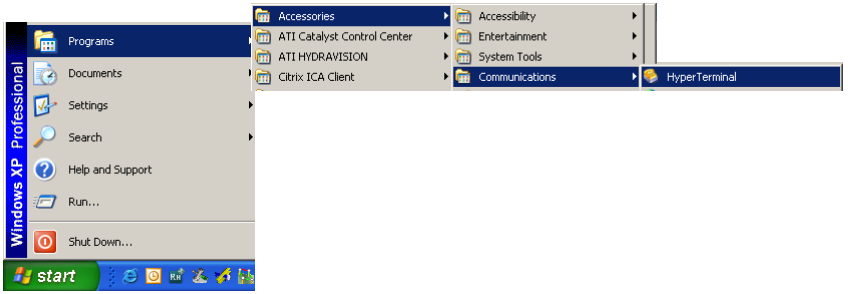
6. Click on the *Format* button to format the CF card for use with the DL-V3. The format sequence erases all data previously stored on the disk. This operation is not reversible and a warning message is also shown:

The *Format* process closes all log files first. If a file transfer is in progress, it is stopped and then the disk is formatted. The logs being logged to file are still present in the log list. The following command can be entered in **CDU**'s *Console* window to remove them:

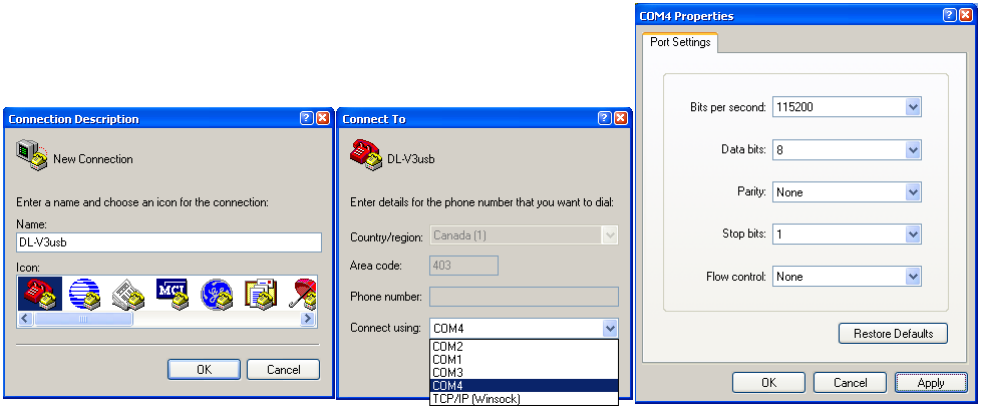
```
unlogall file
```

Using HyperTerminal to Format the CF Card

1. Establish a physical communication connection between the DL-V3 and the PC/laptop. Either connect COM1 on the back of the DL-V3 to a DB-9serial port on the PC/laptop or connect the USB port on the front of the DL-V3 to a USB port on the PC/laptop.
2. Use HyperTerminal to open a communication connection through the USB or COM port.



   a. Open the HyperTerminal program from the *Start* menu.



✉ 1. 9600 bps is the default bits per second rate. The example above shows 115200. To increase the connection rate, please connect the receiver using 9600 and then issue the COM command to a set a higher rate. Refer to the COM command in the *OEMV Family Firmware Reference Manual*.

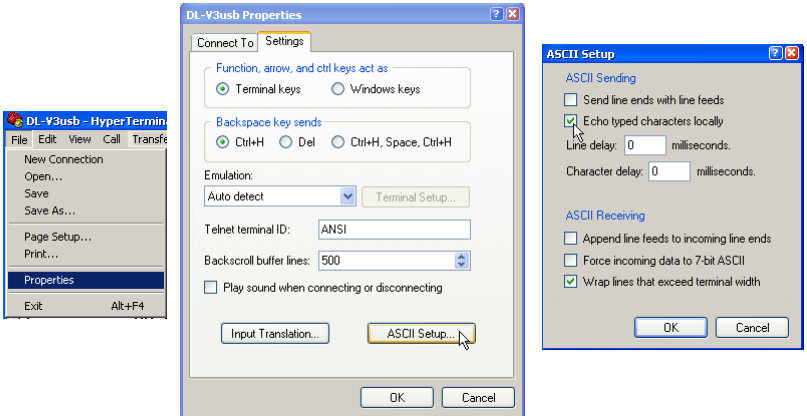
2. Baud rates higher than 115,200 bps are not supported by standard PC/laptop hardware. Special PC hardware may be required for higher rates, including 230400 bps, 460800 bps, and 921600 bps.

3. When connected using the USB port, the baud rate is ignored by the USB drivers and instead the baud rate is as fast as possible. The current highest baud rate is 230400.

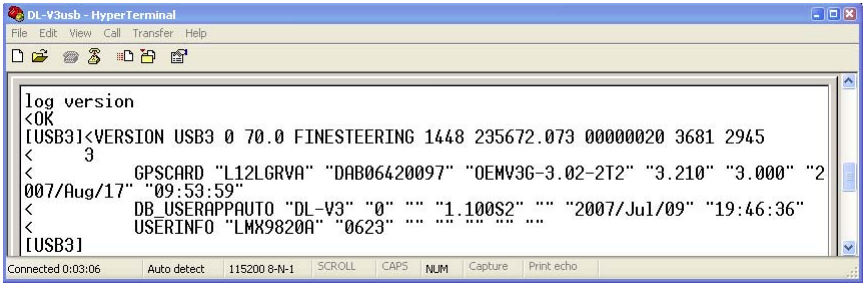
---

   b. Open the *Properties* dialog, select the *ASCII Setup* button in the *Settings* tab, check the *Echo typed characters locally* check box, select *OK* and then *OK* again to return to the main

HyperTerminal window. This enables you to view the characters you type.



3. Type in LOG VERSION and press the <Enter> key to ensure you have a two-way serial connection with the DL-V3. If you do, a VERSION output message appears. For example:



4. Ensure the CF card is in its DL-V3 slot.
5. Type in DISK FORMAT and press the <Enter> key.
6. Wait a minute and power off the DL-V3.
7. Power on the DL-V3 again and the CF card is ready to use.

Chapter 3 Operation

Before operating the receiver for the first time, please ensure that you have followed the installation instructions in *Chapter 2, Installation and Setup* starting on *Page 25*. The following instructions are based on a COM port configuration such as that shown in *Figure 17* on *Page 48*. It is assumed that a personal computer, or laptop, is used during initial operation and testing for greater ease and versatility.

3.1 Communications with the Receiver

Communication with the receiver typically consists of issuing commands through the communication ports from an external serial communications device. This could be either a terminal or an IBM-compatible PC/laptop that is directly connected to the receiver serial port using a null-modem cable. If you are using an RTK radio it connects to the receiver's COM port by means of the radio serial cable supplied with the receiver. It is recommended that you become thoroughly familiar with the commands and logs detailed in the *OEMV Firmware Reference Manual* to ensure maximum utilization of the receiver's capabilities.

3.1.1 Serial Port Default Settings

The receiver communicates with your PC/laptop or terminal via a serial port. For communication to occur, both the receiver and the operator interface have to be configured properly. The receiver's COM1, COM2 and COM3 default port settings are as follows:

- 9600 bps, no parity, 8 data bits, 1 stop bit, no handshaking, echo off

Changing the default settings requires using the *COM* command.

The data transfer rate you choose determines how fast information is transmitted. Take for example a log whose message byte count is 96. The default port settings allows 10 bits/byte (8 data bits + 1 stop bit + 1 framing bit). It therefore takes 960 bits per message. To get 10 messages per second then requires 9600 bps. Please also remember that even if you set the bps to 9600 the actual data transfer rate is lower and depends on the number of satellites being tracked, data filters in use, and idle time. It is therefore suggested that you leave yourself a margin when choosing a data rate (115200 is recommended for most applications).

CAUTION: Although the receiver can operate at data transfer rates as low as 300 bps, this is not desirable. For example, if several data logs are active (that is, a significant amount of information needs to be transmitted every second) but the bit rate is set too low, data will overflow the serial port buffers, cause an error condition in the receiver status and result in lost data.

3.1.2 Communicating Using a Remote Terminal

One method of communicating with the receiver is through a remote terminal. The receiver has been pre-wired to allow proper RS-232 interface with your data terminal. To communicate with the terminal the receiver only requires the RX, TX, and GND lines to be used. Handshaking is not required, although it can optionally be used. Ensure the terminal's communications set-up matches the receiver's RS-232 protocol. In the case of the DL-V3, *Bluetooth* and Ethernet are available.

3.1.3 Communicating Using a Personal Computer

An IBM-compatible PC/laptop can be set up to emulate a remote terminal as well as provide the added flexibility of creating multiple-command batch files and data logging storage files. Any standard communications software package that emulates a terminal can be used to establish bidirectional communications with the receiver, for example, HyperTerminal or our own graphic user interface (GUI) program, **CDU**. All data is sent as raw 8-bit binary or ASCII characters.

3.2 Getting Started

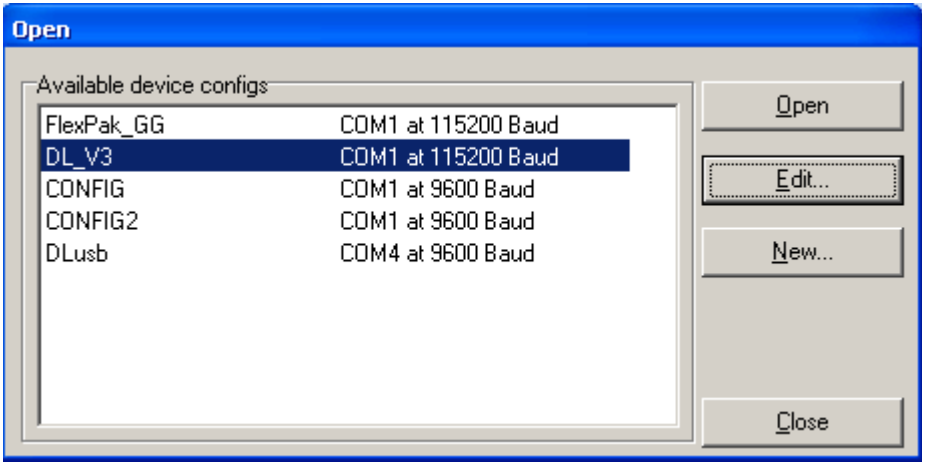
Included with your receiver are NovAtel's **CDU** and Convert programs. **CDU** is a windows-based GUI which allows you to access the receiver's many features without the need for communications protocol or to write special software. The Convert utility is a windows-based utility that allows you to convert between file formats, and strips unwanted records for data file compilation. See *the DL-V3 quick start guide or* installation.

3.2.1 Starting the Receiver

The receiver's software resides in flash memory. When first powered, it undergoes a complete self-test. If an error condition is detected during a self-test, the self-test status word changes. This self-test status word can be viewed in the header of any data output log. Refer to the chapter on *Messages* in the *OEMV Firmware Reference Manual* for header information. If a persistent error develops, please contact your local NovAtel dealer first. If the problem is still unresolved, please contact NovAtel directly through on of the methods listed in the *Customer Service* section at the beginning of this manual on *Page 20*.

3.2.2 Communicating with the Receiver Using CDU

Launch the **CDU** program and select *Device* | *Open* from its main menu. The *Open Configuration* window appears. The example below shows an *Open Configuration* window with two possible configurations already set up. Your configurations may be different or you may have none at all, in which case, the *Open Configuration* window is empty.



Refer to **CDU**'s Help file by selecting the *Help* | *Contents* menu. See also *Chapter 4, DL Explorer* starting on *Page 56* for details of **CDU**'s *DL Explorer* tool. Ensure you can see the *Console* and *ASCII Messages* windows by selecting them from the *View* menu.

When the receiver is first turned on, no data is transmitted from the COM ports except for the port prompt. The Console window displays a port name:

[COM1] *if connected to COM1 port,*

[COM2] *if connected to COM2 port,*

or

[COM3] *if connected to COM3 port*

Any of the above prompts indicate that the receiver is ready and waiting for command input. The screen may display other port names for other port types, for example USB1, USB2, USB3 or AUX.

✉ 1. You may also have to wait for output from receiver self tests. For example, on start-up, the OEMV family receiver is set to log the RXSTATUSEVENTA log ONNEW on all ports. Refer to the *OEMV Family Firmware Reference Manual* for more details.

2. If you find that **CDU** is unable to locate your OEMV family receiver, it may be that you have previously used the SAVECONFIG command. In this case, try using a different COM port to communicate to the receiver. Once communication has been established, issue a FRESET STANDARD command. You should now be able to use your original communication port again.

3. XCOM1, XCOM2 and XCOM3 virtual ports can be generated by the receiver. However they are unlikely to appear as a port prompt as you cannot connect to these types of ports using **CDU**. Also, they are not available with the COM command but may be used with other commands, such as INTERFACEMODE and LOG. Refer to the *OEMV Firmware Reference Manual* for the virtual ports available and details on the above mentioned logs.

Commands are typed at the interfacing computing device's keypad or keyboard, and executed after issuing a carriage return command which is usually the same as pressing the <Enter> key.

An example of a response to an input command is the FIX POSITION command. It can be as:

[COM2] fix position 51.11635 -114.0383 1048.2 *[carriage return]*

<OK

where [COM2] is the port prompt, followed by the command you enter from your keypad or keyboard and *[carriage return]* indicates that you should press the <Enter> key.

The above example illustrates command input to the base receiver's COM2 port which sets the position of the base station receiver for differential operation. Confirmation that the command was actually accepted is the appearance of <**OK**.

If a command is entered incorrectly, the receiver responds with:

<INVALID MESSAGE ID *(or a more detailed message)*

WARNING!: **Ensure the Control Panel's Power Settings on your PC/laptop are not set to go into Hibernate or Standby modes. Data will be lost if one of these modes occurs during a logging session.**

3.3 Transmitting and Receiving Corrections

Corrections can be transmitted from a base station to a rover station to improve position accuracy. The base station is the GNSS receiver which is acting as the stationary reference. It has a known position and transmits correction messages to the rover station. The rover station is the GNSS receiver which does not know its exact position and can be sent correction messages from a base station to calculate differential GNSS positions. An example of a differential setup is given in *Figure 17* on *Page 48.*

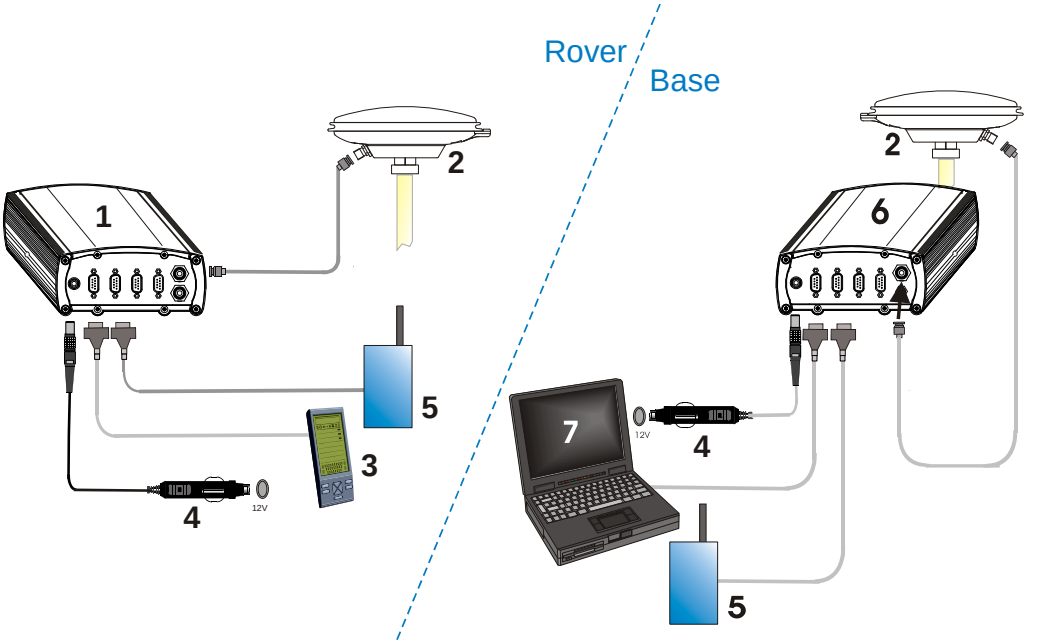


Figure 17: Basic Differential Setup

Reference	Description
1	A DL-V3 receiver for the rover station
2	NovAtel GNSS antenna
3	User-supplied data storage device to COM1
4	User-supplied power supply
5	User-supplied radio device to COM2
6	A DL-V3 receiver for the base station
7	User-supplied PC/laptop, for setting up and monitoring, to COM1

✉ See also *Appendix D, Ethernet Configuration* starting on *Page 178* for Ethernet and *Appendix E, Bluetooth Configuration* starting on *Page 195* for *Bluetooth* configuration options.

System biases can introduce errors, as described in the *Modes of Operation* chapter in the *OEMV Family Installation and Operation User Manual*. In most cases you need to provide a data link between the base station and rover station (two NovAtel receivers) in order to receive corrections. SBAS and L-band corrections can be accomplished with one receiver and are exceptions to the base/rover concept. Generally a link capable of data throughput at a rate of 9600 bits per second, and less than 4.0 s latency, is recommended.

Once your base and rover are set up, you can configure them as shown in the configuration examples that follow in *Sections 3.3.1 - 3.3.2* starting on *Page 50*.

3.3.1 Base Station Configuration

At the base station, enter the following commands:

interfacemode port rx_type tx_type *[responses]*

fix position latitude longitude height

log port message *[trigger [period]]*

For example:

RTCA

```
interfacemode com2 none rtca off
```

fix position 51.11358042 -114.04358013 1059.4105

log com2 rtcaobs ontime 1

log com2 rtcaref ontime 10

log com2 rtca1 ontime 5

log com2 rtcaephem ontime 10 1 *(optional)*

RTCM

```
interfacemode com2 none rtcm off
```

fix position 51.11358042 -114.04358013 1059.4105

log com2 rtcm3 ontime 10

log com2 rtcm22 ontime 10 1

log com2 rtcm1819 ontime 1

log com2 rtcm1 ontime 5

RTCMV3

```
interfacemode com2 none rtcmv3 off
```

fix position 51.11358042 -114.04358013 1059.4105

log com2 rtcm1006 ontime 10

log com2 rtcm1003 ontime 1

CMR+

```
interfacemode com2 none cmr off
```

fix position 51.11358042 -114.04358013 1059.4105

log com2 cmrobs ontime 1

log com2 cmrplus ontime 1 *(important to use ontime 1 with cmrplus)*

CMR

```
interfacemode com2 none cmr off
```

fix position 51.11358042 -114.04358013 1059.4105

log com2 cmrobs ontime 1

log com2 cmrref ontime 10

log com2 cmrdesc ontime 10 1

3.3.2 Rover Station Configuration

At the rover station, enter:

interfacemode port rx_type tx_type *[responses]*

For example:

RTCA `interfacemode com2 rtca none off`

RTCM `interfacemode com2 rtcm none off`

RTCMV3 `interfacemode com2 rtcmv3 none off`

CMR+ `interfacemode com2 cmr none off`

CMR `interfacemode com2 cmr none off` *(same as CMR+)*

3.3.3 Configuration Notes

For compatibility with other GNSS receivers, and to minimize message size, it is recommended that you use the standard form of RTCA, RTCM, RTCMV3 or CMR corrections as shown in the base and rover examples above. This requires using the INTERFACEMODE command to dedicate one direction of a serial port to only that message type. When the INTERFACEMODE command is used to change the mode from the default, NOVATEL, you can no longer use NovAtel format messages.

If you wish to mix NovAtel format messages and RTCA, RTCM, RTCMV3 or CMR messages on the same port, you can leave the INTERFACEMODE set to NOVATEL and log out variants of the standard correction messages with a NovAtel header. ASCII or binary variants can be requested by simply appending an "A" or "B" to the standard message name. For example on the base station:

interfacemode com2 novatel novatel

fix position 51.11358042 -114.04358013 1059.4105

log com2 rtcm1b ontime 2

✉ Using the receiver in this mode consumes more CPU bandwidth than using the native differential messages as shown in *Section 3.3.1, Base Station Configuration* on *Page 49*.

At the rover station you can leave the INTERFACEMODE default settings (interfacemode com2 novatel novatel). The rover receiver recognizes the default and uses the corrections it receives with a NovAtel header.

The PSRDIFFSOURCE and RTKSOURCE commands set the station ID values which identify the base stations from which to accept pseudorange or RTK corrections respectively. They are useful commands when the rover station is receiving corrections from multiple base stations. Refer to the *GNSS Reference Book* for more information on SBAS, available from our website at:

http://www.novatel.com/support/docupdates.htm

✉ All PSRDIFFSOURCE entries fall back to SBAS (even NONE) for backwards compatibility.

At the base station it is also possible to log out the contents of the standard corrections in a form that is easier to read or process. These larger variants have the correction fields broken out into standard types within the log, rather than compressed into bit fields. This can be useful if you wish to modify the format of the corrections for a non-standard application, or if you wish to look at the corrections for system debugging purposes. These variants have "DATA" as part of their names (for example, RTCADATA1, RTCMDATA1, CMRDATAOBS, and more). Refer also to the *OEMV Firmware Reference Manual*, which describes the various message formats in more detail.

✉ Information on how to send multiple commands and log requests using DOS or Windows, can be found on our website at http://www.novatel.com/support/knowledgedb.htm.

3.4 Using the DL-V3

A group is a set of logs for the receiver. The default software configuration for group information includes a group named *default*. A *powerup* group must be created to take advantage of the automatic logging functionality.

Upon acquisition of coarse time, if a group named *powerup* exists, the DL-V3 executes the group automatically.

The FRESET command allows you to reset the DL-V3 to its factory default settings. SITEDEF logs, refer to the *DL-V3 Firmware Reference Manual*, contain site record information. For example:

```
#SITEDEFA,COM1,0,61.0,FINESTEERING,1420,316947.028,00180020,e40c,2678;
0,"","DL-
V3ii",0,0.000000000,"",1420,1420,316890.000,316935.000,00000000,0*c56c1a5d
```

3.4.1 Log Data from a Site to a File

Consider the case of logging data at a site and appending filename and other information. The following steps apply to a base or rover site. For the base, you only need to log one file per session.

✉ 1. There is no need to continually start and stop logging if you are using post-processing software, where it is dealt with automatically.

2. Ensure your antenna is in the correct position at the base and rover.

To log a group and update the site information

1. Select the Group
2. Edit the Site
3. Start the Data Logging
4. Stop the Data Logging

1. Select the Group

The the DL-V3 captures sets of logs using log groups. You create a group in **CDU**'s *DL Explorer* and then upload the group to the DL-V3.

CDU is available from our website at: http:// www.novatel.com/support/fwswupdates.htm.

Launch **CDU** from the *Start* menu folder specified during the installation process. The default location is Start | Programs | NovAtel OEMV | CDU. Launch **CDU** and open, or create, a DL-V3 configuration, refer to your *DL-V3 Quick Start Guide*. Select *DL Explorer* in the *Tools* menu and then select the *Edit DL Groups...* button. Within the *DL Groups* dialog, you can change a log group name by clicking on it and editing it directly. In the *Logs* tab, select the log to add from the *Name* drop-down list. Select the log format using the *Format* drop-down list (ASCII or Binary). Select the trigger for the log using the *Trigger* drop-down list. If you choose the On Time trigger, select the period for logging using the *Period* drop-down list or type it in. Select *OK* to add the new log to the log group. To log to file, select *File* from the *Port* drop-down list.

2. Edit the Site

In the *DL Explorer* dialog, select a group name from the left panel and select the *Site* tab. Check the *Automatically Log Site on Startup* and the *Include Site Information* checkboxes. Then enter a site name or number, and the height of the antenna 'lip' from the site you are measuring.

✉ Place the tape measure from the lip to where the tip of the antenna pole touches the ground (do not measure straight down). The slant from the edge of the antenna is different than when the measurement is straight down.

Add 33 mm to the measured reading. This makes up for the distance of the antenna element to the lip on NovAtel 700-series antennas.

Click *OK* for your input to take effect and return you to the main DL Explorer window.

You can now log a site and the site information is written to the log file.

3. Start the Data Logging

Once a log group has been created, it can be uploaded to the DL-V3. The steps below provide details on uploading a group.

In the DL Explorer window, select the *Group Management* button. 

Select the group to upload to the DL-V3 from the list of groups in the *CDU* panel of the dialog.

Select the *UpLoad* button to copy the group.

Select a group in the *DL Groups* panel and press *Start* on the dialog's right to start logging to your CF card or COM port.

✉ A red cross beside a log group name indicates the group is not active in the DL-V3. A green check mark indicates the group is active in the DL-V3.

Up to 5 log groups can be stored in the DL-V3 at any one time.

4. Stop the Data Logging

In the *Group Management* dialog, click on the *Stop* button to stop logging data. Once the data logging has stopped, it is no longer writing to the card. While you move the antenna, the receiver is still functioning but it is not logging data. To start a new site at a new location, repeat steps #1 to #4. Information is appended to the CF card file.

3.5 Enabling SBAS Positioning

All OEMV family receivers are capable of SBAS positioning. This positioning mode is enabled using the `SBASCONTROL` command. On a simulator, you may want to leave the *testmode* parameter off or specify NONE explicitly. The following commands are typically used to enable WAAS and other SBAS modes, for example EGNOS, respectively:

SBASCONTROL enable waas

SBASCONTROL enable egnos

Refer to the *GNSS Reference Book* for more information on SBAS, available from our website at:

http://www.novatel.com/support/docupdates.htm

3.6 Enabling L-band (OEMV-1, OEMV-3, DL-V3 & ProPak-V3)

L-band equipped receivers allow you to achieve sub-meter accuracy. In order to use this positioning mode, you must enable L-band tracking to the Canada-Wide Differential Global Positioning System (CDGPS) or OmniSTAR signal. A subscription to OmniSTAR is required to use the OmniSTAR service. The CDGPS signal is free and available without subscription. Refer to the *GNSS Reference Book* for more information on L-band, available from our website at:

http://www.novatel.com/support/docupdates.htm.

To obtain an OmniSTAR subscription, contact OmniSTAR at 1-800-338-9178 or 713-785-5850. If you contact OmniSTAR, you will be asked to provide the receiver's OmniSTAR serial number (which is different from the NovAtel serial number). To obtain the OmniSTAR serial number, enter the following command in a terminal window or the Console window in **CDU**:

log lbandinfo

The log that is generated displays the L-band serial number in the fifth field following the log header. It is a six digit number in the range `700000` to `799999`. This log also provides the status of your subscription. Refer to the LBANDINFO command for more information.

In order to activate an OmniSTAR subscription, the receiver must be powered and tracking an L-band satellite. When advised by OmniSTAR of the appropriate satellite frequency and data link rate for your location, use the `ASSIGNLBAND` command to configure your receiver. The CDGPS frequencies can also be used with the `ASSIGNLBAND` command. Below are examples for using either CDGPS or OmniSTAR:

assignlband cdgps 1547547 4800

assignlband omnistar 1536782 1200

✉ 1. In addition to a NovAtel receiver with L-band capability, a subscription to the OmniSTAR, or use of the free CDGPS, service is required. Contact NovAtel for details.

OmniSTAR website: http://www.omnistar.com/

CDGPS website: http://www.cdgps.com/

2. The frequency assignment can be made in Hz or kHz. For example:

Hz: assignlband omnistar 1536782000 1200

kHz: assignlband omnistar 1536782 1200

A value entered in Hz is rounded to the nearest 500 Hz.

To confirm you are tracking an L-band signal, log the L-band status information by entering the following command:

log lbandstat

For example, if you are receiving CDGPS, the fifth field after the header should be 00c2:

lbandstat com1 0 43.5 finesteering 1295 149951.671 00000000 976f 34461

<1547546977 46.18 4541.0 0.00 **00c2** 00f0 0 0 0 8070 0001 0 0 0

Please refer to the LBANDSTAT command in the *OEMV Family Firmware Reference Manual* for details.

3.7 Pass-Through Logging

The pass-through logging feature enables the GNSS receiver to redirect any ASCII or binary data that is input at a specified COM port or, if available, USB port to any specified receiver COM or USB port. This capability, in conjunction with the SEND command, can allow the receiver to perform bi-directional communications with other devices such as a modem, terminal, or another receiver.

There are several pass-through logs. **PASSCOM1**, **PASSCOM2, PASSCOM3, PASSXCOM1,**

PASSXCOM2, PASSXCOM3, PASSUSB1, **PASSUSB2**, **PASSUSB3** and **PASSAUX** are available on OEMV family receivers for logging through serial ports. The AUX port is available on OEMV-3-based products. Refer to the PASSCOMx log for details.

3.8 T Sync Option

The *T Sync Option* section of the *OEMV Installation and Operation User Manual* describes the relationship constraints of the input signal phase when the Time Synchronization Modification (T Sync Mod) option has been added to an OEMV-3-based product (this includes DL-V3).

When an external oscillator is connected, T Sync pulses are sent through hardware on the receiver card and cannot be disabled. You must issue a time-synchronization-enabling command (refer to ADJUST1PPS TIME in the *OEMV Family Firmware Reference Manual*) for the receiver to track properly.

Chapter 4 DL Explorer

DL Explorer is a powerful program which allows you to edit log groups, upload these groups to a DL-V3 and download data from the CF card to your PC/laptop. *DL Explorer* is easy to use and learn, while still providing a wide range of features and flexibility.

4.1 Basic Operations

4.1.1 Starting DL Explorer

DL Explorer is under the *Tools* menu in **CDU**. If you accepted the default installation path, **CDU** can start from the Windows *Start* menu, by selecting Programs | NovAtel OEMV | CDU. Otherwise, select the path where you installed **CDU**.

Launch **CDU** and open, or create, a DL-V3 configuration. Refer to the *Establishing Receiver Communication* section of your *DL-V3 Quick Start Guide* that was included with your receiver. Refer also to **CDU**'s *Help* menu.

Select *DL Explorer* in the *Tools* menu to see the *DL Explorer* main window as shown in *Figure 18, DL Explorer Main Window* on *Page 56*.

✉ Baud rates higher than 115,200 bps are not supported by standard PC/laptop hardware. Special PC hardware may be required for higher rates, including 230400 bps, 460800 bps, and 921600 bps.

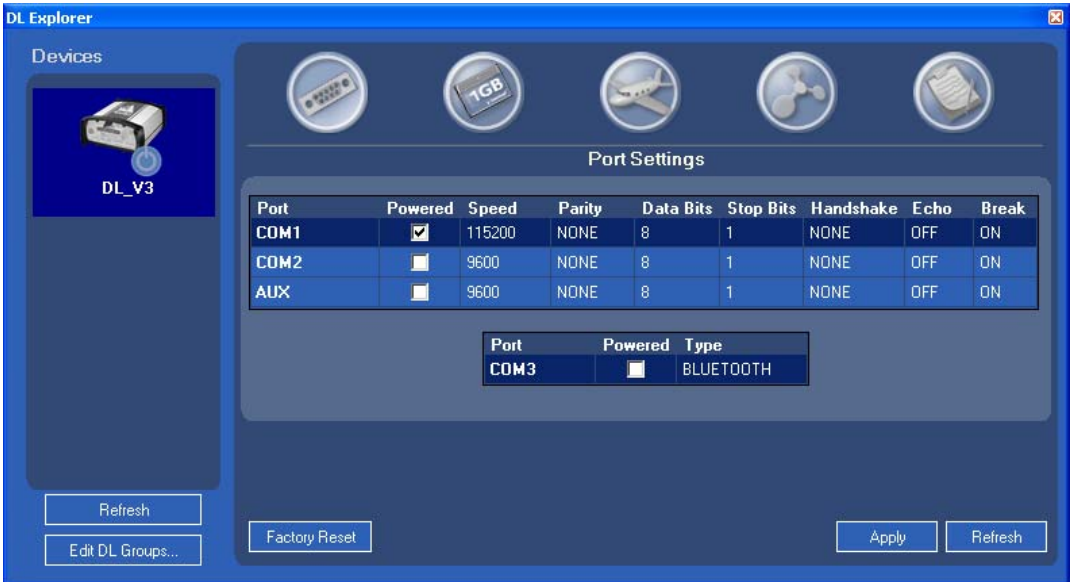


Figure 18: DL Explorer Main Window

4.1.2 Exiting DL Explorer

To exit *DL Explorer*, click the button in the upper right-hand corner of the main window or press <Alt> + <F4> on your keyboard.

4.2 Receiver Operations

DL Explorer can communicate with the DL-V3 to establish data collection groups.

The DL-V3 can collect several types of data. A group is a profile that tells the receiver what type of data to collect, at what rate the data should be collected and where the data should be stored (for example, to the CF card). Use the POWERUP group for automatic data collection on start-up.

4.2.1 Receiver Groups

To start logging data, you must create a group profile and transfer it to the DL-V3. When configuring your group profile, you can define the group settings to determine the type of information the DL-V3 collects. These group profiles consist of the log type, the data destination, the trigger, period and a description for each log within the group.

To edit a group, click on the *Edit DL Groups...* button: Edit DL Groups...

The *DL Groups* dialog appears. An example is shown in *Figure 19, DL Groups Dialog* on *Page 57*.

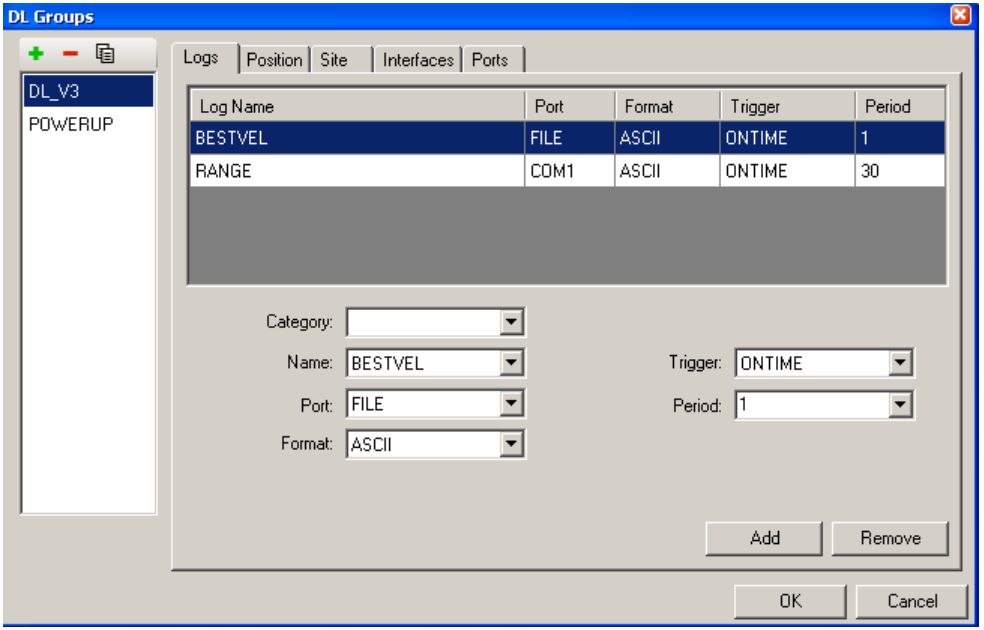


Figure 19: DL Groups Dialog

The *DL Groups* panel, to the left of the dialog, displays the names of the current groups including

groups you defined, and the preset POWERUP group provided by *DL Explorer*. The POWERUP group can be modified from the software, see *Section , Preset POWERUP Group*, on *Page 60*.

Edit a group name by clicking on it directly in the left side panel. Add a new group using the button, remove a group using the button or duplicate a group using the button.

Group names are converted to all uppercase lettering.

The default group name (other than the preset POWERUP group name) is GROUPX where X is the next possible number to make the name unique in the *DL Groups* dialog (for example, GROUP1). The group name can be changed but must be unique. Group names can be up to eight characters long but the first character of the name cannot be a number.

A receiver group consists of information in five tabs:

• Logs	See the *Logs Tab* section on *Page 58*
• Position	See the *Position Tab* section on *Page 60*
• Site	See the *Site Tab* section on *Page 61*
• Interface	See the *Interfaces Tab* section on *Page 63*
• COM Port	See the *Ports Tab* section on *Page 64*

Click the *OK* button to save your changes or the *Cancel* button to discard your changes and return to the main *DL Explorer* window.

Logs Tab

To add a log to a group, select the *Logs* tab.

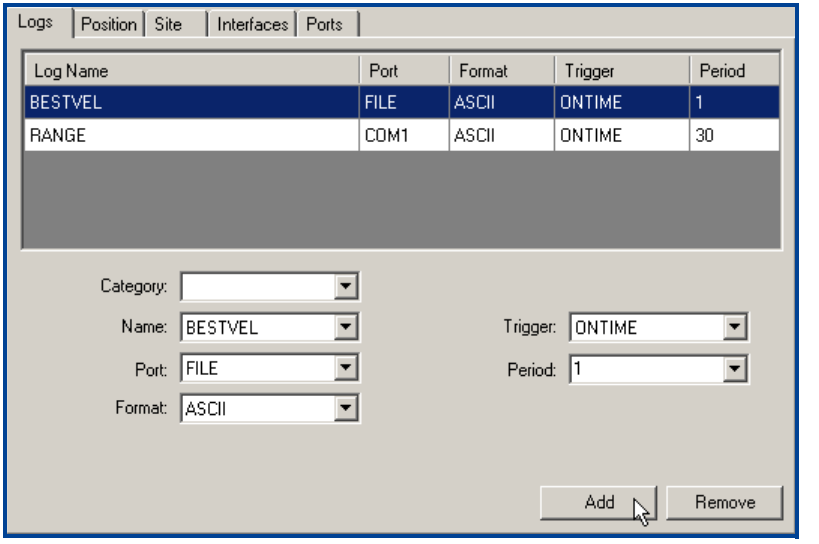


Figure 20: Add Log

Select a log from the *Name* drop down box.

Select a destination from the *Port* list:

• COM1, COM2, COM3	Send this log through a receiver COM port
• AUX	Send this log through a receiver AUX port
• USB1, USB2, USB3	Send this log through a receiver USB port
• FILE	Save this log to the receiver's CF card
• NO_PORTS	No port specified
• THISPORT	Current COM port

If the group is intended for use in a stand-alone mode of operation, choose FILE to save the logs to the DL-V3's internal CF card. You can save ASCII or binary format logs to the FILE destination.

Choose a log output format from the *Format* list, ASCII or binary.

The trigger and period settings can be edited by using the fields in the *Trigger* and *Period* sections of the *Logs* tab.

A log's trigger and period information is what determines when and how often the DL-V3 receiver collects that log's information. For example, if the trigger and period for the compressed range measurements log (RANGECMP) is set to OnTime 2, the receiver logs compressed range measurements every two seconds. For 2 Hz (twice per second), use an OnTime 0.5 trigger.

To edit trigger information for a particular log, first select a trigger from the *Trigger* drop down box.

The *Period* drop down box appears dim unless *OnTime* is selected as the trigger. In this case, you can edit the number of seconds directly or choose a time period from the *Period* drop down box. *Table 10* explains your choices.

Table 10: Log Triggers

Trigger	Description
ontime	You specify when the receiver should collect the information. For example, if you specify On Time 5, the information is collected every 5 seconds.
onchanged	Output only if the message changes. For example, if you select the almanac log (RAWALMB), you can choose the On Changed option so when a log group is run, the receiver collects almanac information once and not again unless the almanac information changes.
once	Output only the current message.
onnew	Output when the message is updated (not necessarily changed).
onnext	Output only the next message.

Click on the Add button to add the log details to the group. Continue to add logs until your group contains the logs you want. To remove a log from the group, select the log in the *Logs* table, and click on the *Remove* button.

To edit a log in a receiver group, select it, change the settings and click on the *Add* button again. The log appears twice in the table. Select the log with the old settings and click on the *Remove* button.

Click the *OK* button to save your changes or the *Cancel* button to discard your changes. The logs you have selected are displayed along with their descriptions, default destination and interval settings.

Preset POWERUP Group

Your *DL Explorer* software is set up with a preset receiver group. Below is an outline of the POWERUP group. The group name, the logs within the group and the interval options are displayed (see details on editing trigger and interval information on *Page 59*).

Use this group when you are working with a receiver that is an RTK base and you want to post-process the data. You might also use this group for automatic data collection on the receiver.

Type of Information	Description
almanacb onchanged	current almanac
ionutcb onchanged	ionospheric and UTC clock parameters
rangecmpb ontime 10.0	compressed channel range measurements
rawephemb onchanged	raw ephemeris
rtcaobs ontime 1.0	base station GPS data output every second
rtcaref ontime 10.0	base station position output every 10 seconds

The first four types of information (almanac, ionutc, rangecmp and rawephem) are typically used for post processing and are logged to the CF card. The last two (rtcaobs and rtcaref) are typically used for an RTK base station and are transmitted from COM2.

Position Tab

The second tab in the *DL Groups* dialog is the *Position* tab, see *Figure 21* on *Page 61*. Click in one of the radio buttons that give you the option of having no position information, known fixed position information (a static point) or single-point averaging information.

If you choose *No Position Information* then the Position tab's *Known Position* and *Position Average* edit boxes appear dim. If you choose *Fixed Known Position* then you **must** enter position information (latitude, longitude and ellipsoidal height) in the *Known Position* fields.

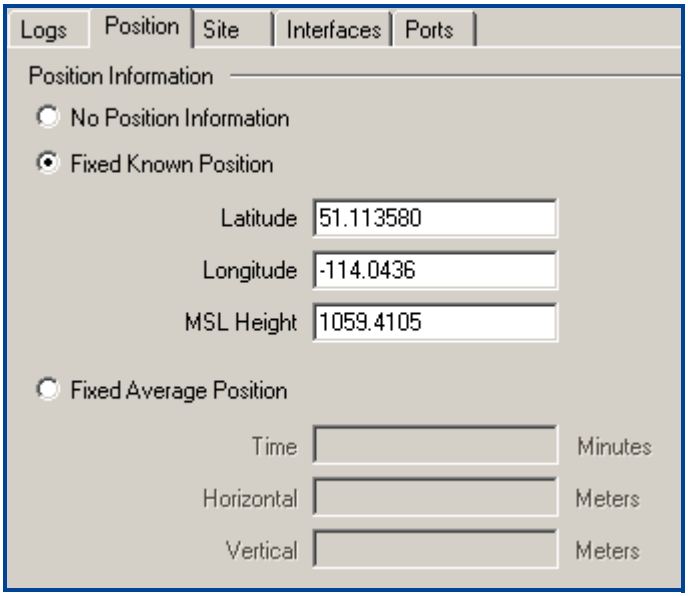


Figure 21: Position Tab

For the *Fixed Averaged Position* option, the *Position Average* fields become editable so you can enter the criteria by which you would like the position averaging to stop.

Position averaging stops either before a certain time period in minutes (a maximum of 60 and a minimum of 1.5 minutes), if the standard deviation for the horizontal axis (in meters) has been met, or, for example, if the standard deviation for the vertical axis (in meters) has been met. The typical standard deviation range is from 10 cm (3.9") to 5 m (16.4'). The position is fixed to the position averaged at that site.

Site Tab

The *Site* tab is the third tab available in the *DL Groups* dialog, see *Figure 22* on *Page 62*. It enables you to control whether site information is specified for sites automatically logged on startup.

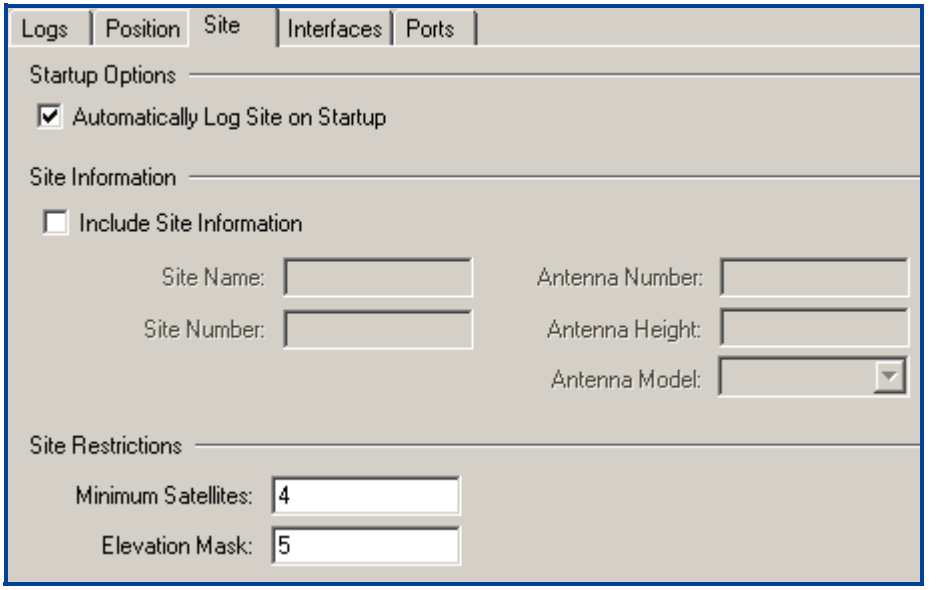


Figure 22: Site Tab

If you check the *Automatically Log Site on Startup* check box, the group mode is set to static, a SITE ENTER command, see *Page 135*, is executed on startup, and the site is configured with parameters from the *Site Information* panel (if the *Include Site Information* check box is also selected), or with a default site name. If the *Automatically Log Site on Startup* check box is not checked, the group mode is set to kinematic.

Static — A method of GNSS data collection that involves simultaneous observations between stationary receivers. Post-processing computes the vector between sites.

Kinematic — Your GNSS antenna is moving. Kinematic data collection requires only short periods of data observations. Operational constraints include starting from, or determining, a known baseline and tracking a minimum of four satellites. One receiver is statically located at a control site, while others are moved between sites to be measured.

If do you wish to enter specific site information and have the information included in the group definition, check the *Include Site Information* check box. The editable fields are:

- Antenna Model — Enter the model number for your antenna.
- Antenna Height — Enter the vertical antenna height above ground.
- Antenna Number — Enter your antenna's serial number.
- Site Number — Enter a number for this site.
- Site Name — Enter a site name.

If the *Site Name* field is left blank, the log file name is used as the site name.

The group definition issued during the group upload includes the GROUPANTHEIGHT, GROUPANTSN, GROUPANTTYPE, GROUPSITENAME, and GROUPSITENUMBER. See *Pages*

97, *98*, *99*, *116*, and *117* respectively for further details on these commands.

You may need to edit the following fields from their default values depending on your application:

Minimum Satellites	Select a number from 1 to 9 for the minimum number of satellites, where the default is 4.
Elevation Mask	Choose an integer value for the elevation mask angle between 0 and 90 degrees, where the default is 0.

Interfaces Tab

The *Interfaces* tab, in the *DL Groups* dialog, is shown in *Figure 23*:

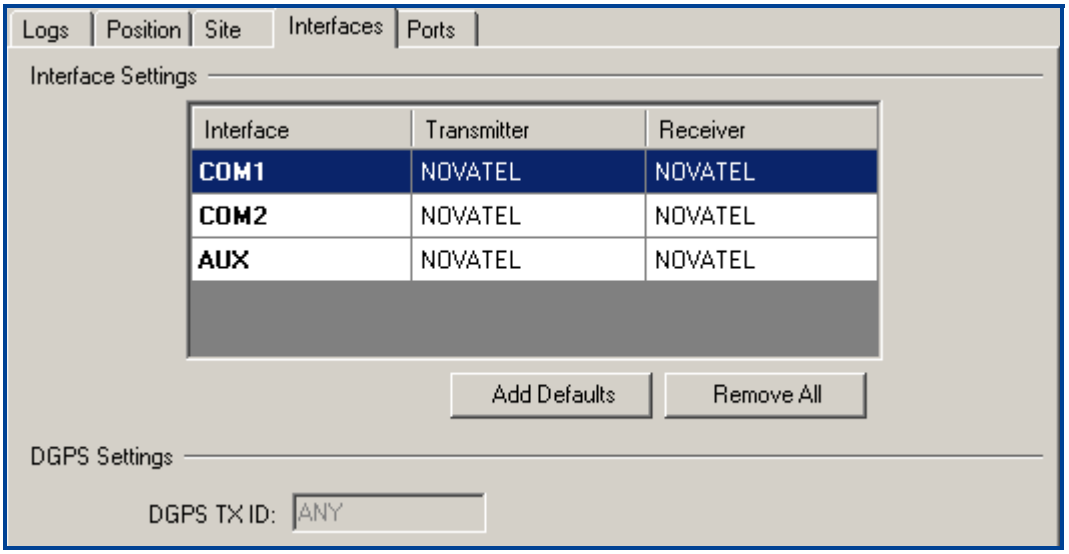


Figure 23: Interfaces Tab

This tab allows you to specify what type of data a particular port on the DL-V3 can transmit and receive. Click directly in any of the cells and a drop down box of choices is available The receive type (*Receiver*) tells the receiver what type of data to accept on the specified port. The transmit type (*Transmitter*) tells the receiver what kind of data it can generate. For example, you would set the receive type on a port to RTCA in order to accept RTCA differential corrections.

The *Ports* and *Interfaces* tabs are originally blank when the user creates a group (in case you don't want to alter the receiver ports and interface configurations when you start logging a group). Otherwise the DL-V3 might drop the connection with **CDU** when the settings are changed.

Click on the *Add Defaults* button to add the default values for interfaces. To remove the values (for example, so as not to interfere with **CDU**), click on the *Remove All* button.

You can set the base station ID, when it is transmitting corrections, in the *DGPS TX ID* field. The following range values should be used when you are entering a base ID:

RTCA ID: any four character string containing only alpha (a through z) or numerical (0 - 9) characters

0 ≤ RTCM ID ≤ 1023

0 ≤ CMR ID ≤ 31

The default entry for the *DGPS Tx Id* field is ANY. The ANY option forces the message to revert to its default base ID. The ANY defaults are:

RTCM 0

RTCA AAAA

CMR 0

It is also possible to disable or enable the generation or transmission of command responses for a particular port. Disabling of responses is important for applications where data is required in a specific form and the introduction of extra bytes may cause problems, for example RTCA, RTCM or CMR. Disabling a port prompt is also useful when the port is connected to a modem or other device that responds with data the receiver does not recognize.

When NONE is chosen, the specified port is disabled from interpreting any input or output data. Therefore, no commands or differential corrections are decoded by the specified port.

Ports Tab

The last tab in the *DL Groups* dialog is the *Ports* tab as seen in *Figure 24* on *Page 64:*

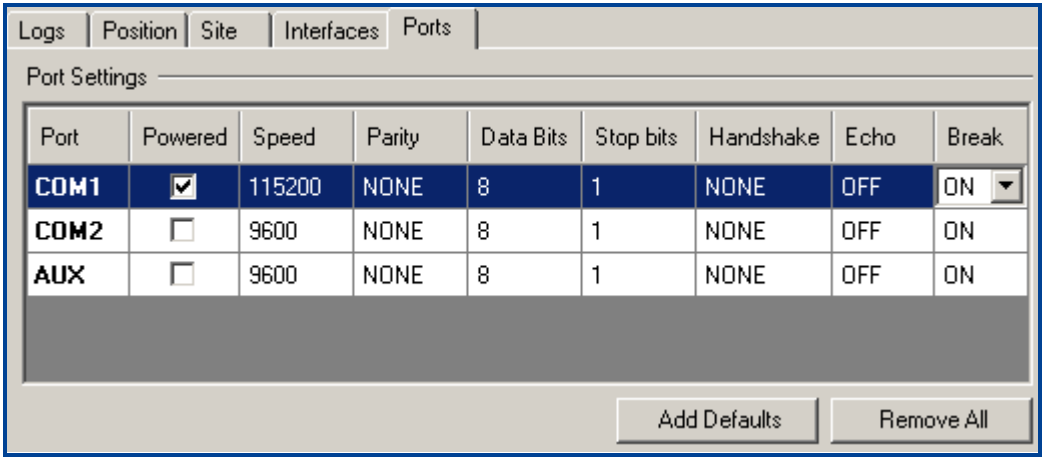


Figure 24: Ports Tab

This tab allows you to specify the setting for each COM port and the AUX port. The defaults for the POWERUP group are shown in *Figure 24, Ports Tab* on *Page 64*. You can also turn on/off ports by checking (on) or unchecking (off) their check boxes in the *Powered* column.

The *Ports* and *Interfaces* tabs are originally blank when the user creates a group (in case you don't want to alter the receiver ports and interface configurations when you start logging a group). Otherwise the DL-V3 might drop the connection with **CDU** when the settings are changed.

Click on the *Add Defaults* button to add the default port values. To remove the values (for example, so as not to interfere with **CDU**), click on the *Remove All* button.

4.3 DL Explorer Receiver Communications

You can use the *DL Explorer* utility to manage and transfer files or groups between the CF card in the DL-V3 and your PC/laptop.

4.3.1 Communication Parameters

Click on the *Port Settings* button,  in the main *DL Explorer* window, to view the current communication parameters:

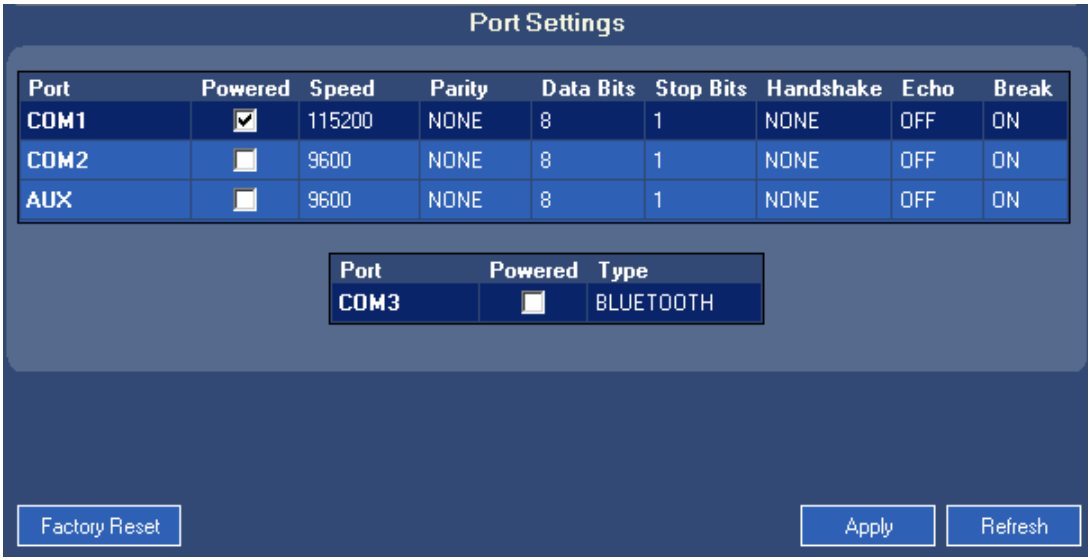


Figure 25: COM Parameters

WARNING!: **CDU is already connected to the receiver. If you change these settings, CDU will lose its connection.**

✉ 1. When connected using the USB port, the baud rate is ignored by the USB drivers and instead the baud rate is as fast as possible.

2. The current highest baud rate shown in *DL Explorer* is 230400.

4.3.2 Upload Group from the PC/Laptop to the Receiver

Click on the  button in the main *DL Explorer* window and the *Group Management* dialog appears, see *Figure 26*.

Figure 26: Group Management

The *Group Management* dialog displays the current default group table on the PC/laptop in the *CDU Groups* panel on the left. The groups stored on the connected receiver are in the *DL Groups* panel on the right. If the receiver is not connected, or if there are no groups loaded onto the DL-V3, the *DL Groups* panel is empty.

Up to five groups at a time can be selected for upload from your PC/laptop to the receiver. To upload a group, highlight it in the *CDU Groups* panel.

Select the *UpLoad* button to copy the group.

Select a log group in the *DL Groups* panel and click on the *Start* button to start logging to the CF card. The *Starting Groups* dialog appears, see *Figure 27* on *Page 67*. Specify the default port to use and a name for the log file. If you leave the *Log Filename* field empty, a sequential filename is created. If the *Port* field for the group is set to NO_PORTS in the *Logs* tab of the *DL Groups* dialog, see *Logs Tab* on *Page 58-59*, the *Start* process uses the port you select in the *Starting Groups* dialog. Otherwise, logs using a specific port are not affected by an entry in the *Default Port* field.

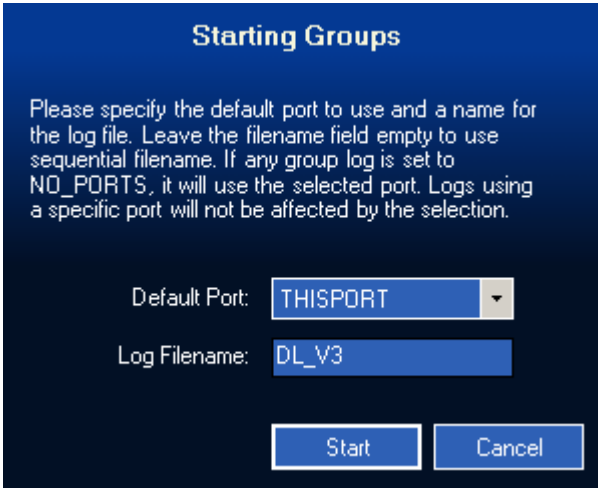


Figure 27: Starting Groups

The *Stop* button in the Group Management dialog becomes active while the DL-V3 is logging the data. Click on the *Stop* button to stop the DL-V3 from logging the chosen log group. Only one log group may be started at a time.

✉ A red cross beside a log group name indicates the group is not active in the DL-V3. A green check mark indicates the group is active in the DL-V3.

When there are groups in the *DL Groups* panel, you can also download them to **CDU**. To download groups to **CDU**, highlight them in the *DL Groups* panel and click on the *Download* button. The groups are downloaded to **CDU** and may then be seen in the *CDU Groups* panel.

To refresh the data displayed in the *DL Groups* panel, click on the *Refresh* button. Delete groups from the DL-V3 by first highlighting them and then clicking on the *Delete* button. To delete all the groups on the DL-V3, click on the *Delete All* button. There is no need to highlight any groups in the *DL Groups* panel in this case.

✉ Files are stored on the CF card but groups are stored in the DL-V3's NVM.

4.3.3 Transfer a File from the DL-V3 to the PC/Laptop

Ensure that your PC/laptop and DL-V3 are communicating, see *Section 4.3.1, Communication Parameters* on *Page 65*.

Click on the  button in the main *DL Explorer* window and the *Logs Transfer* dialog appears, see *Figure 26*.

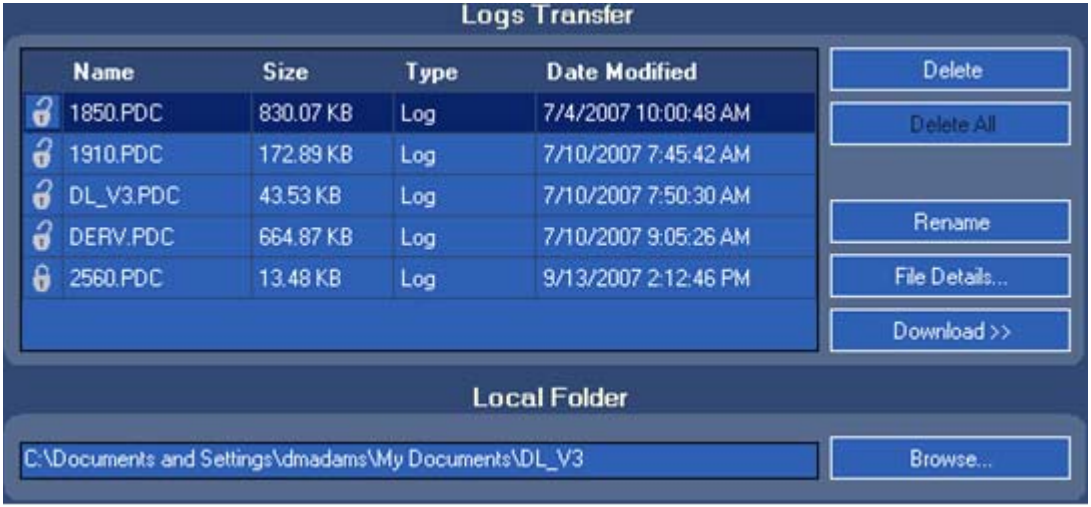


Figure 28: Log Transfer Dialog

The *Logs Transfer* dialog displays the files stored on the connected receiver. To check the details on a file, click on the *File Details* button. A *File Details* information window pops up, see *Figure 29* on *Page 69*. Once you have reviewed the file details, click on the *OK* button to return you to the *Logs Transfer* dialog.

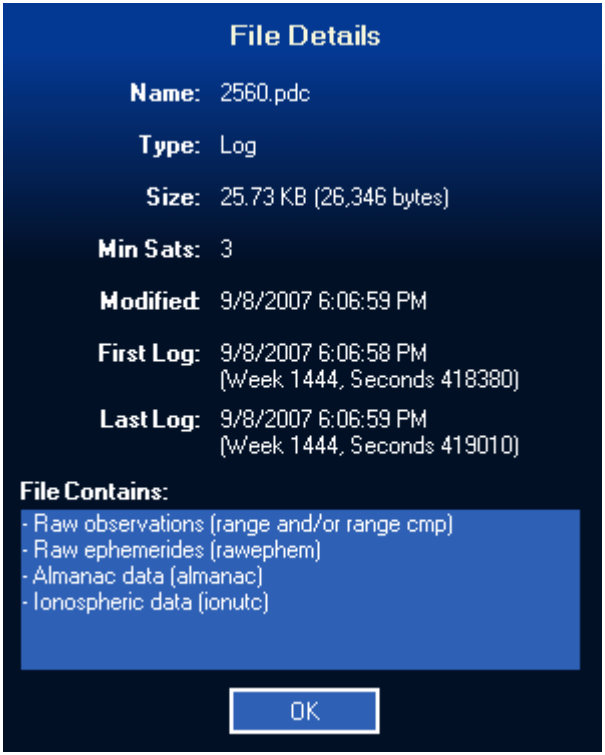


Figure 29: File Details

To transfer a file from the CF card to your PC/laptop, first edit the destination in the *Local Folder* field at the bottom of the *Logs Transfer* dialog using the *Browse...* button. Then select a file by highlighting it in the *Logs Transfer* panel. You can select one or multiple files at a time. Click on the *Download* button. A progress window pops up until the file is downloaded, see *Figure 30* below.

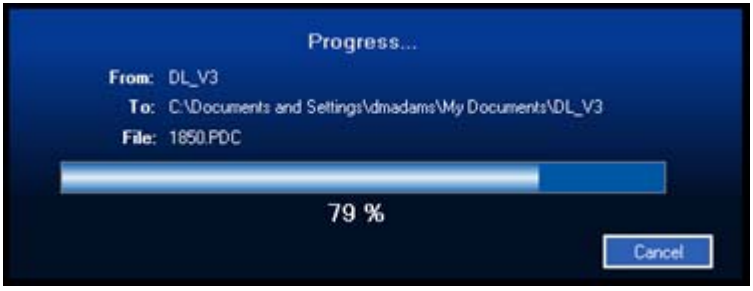


Figure 30: Download Progress Bar

The selected files are transferred to your PC/laptop.

If, when you try to transfer a file to the PC/laptop, a filename already exists in the directory on the PC/laptop, you are prompted with the dialog *File Already Exists*. This dialog enables you to reply with the following options:

<Overwrite> .....this option enables you to replace the current file on the PC/laptop with the new file from the receiver

<Rename>.....this options enables you to give a different name to the file that you are transferring to the PC/laptop

<Cancel>.....this option cancels the file transfer to the PC/laptop

To refresh the files on your CF card, click on the *Refresh* button. To delete a file from the CF card, select it and click on the *Delete* button. To delete all the files on the CF card, click on the *Delete All* button. There is no need to highlight any files in this case.

4.3.4 Flight Recorder

The DL-V3 can record the receiver's hardware status and satellite tracking data. The *Flight Recorder* is not on by default. You must request it.

To request a flight record, click on the  button in the main *DL Explorer* window. The Flight Recorder dialog appears, see *Figure 31* below.

Figure 31: Flight Recorder: OFF

Click in the Report HW and/or the Report Tracking check boxes in the Reporting Options section (at least one option should be selected before recording) of the Flight Recorder dialog. Click on the *Start* button to start recording. The *Start* button appears dim while flight recording is in progress, see *Figure 32* below.

Figure 32: Flight Recorder: ON

The debuglog.bin file stores the results of your recording. Click on the  button in the *DL Explorer* window to see it.

Click on the  button in the *DL Explorer* window. Then click on the Stop button to stop the recording.

✉ 1. If you quit CDU, flight recording continues until you click on the Stop button in CDU's Flight Recorder window.

2. You can download the debuglog.bin file after you stop the flight recorder.

4.3.5 CF Card Status

To find out the status of the CF card, click on the  button in the main *DL Explorer* window. The *CF Card Status* window appears as shown in *Figure 33, CF Card Status* on *Page 71*:

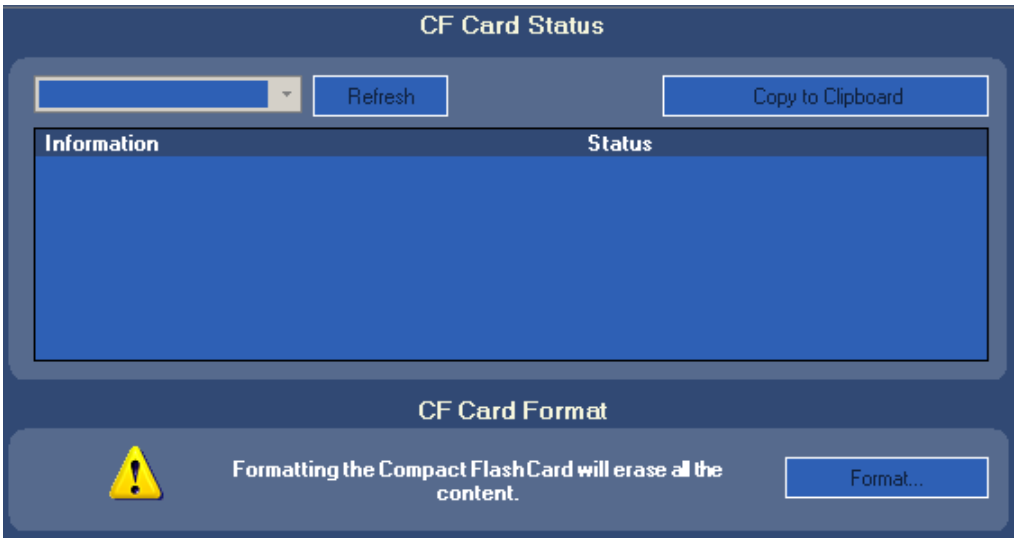


Figure 33: CF Card Status

Click on the *Format* button to format the CF card for use with the DL-V3. The format sequence erases all data previously stored on the disk. This operation is not reversible and a warning message is also shown.

The *Format* process closes all log files first. If a file transfer is in progress, it is stopped and then the disk is formatted. The logs being logged to file are still present in the log list. The following command can be entered in **CDU**'s *Console* window to remove them: `unlogall file`.

Appendix A Technical Specifications

A.1 OEMV Family Receiver Performance

PERFORMANCE *(Subject To GPS System Characteristics)*		
Position Accuracy [a]	Standalone:	
	L1 only	1.8 m RMS
	L1/L2	1.5 m RMS
	SBAS [b]	0.6 m RMS
	DGPS	0.45 m RMS
	RT-20	0.20 m RMS
	RT-2	0.01 m + 1 ppm RMS
	CDGPS [b]	0.6 m RMS
	OmniSTAR:	
	VBS	0.7 m RMS (OEMV-1 and OEMV-3 only)
	XP	0.15 m RMS (OEMV-3 only)
	HP	0.10 m RMS (OEMV-3 only)
	Post Processed	5 mm + 1 ppm RMS
Time To First Fix	Hot: 30 s (Almanac and recent ephemeris saved and approximate position) Warm: 40 s (Almanac, approximate position and time, no recent ephemeris) Cold: 50 s (No almanac or ephemeris and no approximate position or time)	
Reacquisition	0.5 s L1 (typical) 1.0 s L2 (typical) (OEMV-2 and OEMV-3 only)	
Data Rates	Raw Measurements:	20 Hz
	Computed Position:	20 Hz
	OmniSTAR HP Position:	20 Hz (OEMV-3 only)
Time Accuracy [a c]	20 ns RMS	
Velocity Accuracy	0.03 m/s RMS	
Measurement Precision	C/A code phase	6 cm RMS
	L1 carrier phase:	
	Differential	0.75 mm RMS
	L2 P code	25 cm RMS (OEMV-2 and OEMV-3 only)
	L2 carrier phase:	
	Differential	2 mm RMS (OEMV-2 and OEMV-3 only)
Dynamics	Velocity	515 m/s [d]
	Height	18,288 m [d]

a. Typical values. Performance specifications are subject to GPS system characteristics, U.S. DOD operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length and multipath effects.
b. GPS-only
c. Time accuracy does not include biases due to RF or antenna delay.
d. In accordance with export licensing.

A.2 DL-V3 Specifications

INPUT/OUTPUT CONNECTORS	
Antenna Input	TNC female jack, 50 Ω nominal impedance +4.75 to +5.10 V DC, 100 mA max (output from DL-V3 to antenna/LNA)
PWR	4-pin LEMO connector +9 to +28 V DC at 3.5 W (typical while logging) [a] In-rush power consumption: 8 A for less than 120 µs [b]
COM1 COM2 COM3 AUX I/O OSC	DB9P connector DB9P connector *Bluetooth* v1.1 interface or Ethernet [c] DB9P connector DB9S connector BNC connector (external oscillator)
NOVATEL PART NUMBER	
DL-V3	01017829
LED INDICATORS	
More details can also be found in *Section 2.2.3, Status Indicators* starting on *Page 35*	
Power	Orange: receiver is powered Green: receiver is turned on
Status	Orange flash: at start-up Off: normal operation Orange flash again: status event
COM1/COM2/ AUX	Green flash (top): transmitting Amber flash (bottom): receiving
COM3	Blue: *Bluetooth* active Orange: Ethernet active
Satellite Tracking	See table below
Positioning Mode	See *Table 8, Positioning Mode LEDs* on *Page 37*

LED#	# of SVs	LED Color
1 (left)	≤ 3	Red
2	4 or 5	Amber
3	6 or 7	Green
4	8 or 9	Green
5 (right)	≥ 10	Green

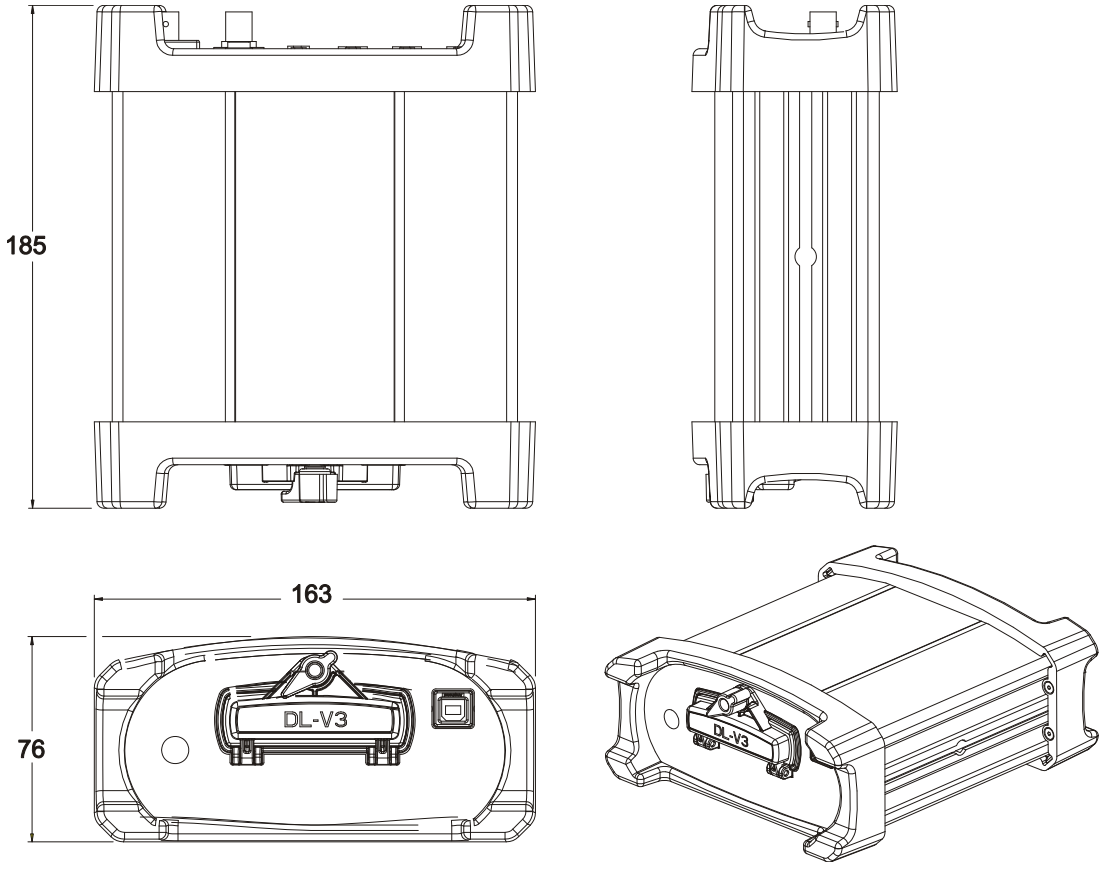
Continued on Page 74

<table>
<tr><th colspan="3">LED INDICATORS (CONTINUED)</th></tr>
<tr><td>Flash Card Memory</td><td>  </td><td>
<table>
<tr><th># of LEDs</th><th>Capacity</th><th>LED Color</th></tr>
<tr><td>1</td><td>Capacity ≤ 20%</td><td>Red [a]</td></tr>
<tr><td>2</td><td>40% ≥ Capacity > 20%</td><td>Amber</td></tr>
<tr><td>3</td><td>60% ≥ Capacity > 40%</td><td>Green</td></tr>
<tr><td>4</td><td>80% ≥ Capacity > 60%</td><td>Green</td></tr>
<tr><td>5</td><td>Capacity > 80%</td><td>Green</td></tr>
</table>
a. This red LED can also mean that the card was not formatted, and placed in the receiver, when the receiver was powered off.
</td></tr>
<tr><td>Occupation Time</td><td>  </td><td>
<table>
<tr><th>LED#</th><th>Baseline Length (km)</th><th>LED Color</th></tr>
<tr><td>1 (left)</td><td>≤ 5</td><td>Green</td></tr>
<tr><td>2</td><td>> 5
≤ 10</td><td>Green</td></tr>
<tr><td>3</td><td>> 10
≤ 15</td><td>Green</td></tr>
<tr><td>4</td><td>> 15
≤ 20</td><td>Green</td></tr>
<tr><td>5 (right)</td><td>≥ 20</td><td>Green</td></tr>
</table>
</td></tr>
<tr><th colspan="3">PHYSICAL</th></tr>
<tr><td>Size</td><td colspan="2">185 x 163 x 76 mm</td></tr>
<tr><td>Weight</td><td colspan="2">1.3 kg maximum (including OEMV-3 card)</td></tr>
<tr><th colspan="3">ENVIRONMENTAL</th></tr>
<tr><td>Operating Temperature</td><td colspan="2">-40°C to +75°C</td></tr>
<tr><td>Storage Temperature</td><td colspan="2">-45°C to +95°C</td></tr>
<tr><td>Humidity</td><td colspan="2">Not to exceed 95% non-condensing</td></tr>
<tr><td>Vibration[d]</td><td colspan="2">Random MIL-STD-810F
Sinusoidal IEC 68-2-6
Shock IEC 68-2-27</td></tr>
</table>

a. When tracking GPS satellites
b. Occurs approximately 7 s after power is applied
c. COM3 may be configured for *Bluetooth* or Ethernet but only one communication mode at a time can be used on COM3. Ethernet usage also requires a change of cable. See also the *APPCONTROL* command in the *DL-V3 Firmware Reference Manual* and *Appendix D, Ethernet Configuration* on *Page 178* of this manual.
d. See also the *Notice* section of this manual starting on *Page 16.*

DIMENSIONS

a b



a. All dimension are in millimeters, please use the *Unit Conversion* section of the *GNSS Reference Book* for conversion to imperial measurements.

b. See also the ProPak-V3 *Dimensions* section, in *Appendix A* of the *OEMV Family Installation and Operation User Manual*, for the dimensions of the mounting bracket. The mounting bracket also has a set of instructions that come with it.

A.2.1 Port Pin-Outs

Table 11: DL-V3 Serial Port Pin-Out Descriptions

Connector Pin No.	COM1 RS-232	COM2 RS-232	AUX RS-232
1	N/C	N/C	N/C
2	COM1_Rx	COM2_Rx	COM3_Rx
3	COM1_Tx	COM2_Tx	COM3_Tx
4	N/C	POUT	POUT
5	GND	GND	GND
6	N/C	N/C	N/C
7	RTS1	RTS2	RTS3
8	CTS1	CTS2	CTS3
9	N/C	N/C	N/C

Table 12: DL-V3 I/O Port Pin-Out Descriptions

Connector Pin No.	Signal Name	Signal Descriptions
1	VARF	Variable frequency out
2	PPS	Pulse per second
3	MSR	Mark 1 output
4	EVENT1	Mark 1 input
5	PV	Valid position available
6	EVENT2	Mark 2 input, which requires a pulse longer than 150 ns is pulled up to 5V through a 47kΩ resistor in the DL-V3. Refer also to the MARKCONTROL command in the *OEMV Firmware Reference Manual*.
7	_RESETOUT	Reset TTL signal output to an external system. Active low.
8	ERROR	Indicates a fatal error when high.
9	GND	Digital ground

A.2.2 Cables

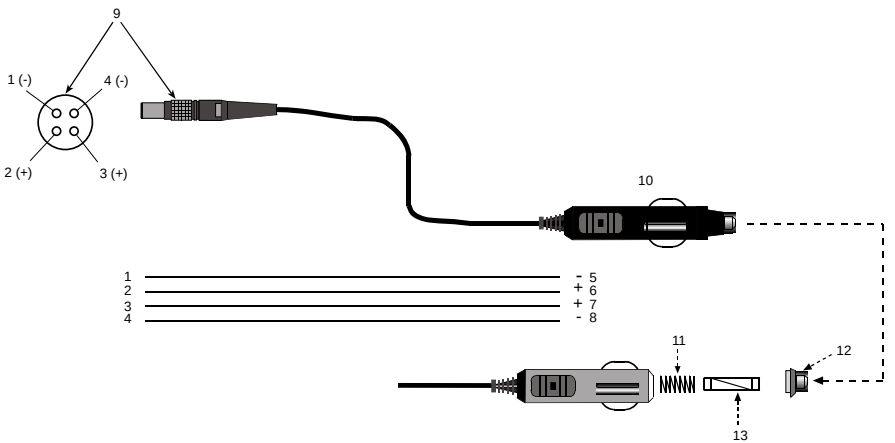
A.2.2.1 12V Power Adapter Cable (NovAtel part number 01017663)

The power adapter cable supplied with the DL-V3, see *Figure 34* below, provides a convenient means for supplying +12 V DC while operating in the field.

Input is provided through the standard 12V power outlet. The output from the power adapter utilizes a 4-pin LEMO connector (LEMO part number FGG.0B.304.CLAD52Z) and plugs directly into the *PWR* input located on the back panel of the DL-V3.

This cable is RoHS compliant.

For alternate power sources please see *Section 2.1.9* on *Page 32*.



Reference	Description	Reference	Description
1	Black	5	Ground
2	Red	6	12V
3	Orange	7	12V
4	Brown	8	Ground
9	Connector key marking	12	Universal tip
10	12V adapter	13	6 Amp slow-blow fuse
11	Spring		

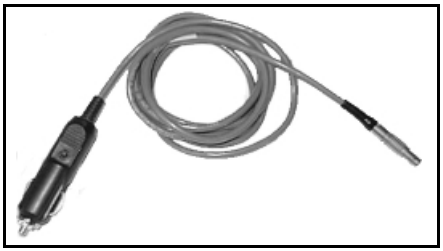
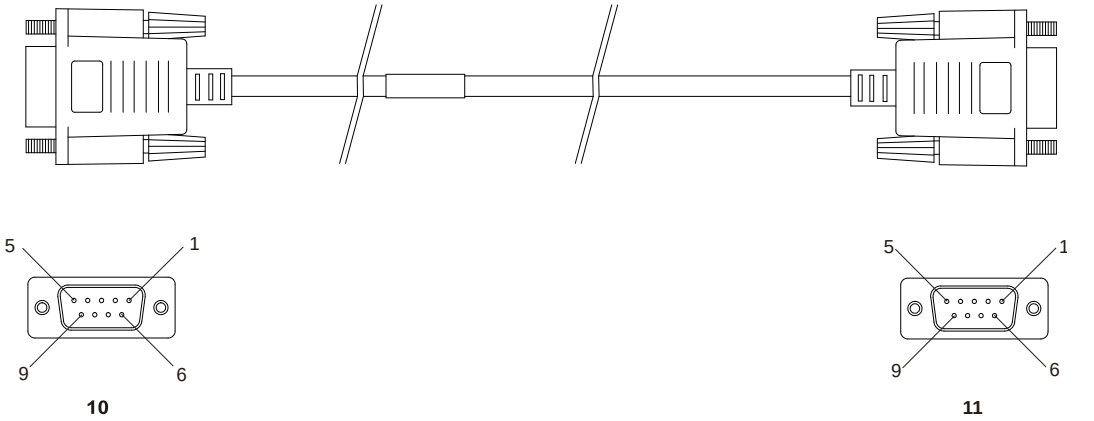


Figure 34: DL-V3 Power Cable

A.2.2.2 Null-modem Cable (NovAtel part number 01017658)

This cable supplied with the DL-V3, see *Figure 35* below, provides an easy means of communications with a PC/laptop. The cable is equipped with a 9-pin connector at the receiver end which can be plugged into the *COM1*, *COM2*, or *AUX* port. At the PC/laptop end, a 9-pin connector is provided to accommodate a PC/laptop serial (RS-232) communication port.

This cable is RoHS compliant.



Wiring Table:

Connector	Pin Number						
To DB9S (10)	2	3	8	7	4	5	1 & 6
To DB9S (11)	3	2	7	8	1 & 6	5	4

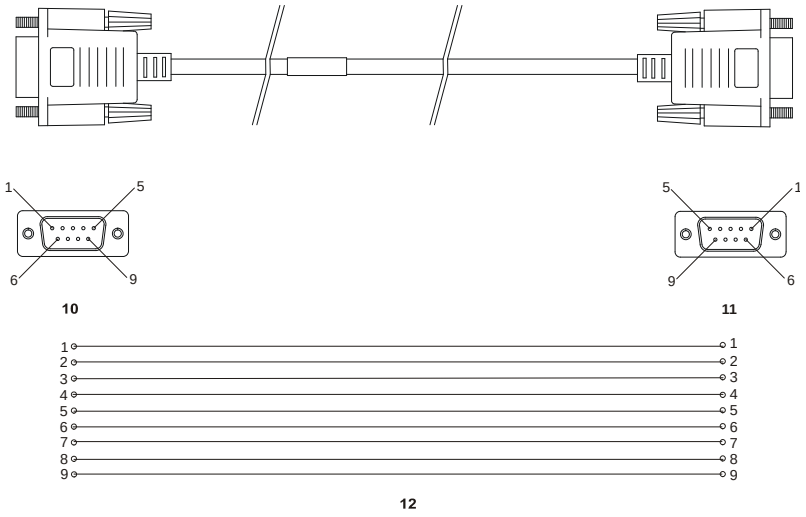
Reference	Description
10	DB9S (Female)
11	DB9S (Female)

Figure 35: DL-V3 Null-Modem Cable

A.2.2.3 Straight Through Serial Cable (NovAtel part number 01017659)

This cable can be used to connect the DL-V3 to a modem or radio transmitter to propagate differential corrections. The cable is equipped with a female DB9 connector at the receiver end. The male DB9 connector at the other end is provided to plug into your user-supplied equipment (please refer to your modem or radio transmitter user guide for more information on its connectors). The cable is approximately 2 m in length. See *Figure 36* below.

This cable is RoHS compliant.



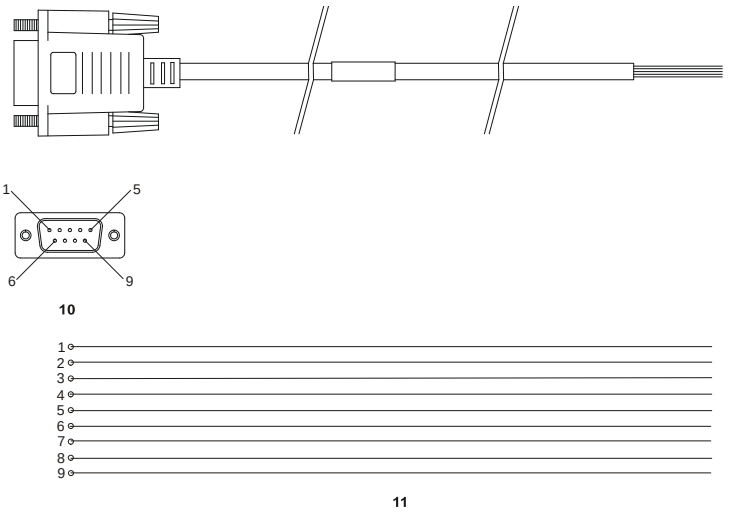
Reference	Description	Reference	Description
10	DB9P (male) connector	12	9-conductor cable
11	DB9S (female) connector		

Figure 36: DL-V3 Straight Through Serial Cable

A.2.2.4 I/O Strobe Port Cable (NovAtel part number 01017660)

The strobe lines on the DL-V3 can be accessed by inserting the male DB9 connector of the I/O strobe port cable into the *I/O* port. The other end of this cable is provided without a connector to provide flexibility. The jacket insulation is cut away slightly from the end but the insulation on each wire is intact. The cable is approximately 2 m in length. See *Figure 37* below.

This cable is RoHS compliant.



Wiring Table:

I/O Port Pin	I/O Port Signal	I/O Port Cable Wire Color	I/O Port Pin	I/O Port Signal	I/O Port Cable Wire Color
1	VARF	Black	6	Event2	Green
2	PPS	Brown	7	_RESETOUT	Blue
3	MSR	Red	8	ERROR	Violet
4	Event1	Orange	9	GND	White/Grey
5	PV	Yellow			

Reference	Description	Reference	Description
10	DB9P (male) connector	11	9-conductor cable

Figure 37: DL-V3 I/O Strobe Port Cable

Appendix B Commands

The DL-V3 firmware implements the commands in *Table 13* (repeated in *Table 14* on *Page 82* in the order of their binary messages IDs), in addition to the OEMV family command set. The LOG command is available to all OEMV receivers but is an essential command to do any logging. It is included in this appendix for your convenience.

Table 13: DL-V3 Commands in Alphabetical Order

Message ID	ASCII Command	Description
781	appcontrol	Switch between Ethernet and *Bluetooth* on COM3
779	comvout	Control the peripheral power supply on specific COM ports
185	currentfile	Specify a file for FILEHDR and FILETRANSFER requests
186	currentgroup	Specify a group for GROUPDEF requests
53	del	Delete files from the CF Card
284	disk	Carry out CF card maintenance
67	extcontrol	Disable POWERUP group execution on start-up
20	freset	Factory reset
54	group	Modify log group definitions
66	groupantheight	Edit the antenna height for the group
55	groupantsn	Edit the serial number for the group
65	groupanttype	Edit the antenna type for the group
755	groupcom	Associate one or more port configurations with a group
753	groupcomvout	Control power on specified COM ports for the group
271	groupdgpstxid	Edit the DGPS base ID configuration for the group
56	groupecutoff	Edit the elevation cut-off configuration for the group
58	groupfixpos	Fix the receiver position when the group is executed
318	groupinterfacemode	Edit the interface mode configuration for the group
64	grouplog	Modify message-logging specifications in a group
57	groupmode	Configure the survey type for a group survey
63	grouppossave	Configure position averaging when the group is executed
62	groupsatlimit	Edit the satellite limit configuration for the group
59	groupsitename	Edit the site name for the group
61	groupsitenumber	Edit the site number for the group
149	groupuse	Group configuration macro to execute DL-V3 commands

Continued on Page 82

Message ID	ASCII Command	Description
1	log	Request logs from the receiver
157	logfile	Manual file logging control
163	methumid	Specify air humidity
164	metpress	Specify air pressure
165	mettemp	Specify ambient temperature
211	project	Project-related parameters
201	rename	Rename a file stored in the CF Card
18	reset	Perform a hardware reset
212	satlimit	Specify the minimum number of satellites to use in the position solution
166	site	Control site occupations
167	siteupdateantheight	Configure occupied site's antenna height information
168	siteupdateanttype	Configure site antenna type information for an occupied site
169	siteupdateattribute	Configure site attribute information for an occupied site
170	siteupdatename	Configure site name information for an occupied site
171	siteupdatenumber	Configure site number information for an occupied site
213	softpower	Power-button OFF simulation
257	write	Create logs containing user data
204	writefile	Create files or append data to an existing file on the CF Card where the data format is char
240	writefilehex	Create files or append data to an existing file on the CF Card where the data format is hexbytes
205	writehex	Create logs containing user data

Table 14: DL-V3 Commands in Order of their Message IDs

Message ID	ASCII Command	Description
1	log	Request logs from the receiver
18	reset	Perform a hardware reset
20	freset	Factory reset
53	del	Delete files from the CF Card
54	group	Modify log group definitions
55	groupantsn	Edit the serial number for the group
56	groupecutoff	Edit the elevation cut-off configuration for the group

Continued on Page 83

Message ID	ASCII Command	Description
57	groupmode	Configure the survey type for a group survey
58	groupfixpos	Fix the receiver position when the group is executed
59	groupsitename	Edit the site name for the group
61	groupsitenumber	Edit the site number for the group
62	groupsatlimit	Edit the satellite limit configuration for the group
63	grouppossave	Configure position averaging when the group is executed
64	grouplog	Modify message-logging specifications in a group
65	groupanttype	Edit the antenna type for the group
66	groupantheight	Edit the antenna height for the group
67	extcontrol	Disable POWERUP group execution on start-up
149	groupuse	Group configuration macro to execute DL-V3 commands
157	logfile	Manual file logging control
163	methumid	Specify air humidity
164	metpress	Specify air pressure
165	mettemp	Specify ambient temperature
166	site	Control site occupations
167	siteupdateantheight	Configure occupied site's antenna height information
168	siteupdateanttype	Configure site antenna type information for an occupied site
169	siteupdateattribute	Configure site attribute information for an occupied site
170	siteupdatename	Configure site name information for an occupied site
171	siteupdatenumber	Configure site number information for an occupied site
185	currentfile	Specify a file for FILEHDR and FILETRANSFER requests
186	currentgroup	Specify a group for GROUPDEF requests
201	rename	Rename a file stored in the CF Card
204	writefile	Create files or append data to an existing file on the CF Card where the data format is char
205	writehex	Create logs containing user data
211	project	Project-related parameters
212	satlimit	Specify the minimum number of satellites to use in the position solution
213	softpower	Power-button OFF simulation
240	writefilehex	Create files or append data to an existing file on the CF Card where the data format is hexbytes

Continued on Page 84

Message ID	ASCII Command	Description
257	write	Create logs containing user data
271	groupdgpstxid	Edit the DGPS base ID configuration for the group
284	disk	Carry out CF card maintenance
318	groupinterfacemode	Edit the interface mode configuration for the group
753	groupcomvout	Control power on specified COM ports for the group
755	groupcom	Associate one or more port configurations with a group
779	comvout	Control the peripheral power supply on specific COM ports
781	appcontrol	Switch between Ethernet and *Bluetooth* on COM3

The arguments for each of these commands are described in the following sections.

For a complete listing and description of the other commands that the DL-V3 is capable of processing, please refer to the *OEMV Family Firmware Reference Manual.*

B.1 SYNTAX CONVENTIONS

The following rules apply when entering commands, at the command prompt, from a keyboard.

1. `Courier` font is used to illustrate program output or user input.
2. References to other commands, logs or any of their fields are shown in *italics*.
3. The commands are not case sensitive. For example, you could type either `METTEMP 0` or `mettemp 0`.
4. Except where noted, either a space or a comma can separate commands and their required entries. For example, you could type either `group del alpha p20a` or `group,del,alpha,p20a`.
5. At the end of a command, a carriage return is required. For example, press <Enter> or <Return> on your keyboard.
6. Responses are provided to indicate whether or not an entered command was accepted. The format of the response depends on the format of the command. Refer to the *OEMV Family Firmware Reference Manual* for more information.
7. Optional parameters are indicated by square brackets (`[ ]`). For commands that contain optional parameters, the value used if the optional parameter is not specified is given in the syntax table for the command.
8. Data format definitions, as specified in the “Format” field, are detailed in the *OEMV Family Firmware Reference Manual*. Note that all binary data is little-endian byte-ordered.

B.2 APPCONTROL COM3 *Bluetooth*/Ethernet Switch

Use the *appcontrol* command to switch between Ethernet and *Bluetooth* on COM3.

Use the *appcontrol option 12 9* command to restore Ethernet settings back to their defaults[1]:

IP: 192.168.1.223

Mask: 255.255.255.0

DHCP: OFF

The APPCONTROL OPTION 12 9 command triggers a receiver RESET and, on startup, restores the Ethernet defaults.

The APPCONTROL OPTION 12 1 command resets the XPORT-AR Ethernet device. This does not restore the Ethernet defaults. The Ethernet device settings are persistent until you issue a FRESET or APPCONTROL OPTION 12 9 command, see above.

When COM3 uses *Bluetooth*, the baud rate is set to 115200. When COM3 is switched to Ethernet, the baud rate is still 115200.

✉ 1. When the DL-V3 is in *Bluetooth* range, your computer can recognize it and is able to access it using this password: 0000 (four zeroes).

2. If the receiver is turned off, or power is removed, the Ethernet or *Bluetooth* mode on COM3 is returned to whichever mode was applied before power-down when it is powered up again.

Syntax

```
appcontrol function param1 [param2 [param3 [param4]]]
```

Message ID = 781

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Application control function	BLUETOOTH	4	Enum	none	H
3	Application control parameter 1, see *Table 16* and the examples that follow	0	4	Enum	none	H+4
4	Application control parameter 2 (for future use)	0	4	Ulong	none	H+8
5	Application control parameter 3 (for future use)	0	4	Ulong	none	H+12
6	Application control parameter 4 (for future use)	0	4	Ulong	none	H+16

1. See also the *Ethernet Configuration* appendix starting on *Page 178*.

Table 15: Application Functions

Binary	ASCII	Description
0	BLUETOOTH	Use BLUETOOTH followed by either 0 or 1 of the Application Parameters, see *Table 16*, to select either *Bluetooth* or Ethernet
8	OPTION	Use OPTION followed by 12 and then 9, from *Table 16*, to restore the Ethernet settings defaults.

Table 16: Application Parameters

Binary	ASCII
0	Select *Bluetooth* application
1	Select Ethernet application
9	Restore Ethernet settings I

Examples:

To switch back to *Bluetooth* on COM3, issue this command:

APPCONTROL BLUETOOTH 0

To switch COM3 from *Bluetooth* to Ethernet, issue this command:

APPCONTROL BLUETOOTH 1

To restore Ethernet settings to their defaults and reset the receiver, issue this command:

APPCONTROL OPTION 12 9

To reset the XPORT-AR Ethernet device but not restore the Ethernet settings' defaults:

APPCONTROL OPTION 12 1

B.3 COMVOUT Control COM Peripheral Power

The *comvout* command allows you to control the peripheral power supply on specific COM ports.

It supports COM2, COM3 and AUX. No power is supplied for peripheral ports when the receiver is turned off. COM3 does not have a power pin and there is no direct access to COM3.

The *comvout* command enables (on) or disables (off) the supply of power to the specified port. For COM2, and AUX, power is turned on or off to the power pin associated with each port. The *comvout* command specified for COM3 puts the *Bluetooth* device to sleep (low power mode), or turns off the Ethernet device completely, when *comvout* is set to OFF. The *Bluetooth* device wakes up from sleep mode when *comvout* is set to ON.

Peripheral power is disabled in all cases while the receiver is turned off (if COM2 power is enabled, COM2 power is disabled while the receiver is off, and is enabled again when the receiver is on).

Also, the COM3 peripheral is off when the receiver is off. This applies to *Bluetooth* and Ethernet.

Refer to the DL-V3 power specifications in *Appendix A* of the *OEMV Installation and Operation User Manual*.

Syntax

```
comvout com2|com3|aux on|off
```

Message ID = 779

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Serial port identifier, see *Table 17*	-	4	Enum	none	H
3	Action, see *Table 18* on *Page 88*	ON	4	Enum	none	H+4

Table 17: COM Serial Port Identifiers

Binary	ASCII	Description
1	Not used in this command [a]	
2	COM2	COM port 2
3	COM3	COM port 3
6-15	Not used in this command [a]	
16	AUX	AUX port
17	Not used in this command [a]	

a. Refer to the *OEMV Family Firmware Reference Manual* for other port identifiers. If an identifier other than COM2, COM3 or AUX is used with this command, it returns an error.

Table 18: COM Voltage Out Action

Binary	ASCII	Description
0	OFF	Set state to off
1	ON	Set state to on
2	Reserved	
3	DEFAULT	Do not change the COMVOUT state. This option only applies to the GROUPCOMVOUT command. Refer also to the GROUP command in the *DL-V3 Firmware Reference Manual*.

B.4 CURRENTFILE Specify File for FILEHDR/FILETRANSER Logs

The *currentfile* command allows you to specify a file to which subsequent requests for *filehdr* and *filetransfer* logs apply, see *Pages 158-160*.

Specified without arguments, the *currentfile* command clears any previously configured *currentfile* settings. The *currentfile file* command:

- Configures the *currentfile* to *file*. *File* is a name of a file on the CF card specified in a *base.ext* format, where *base* is a maximum of 8 characters and the optional *ext* is a maximum of 3 characters. Subsequent requests for the *filehdr* log, see *Page 158*, displays the *filehdr* log read from *file* or for the *filetransfer* log, see *Page 160*, transfers *file* in *filetransfer* log packets.
- Causes the receiver to transfer the entire file on all subsequent requests for the *filetransfer* log when issued with the dump mode specified as *all*.
- Causes the receiver to transfer only file packet number *packet_id* on all subsequent requests for the *filetransfer* log when issued with the transfer mode specified as *{single [packet_id]}*. *Packet_id* ranges from 0 to SizePackets-1, see the *dirent* log on *Page 154*. The first packet is numbered 0. Packet size is defined in the *file* log definition.
- Defaults the dump mode to *all* when issued without specifying the dump mode.

Syntax

`currentfile`

`currentfile` *`file`* `[all|{single [`*`packet_id`*`]}]`

Message ID = 185

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	File	-	12	Char[]	none	H
3	Dump Mode, see *Table 19*	ALL	4	Enum	none	H+12
4	Packet ID	0	4	Ulong	none	H+16

Table 19: Dump Mode

Binary Value	ASCII Value	Description
0	ALL	Send all packets on dump
1	SINGLE	Send single packet on dump

Table 20: CURRENTFILE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
currentfile	none	none	NO

B.5 CURRENTGROUP Specify File for GROUPDEF Log

The *currentgroup* command allows you to specify a group to which subsequent requests for *groupdef* logs apply, see *Page 163*. If no group is specified, the currentgroup setting is cleared, and requests for *groupdef* logs list the entire group table.

Syntax

```
currentgroup [group]
```

Message ID = 186

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header			-	-	0
2	Group Name	NUL	12	Char[]	none	H

Table 21: CURRENTGROUP Default Configuration

Parameter	Power-On	Freset	Stored in NVM
currentgroup	none	none	NO

B.6 DEL Delete Files from CF Card

The *del* command allows you to delete files from the CF card.

The *del all* command deletes all files from the CF card. This operation is not reversible. The *del all* command fails if there are any open files.

The *del file filename* command deletes the file named *file* from the CF card. *File* is a name of a file on the CF card specified in a *base.ext* format, where *base* is maximum 8 characters and the optional *ext* is maximum 3 characters. The *del file filename* command fails if *filename* is open.

Syntax

`del all|{file filename}`

Message ID = 53

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Delete Target, see *Table 22*	4	Enum	none	H
3	File	12	Char[]	none	H+4

Table 22: Delete Target

Binary Value	ASCII Value	Description
0	ALL	Delete all files
1	FILE	Delete the filename specified

B.7 DISK Format the CF Card

The *disk* command allows you to carry out CF card maintenance.

The *disk format* command formats the CF card for use with DL-V3. The format sequence erases all data previously stored on the CF card. This operation is not reversible.

✉ Prior to issuing a *disk format* command, all logs being sent to file should be unlogged, refer to the UNLOG and UNLOGALL commands in the *OEMV Family Firmware Reference Manual*, and the log file closed. If a group is being logged, the *groupuse stop* command should be issued, see the GROUPUSE command starting on *Page 118*.

Syntax

`disk format`

Message ID = 284

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	CF card operation, see *Table 23*	4	Enum	-	H

Table 23: CF Card Operation

Binary Value	ASCII Value	Description
1	FORMAT	Format the CF card

B.8 EXTCONTROL Disable Automatic POWERUP Group

The *extcontrol* command provides a means of disabling the automatic POWERUP group execution.

When entered prior to POWERUP group execution (prior to acquisition of coarse time), the *extcontrol* command prevents subsequent automatic execution of the POWERUP group. The *extcontrol* command is ignored if entered after POWERUP execution has already started.

Syntax

`extcontrol`

Message ID = 67

B.9 FRESET Clear Selected Data from NVM and Reset

The OEMV *freset* command is extended to include DL-V3 features. An additional target field, *userdata* (value = 10), resets only the DL-V3 user data NVM, thereby resetting all parameters indicated in this document as “Stored in NVM” to factory defaults. Issuing the *freset* command with the “target” field set to *standard*, resets the userdata NVM as well as OEMV parameters as indicated in the *OEMV Family Firmware Reference Manual*.

The DL-V3 factory default command list is on *Page 96*.

✉ If you issue the FRESET command without any parameters, it is the same as issuing a FRESET STANDARD command.

Field	Field Type	ASCII Value	Binary Value	Description	Binary Format	Binary Bytes	Binary Offset
1	FRESET header	-	-	This field contains the command name or the message header depending on whether the command is abbreviated ASCII, ASCII or binary, respectively.	-	H	0
2	target	See *Table 24*		Data to be reset by the receiver	Enum	4	H

Table 24: FRESET Target

Binary	ASCII	Description
0	STANDARD	Resets commands, ephemeris, and almanac (default). Also resets all L-band related data except for subscription information.
1	COMMAND	Resets the stored commands (saved configuration)
2	GPSALMANAC	Resets the stored GPS almanac
3	GPSEPHEM	Resets the stored GPS ephemeris
4	GLOEPHEM	Resets the stored GLONASS ephemeris
5	MODEL	Resets the currently selected model
10	USERDATA	Reset DL-V3-only commands
11	CLKCALIBRATION	Resets the parameters entered using the CLOCKCALIBRATE command
20	SBASALMANAC	Resets the stored SBAS almanac
21	LAST_POSITION	Resets the position using the last stored position
31	GLOALMANAC	Resets the stored GLONASS almanac

B.10 GROUP Create and Manipulate Groups

A *group* is a set of log specifiers and configuration parameters that are normally used together in a specific scenario. When a group is *executed*, information contained in a group is mapped into a series of receiver commands which has the same effect as entering the commands individually. The group can then be viewed as a “batch file” for the configuration of a specific set of receiver parameters.

A maximum of nine groups is supported. Upon creation, the group is added to the *group table* which is stored in non-volatile memory (NVM – which is preserved through a complete power failure). Any modifications to the group parameters are also immediately stored in the NVM.

If a group named "POWERUP" is defined, this group's log specification is executed with *groupuse start powerup file* upon first acquisition of time after a powerup with a power button, or COM activity on COM1 or COM2, or after powerup with a *freset*, and excludes any other pending activity.

The *group* command allows you to create and manipulate groups. Configuration of group parameters is handled by commands described in *GROUP Create and Manipulate Groups* on *Page 95* to *GROUPLOG Edit Group Logging Specifications* on *Page 111*.

The *group add groupname1* command creates a group named *groupname1* and adds it to the group table. A maximum of nine groups is supported; the *group add* command fails if a group needs to be added and nine groups already exist (that is, the group table is full).

The *group del groupname1* command deletes the group named from the group table (and also from NVM). This operation is not reversible.

The *group clear* command deletes all groups from the group table (and also from NVM). This operation is not reversible.

The *group copy groupname1 groupname2* command copies group information from group *groupname1* to group *groupname2*. If a group named *groupname2* already exists, it is overwritten by *groupname1*. This operation is not reversible.

Syntax

`group add groupname1`
`group del groupname1`
`group clear`
`group copy groupname1 groupname2`

Message ID = 54

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Action, see *Table 25*	4	Enum	none	H
3	GroupName1	12	Char[]	none	H+4
4	GroupName2	12	Char[]	none	H+16

Table 25: Action

Binary Value	ASCII Value	Description
0	ADD	Add a group
1	DEL	Delete a group
2	CLEAR	Erase all groups
3	COPY	Copy one group to another

Table 26: GROUP Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Group table	no change	Only *DEFAULT* group, see *Page 96*	YES

B.10.1 Factory-Reset DEFAULT Group

The factory-reset *DEFAULT* group is defined as follows:

RANGECMPB ONTIME 15
ALMANACB ONCHANGED
RAWEPHEMB ONCHANGED
IONUTCB ONCHANGED
RXSTATUSEVENTB ONNEW

✉ You may edit or delete the factory-reset *DEFAULT* group.

B.11 GROUPANTHEIGHT Edit Group Antenna Height

The *groupantheight* command allows you to edit the antenna height definition for the group.

The *groupantheight set* command sets the antenna height for the group named *groupname* to *antheight*.

The *groupantheight clear* command removes the antenna height setting from the group named *groupname.*

The *groupantheight default* command sets the antenna height for the group to 0.

Syntax

`groupantheight set` *`groupname`* [*`antheight`*]

`groupantheight default|clear` *`groupname`*

B.11.1 Groupuse Translation

groupuse start

The antenna height setting is reflected in the *groupdef* log.

If an automatic site is being generated (see *groupmode*), the group antenna height is used in site configuration.

groupuse stop

Not Applicable (N/A)

Message ID = 66

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Antenna height, see *Table 27*	0	4	Float	none	H+16

Table 27: GROUPANTHEIGHT Default Configuration

Parameter	Power-On	Freset	Stored in NVM
antheight	no change	0	YES

B.12 GROUPANTSN Edit Group Antenna Serial Number

The *groupantsn* command allows you to edit the antenna serial number definition for the group.

The *groupantsn set* command sets the antenna serial number for the group named *groupname* to *antsn*.

The *groupantsn clear* and the *groupantsn default* commands remove the antenna serial number setting from the group named *groupname.*

Syntax

`groupantsn set groupname [antsn]`

`groupantsn default|clear groupname`

B.12.1 Groupuse Translation

groupuse start

The antenna serial number setting is reflected in the *groupdefb* log.

`groupuse stop`

N/A

Message ID = 55

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Antenna serial number, see *Table 28*	NUL	16	Char[]	none	H+16

Table 28: GROUPANTSN Default Configuration

Parameter	Power-On	Freset	Stored in NVM
antsn	no change	NUL	YES

B.13 GROUPANTTYPE Edit Group Antenna Type

The *groupanttype* command allows you to edit the antenna type definition for the group.

The *groupanttype set* command sets the antenna type for the group named *groupname* to *anttype*.

The *groupanttype clear* and the *groupanttype default* commands remove the antenna type setting from the group named *groupname*.

Syntax

`groupanttype set groupname [anttype]`
`groupanttype default|clear groupname`

B.13.1 Groupuse Translation

`groupuse start`

- The antenna type is reflected in the *groupdef* log.

If an automatic site is being generated (see *groupmode* on *Page 113*), the group antenna type is used in site configuration.

`groupuse stop`

N/A

Message ID = 65

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Antenna type, see *Table 29*	NUL	16	Char[]	none	H+16

Table 29: GROUPANTTYPE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
anttype	no change	NUL	YES

B.14 GROUPCOM Associate Port Configurations with a Group

This command allows you to associate one or more port configurations with a group. It is identical to the standard OEMV COM command but with these exceptions:

- an additional leading argument is used to specify the associated groupname
- configuration of COM3 and USB ports is not supported for GROUPCOM

✉ 1. GROUPCOM is not supported on the DL-V3's COM3 port because it may cause the COM3 *Bluetooth* or Ethernet applications to become non-responsive. Both applications are preconfigured to the fixed baud rate of 1152000.

2. If you add GROUPCOM settings to a particular group, they do not take effect until the next time a GROUPUSE command is run for that group.

   If added, each distinct group may have unique settings for GROUPCOM.

3. Use of the GROUPCOM command does not affect the INTERFACEMODE or COMVOUT settings for a group.

The *set* command provides the port settings that are configured the next time the named group is executed.

The *clear* command removes any port settings for the specified group name and port. No port configuration is performed for the specified port the next time the group is executed.

The *default* command removes any port settings for the specified group name and port. No port configuration is performed for the specified port the next time the group is executed.

Syntax

```
groupcom clear | default groupname [com1|com2|aux]
```

B.14.1 Groupuse Translation

```
groupuse start
```

- Settings for each configured *groupcom* port are set

```
groupuse stop
```

- N/A

Message ID = 755

Field	Field Type	Bytes	Format	Units	Offset
1	Header	-	-		0
2	Parameter update, see *Table 30*	4	Enum	-	H
3	Group name	12	Char[ ]	-	H+4
4	Port to configure. (default = THISPORT) See *Table 17* on *Page 87*	4	Enum	-	H+16
5	;Communication baud rate (bps). A value of '0' indicates that no GROUPCOMCONFIG specification is associated with the port for the specified group. Possible bps values: 300, 600, 900, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400	4	ULong	bps	H+20
6	Parity See *Table 31* on *Page 102*	4	Enum	-	H+24
7	Number of data bits 7 or 8 (default = 8)	4	ULong	-	H+28
8	Number of stop bits 1 or 2 (default = 1)	4	ULong	-	H+32
9	Handshaking See *Table 32* on *Page 102*	4	Enum	-	H+36
10	Echo 0 = Off - No echo 1 = On (default) - Transmit any input characters as they are received	4	Enum	-	H+40
11	Break 0 = Off - Disable break detection 1 = On (default) - Enable break detection	4	Enum	-	H+44

Table 30: Parameter Update

Binary	ASCII	Description
0	DEFAULT	Set the parameter for a group to the default (default)
1	SET	Set parameter for a the group
2	CLEAR	Clear a parameter from the group

Table 31: Parity

Binary	ASCII	Description
0	N	No parity (default)
1	E	Even parity
2	O	Odd parity

Table 32: Handshaking

Binary	ASCII	Description
0	N	No handshaking (default)
1	XON	XON/XOFF software handshaking
2	CTS	CTS/RTS hardware handshaking

B.15 GROUPCOMVOUT Control COM Power for a Group

The *groupcomvout* command allows you to control the peripheral power supply on the COM ports when a specific group is executed. Command usage is similar to that of the *comvout* command, see *Page 87*, except that a group name argument is required.

✉ 1. The port specifier is the same for the *groupinterfacemode* command, see *Page 109*.

2. If you add GROUPCOMVOUT settings to a particular group, they do not take effect until the next time a GROUPUSE command is run for that group.

   If added, each distinct group may have unique settings for GROUPCOMVOUT.

The *groupcomvout set* command enables you to configure *comvout* behavior for a specific group (when the group is executed). The interpretation of the *groupcomvout* arguments is the same as that seen for the *comvout* command.

The *default* action is supported for the *groupcomvout* command. If this argument is supplied, no changes to the current *comvout* configuration for a peripheral port occurs when the associated group is executed.

Example:

```
groupcomvout set mygroup com2 on
groupcomvout set mygroup aux default
```

The *groupcomvout clear* command removes the *comvout* configuration for the specified port. The *comvout* configuration for that port is not altered when the group specified in *groupname* is executed.

The *groupcomvout* default command removes *comvout* configurations for all ports. The *comvout* configurations for all ports are not altered when the group specified in *groupname* is executed. This is equivalent to using the *groupcomvout set* command to specify *default* for every port.

Syntax

```
groupcomvout  set  groupname  [com2 | aux]   [on | off | default]
groupcomvout  clear | default  groupname   [com2 | aux]
```

B.15.1 Groupuse Translation

```
groupuse start
```

- *comvout* settings for each configured port will be set.

```
groupuse stop
```

- N/A

Message ID = 753

Field	Field Type	Bytes	Format	Units	Offset
1	Header	-	-	-	0
2	Parameter update, see *Table 30* on *Page 101*	4	Enum	-	H
3	Group name	12	Char[ ]	-	H+4
4	Serial port identifier, see *Table 17* on *Page 87*	4	Enum	-	H+16
5	Action, see *Table 25* on *Page 96*	4	Enum	-	H+20
6	Reserved	4	Long	-	H+24

B.16 GROUPDGPSTXID Edit Group DGPS ID Configuration

The *groupdgpstxid* command allows you to edit the DGPS base ID configuration for the group. The group can be configured to store base ID for one DGPS message type.

The *groupdgpstxid set* command sets the DGPS base ID configuration for the group named *groupname* to *type* and *ID* (refer to the DGPSTXID command in the *OEMV Family Firmware Reference Manual*, for further details on *type* and *ID*).

The *groupdgpstxid clear* and the *groupdgpstxid default* commands remove the DGPS base ID configuration from the group named *groupname*.

Syntax

`groupdgpstxid set` *`groupname type ID`*

`groupdgpstxid default|clear` *`groupname`*

B.16.1 Groupuse Translation

```
groupuse start
```

If set, the *dgpstxid* command is issued.

```
groupuse stop
```

N/A

Message ID = 271

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	4	Enum	none	H
3	Group name	12	Char[]	none	H+4
4	DGPS Type, see *Table 73* on *Page 165* and *Table 33* on *Page 106*	4	Enum	none	H+16
5	ID, String [max. 5] or `"ANY"` ANY type defaults: RTCM - 0 RTCMV3 - 0 RTCA - AAAA CMR - 0 The following range values are in affect: 0 ≤ CMR ID ≤ 31 0 ≤ RTCM ID ≤ 1023 0 ≤ RTCMV3 ID ≤ 4095 RTCA: any four character string containing only alpha (a-z) or numerical characters (0-9) See also *Table 33* on *Page 106*	5	Char[]	none	H+20

Table 33: GROUPDGPSTXID Default Configuration

Field	Power-On	Freset	Stored in NVM
DGPS Type	no change	AUTO	YES
ID	no change	NUL	YES

B.17 GROUPECUTOFF Edit Group Elevation Cut-Off Angle

The *groupecutoff* command allows you to edit the elevation cut-off angle configuration for the group.

groupecutoff set sets cut-off for the group named *groupname* to *ecutoff*. *groupecutoff clear* removes the cut-off setting from the group named *groupname*. *groupecutoff default* sets the elevation cut-off for the group to 0 degrees.

Syntax
groupecutoff set *groupname* [*ecutoff*]

groupecutoff default|clear *groupname*

B.17.1 Groupuse Translation

groupuse start

If set, the *ecutoff* command is issued.

```
groupuse stop
```

N/A

Message ID = 56

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 33* on *Page 106*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Elevation cutoff	0	4	Float	none	H+16

Table 34: Parameter Update

Binary Value	ASCII Value	Description
0	DEFAULT	Set the parameter for a group to the default
1	SET	Set the parameter for a group
2	CLEAR	Clear the parameter from a group

Table 35: GROUPECUTOFF Default Configuration

Parameter	Power-On	Freset	Stored in NVM
ecutoff	no change	0	YES

B.18 GROUPFIXPOS Configure Group to Fix Receiver Position

The *groupfixpos* command allows you to configure the group to fix the receiver position when the group is executed. *groupfixpos* and *groupposave* configurations are mutually exclusive, and the last setting to be entered takes effect.

groupfixpos set configures the group to fix the position to *lat long height*. *groupfixpos clear* clears the group position-fix configuration. *groupfixpos default* clears the group position-fix configuration.

Syntax

`groupfixpos set groupname [lat [long [height]]]`

`groupfixpos default|clear groupname`

B.18.1 Groupuse Translation

groupuse start

If position fixing is configured in the group, the *fix position* command is executed with the supplied parameters.

groupuse stop

If position fixing is configured in the group, issues a *fix none* command.

Message ID = 58

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Latitude	0	8	Double	degrees	H+16
5	Longitude	0	8	Double	degrees	H+24
6	Height	0	8	Double	metres	H+32
7	Reserved for future use	-1	4	Int	none	H+40
8		-1	4	Int	none	H+44

Table 36: GROUPFIXPOS Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Fixed Position Configuration	no change	CLEAR	YES

B.19 GROUPINTERFACEMODE Edit Group Interface Mode

The *groupinterfacemode* command allows you to edit the interface mode configuration for the group. The group can be configured to issue the interfacemode command to COM1, COM2 and/or AUX.

The *groupinterfacemode set* command sets the interface mode configuration for the group named *groupname* and *port* to the specified parameters (refer to the *interfacemode* command in the *OEMV Family Firmware Reference Manual*, for further details on *rx_type*, *tx_type* and *responses*). *Port* can be *COM1*, *COM2 our AUX*.

The *groupinterfacemode clear* and the *groupinterfacemode default* commands remove (disable) the interface mode configuration for all ports from the group named *groupname.*

Syntax

`groupinterfacemode set` *`groupname`* `[`*`port`*`] [`*`rx_type`* `[`*`tx_type`*`]] [`*`responses`*`]`

`groupinterfacemode default|clear` *`groupname`*

B.19.1 Groupuse Translation

```
groupuse start
```

If set for the particular port, the *interfacemode* command is issued for the port.

```
groupuse stop
```

N/A

Message ID = 318

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Serial Port Identifier, see *Appendix C, **Logs**, Table 67* on *Page 150*	NO_PORT	4	Enum	none	H+16
5	rx_type – Serial Port Interface Mode, see *Table 70* on *Page 151*	NOVATEL	4	Enum	none	H+20
6	tx_type – Serial Port Interface Mode, see *Table 70* on *Page 151*	NOVATEL	4	Enum	none	H+24
7	Responses 0 = Off 1 = On	ON	4	Enum	none	H+28

Table 37: GROUPINTERFACEMODE Default Configuration

Parameter	Power-On	Freset[a]	Stored in NVM
COM1 RX type	no change	NOVATEL	YES
COM1 TX type	no change	NOVATEL	YES
COM1 responses	no change	ON	YES
COM2 RX type	no change	NOVATEL	YES
COM2 TX type	no change	NOVATEL	YES
COM2 responses	no change	ON	YES
AUX RX type	no change	NOVATEL	YES
AUX TX type	no change	NOVATEL	YES
AUX responses	no change	ON	YES

a. The AUX port automatically changes configuration to NONE, NONE when the POWERUP group is run unless the GROUPINTERFACEMODE command was issued manually for AUX.

B.20 GROUPLOG Edit Group Logging Specifications

The *grouplog* command allows you to modify the message-logging specifications in a group. A maximum of 20 message-logging specifications is supported.

The *grouplog add* command allows you to add message-logging specifications to a group.

- The message-logging specification is added to a group named *group*. If a group named *group* does not exist, the group is created. The *grouplog add* command fails if a group needs to be created and the group table is full.
- *dst* specifies the destination to which the requested message is to be sent when the group is executed. If *dst* is not specified (or specified as *no_port*), the group-default destination is assumed (the destination which is specified at the time the group is executed). See *Table 17* on *Page 87* for a list of valid port identifiers.
- *message* specifies any valid NovAtel ASCII, NovAtel Binary, NMEA, Abbreviated ASCII, or RTK-format (for example, RTCAOBS) OEMV log. This includes OEMV messages such as CMRPLUS and RTCMV3 format logs.
- *trigger* specifies a valid OEMV message trigger which applies to this log specification (refer to the *log* command on *Page 122*).
- *period* specifies the repetition period for this message (refer to the *log* command).
- Within one group, the *message-dst* combination must be unique. The *grouplog add* command fails if an attempt is made to add a message-logging specification with a *message* and *dst* which are the same as a previously-entered specification in the same group.
- Message-logging specifications that are added are automatically saved to NVM.
- The *grouplog del* command allows you to delete message-logging specifications from a group.
- *dst* and *message* identify a unique message-logging specification to be deleted. If *dst* is not specified, the group-default destination is assumed.
- Message-logging specifications that are deleted are also removed from NVM. This operation is not reversible.

Syntax

```
grouplog add group [dst] message [trigger [period]]
grouplog del group [dst] message
```

B.20.1 Groupuse Translation

```
groupuse start
```

For each message-logging specification, a *log* command is issued.

For each message-logging specification, *dst* is added to the groupuse destination list (see the *groupuse* command on *Page 118*)

```
groupuse stop
```

For each message-logging specification, an *unlog* command is issued.

For each message-logging specification, *dst* is added to the groupuse destination list (see the *groupuse* command)

✉ *Action* is limited to ADD and DEL for this command.

Message ID = 64

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Action, see *Table 25* on *Page 96*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Serial Port Identifier, see *Table 67* on *Page 150*	NO_PORT	4	Enum	none	H+16
5	Message ID	-	4	Ulong	none	H+20
6	Trigger (see the LOG command in the *OEMV Family Firmware*	ONCE	4	Enum	none	H+24
7	Period	0	4	Float	seconds	H+28

Table 38: GROUPLOG Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Log configuration	no change	See *Section B.10.1, Factory-Reset DEFAULT Group* on *Page 96*	YES

B.21 GROUPMODE Configure Group Survey Type

The *groupmode* command configures the survey type for a survey carried out with the group.

The *groupmode set kinematic|static* command sets the survey type for the group named *groupname* to the specified mode. The *groupmode clear* command sets the survey type for the group to *static*. The *groupmode default* command sets the survey type for the group to *static*.

Syntax

`groupmode set groupname [kinematic|static]`

`groupmode default|clear groupname`

B.21.1 Groupuse Translation

```
groupuse start
```

If the groupmode is set to *static*, a *site add* command is executed, and the site is configured with parameters defined by *groupantheight*, *groupsitenumber*, *groupsitename*, and *groupanttype* commands.

```
groupuse stop
```

N/A

Message ID = 57

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Group Mode, see *Table 39*	STATIC	4	Enum	none	H+16

Table 39: Group Mode

Binary Value	ASCII Value	Description
0	STATIC	Set group mode to static
1	KINEMATIC	Set group mode to kinematic

Table 40: GROUPMODE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Group Mode	no change	KINEMATIC	YES

B.22 GROUPPOSAVE Configure Group Position Averaging

The *groupposave* command allows you to configure position averaging to commence when the group is executed. *groupfixpos* and *groupposave* configurations are mutually exclusive, and the last setting to be entered takes effect.

The *groupposave set* command configures the group for position-averaging with parameters set to *maxtime*, *maxhorstd* and *maxverstd*.

The *groupposave clear* and *default* commands clear the group position-average configuration.

Syntax

`groupposave set` *`groupname`* `[`*`maxtime`* `[`*`maxhorstd maxverstd`*`]]`

`groupposave default|clear` *`groupname`*

B.22.1 Groupuse Translation

```
groupuse start
```

If position averaging is configured in the group, the *posave* command is executed with averaging time, maximum horizontal and vertical standard deviation set to the configured values.

```
groupuse stop
```

If position averaging is configured in the group, this command cancels it and issues a *fix none* command.

Message ID = 63

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Maximum time	0	8	Double	hours	H+16
5	Maximum horizontal standard deviation	0	8	Double	none	H+24
6	Maximum vertical standard deviation	0	8	Double	none	H+32

Table 41: GROUPSAVE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
maxtime	no change	0.01	YES
maxhorstd	no change	0	YES
maxverstd	no change	0	YES

B.23 GROUPSATLIMIT Limit Number of Satellites for Group

The *groupsatlimit* command allows you to limit the number of satellites used for the group. The *groupsatlimit set* command sets satlimit for the group named *groupname* to *satlimit*. The *groupsatlimit clear* command removes the satlimit setting from the group named *groupname.* The *groupsatlimit default* command sets the satlimit for the group to 0.

Syntax

`groupsatlimit set` *`groupname`* `[`*`satlimit`*`]`

`groupsatlimit default|clear` *`groupname`*

B.23.1 Groupuse Translation

```
groupuse start
```

If set, the *satlimit* command, see *Page 133*, is issued for each virtual channel associated with a logfile by this *groupuse start* command.

```
groupuse stop
```

N/A

Message ID = 62

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Satellite limit	0	4	Int	none	H+16

Table 42: GROUPSATLIMIT Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Satellite Limit	no change	0	YES

B.24 GROUPSITENAME Edit Group Site Name

The *groupsitename* command allows you to edit the site name definition for the group.

The *groupsitename set* command sets the site name for the group named *groupname* to *sitename*.

The *groupsitename clear* and the *groupsitename default* commands remove the site name setting from the group named *groupname*.

Syntax

`groupsitename set groupname sitename`

`groupsitename default|clear groupname`

B.24.1 Groupuse Translation

```
groupuse start
```

The site name is reflected in the *groupdef* log.

If an automatic site is being generated (see the *groupmode* command on *Page 113*), the group site name is used in the site configuration. If the group site name is not specified and an automatic site is being generated, the log file name is used as the site name.

```
groupuse stop
```

N/A

Message ID = 59

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	4	Enum	none	H
3	Group name	12	Char[]	none	H+4
4	Site name	32	Char[]	none	H+16

Table 43: GROUPSITENAME Default Configuration

Parameter	Power-On	Freset	Stored in NVM
sitename	no change	NUL	YES

B.25 GROUPSITENUMBER Edit Group Site Number

The *groupsitenumber* command allows you to edit the site number definition for the group.

The *groupsitenumber set* command sets the site number for the group named *groupname* to *sitenumber.*

The *groupsitenumber clear* and the *groupsitenumber default* commands remove the site number setting from the group named *groupname.*

Syntax

`groupsitenumber set` *`groupname`* `[`*`sitenumber`*`]`

`groupsitenumber default|clear` *`groupname`*

B.25.1 Groupuse Translation

Syntax

groupuse start

The site number setting is reflected in the *groupdef* log.

If an automatic site is being generated (see the *groupmode* command on *Page 113*), the group site number is used in the site configuration.

groupuse stop

N/A

Message ID = 61

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Site number	NUL	8	Char[]	none	H+16

Table 44: GROUPSITENUMBER Default Configuration

Parameter	Power-On	Freset	Stored in NVM
sitenumber	no change	NUL	YES

B.26 GROUPUSE Execute a Set of Commands

The *groupuse* command is a macro which uses the group configuration to execute a set of DL-V3 commands.

The *groupuse start* command executes the *start macro* for the group named *groupname*, with the default log destination set to *dst*. If *dst* is not specified, THISPORT is assumed. If any message-logging destinations are FILE_*n*, *filename* is associated with these destinations. If *filename* is not specified, it is automatically generated as per the *logfile* command.

The *groupuse start* command interprets the group configuration as follows:

- The *groupuse destination list* is assembled, representing all destinations to be used by the group.
- For each destination in the groupuse destination list, an *unlogall* command is issued.
- If the groupuse destination list contains any FILE_*n*, destinations, a *logfile close* command is issued, closing current logfile (if open).
- For each FILE_*n* destination in the groupuse destination list, a *logfile* command is issued, associating the destination with *filename*.
- The file-header destination, *hdrdst*, is selected as the first FILE_*n* destination in the destination list. If no FILE_*n* destination exists, the next 6 sub-steps are omitted.
    - *log hdrdst versionb* command is issued.
    - *log hdrdst timeb* command is issued.
    - If a project has been defined, *log hdrdst projectdefb* command is issued.
    - The *currentgroup groupname* command is issued.
    - The *log hdrdst groupdefb* command is issued.
    - The *currentgroup* command is issued.
- *groupinterfacemode* configuration is executed.
- *groupdgpstxid* configuration is executed
- *groupecutoff* configuration is executed.
- *groupsatlimit* configuration is executed.
- *groupposfix* or *groupposave* configuration is executed.
- If a file is opened as above, *groupmode* (in conjunction with *groupantheight*, *groupsitenumber*, *groupsitename*, and *groupanttype*) configuration is executed.
- *grouplog* configuration is executed.

The *groupuse stop* command executes the *stop macro* for the group named *groupname*, with the default log destination set to *dst*. If *dst* is not specified, THISPORT is assumed.

The *groupuse stop* command interprets the group configuration as follows:

• The *groupuse destination list* is assembled, representing all destinations to be used by the group.

• For each destination in the groupuse destination list, an *unlogall* command is issued (for the particular virtual channel).

• If the groupuse destination list contains any FILE_*n* destinations, and a site has been defined, a *site leave* command is issued.

• For each FILE_*n* destination in the groupuse destination list, a *logfile* command is issued, terminating the associated destination with the logfile.

• *groupposfix* or *groupposave* configuration is executed.

✉ 1. An OK response to the *groupuse* command does not guarantee that all steps in the *groupuse* sequence have completed successfully.

2. A response to the *groupuse* command does not guarantee that the sequence has completed execution. If it is important to guarantee that a subsequent command is executed *after* the entire *groupuse* sequence has been completed, the "Groupuse execution in progress" bit in the Auxiliary 2 status word in the *rxstatus* log, see *Page 172*, should be used.

Syntax
groupuse start|stop *groupname* [*dst*] [*filename*]

Message ID = 149

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Group Action, see *Table 45* on *Page 119*	-	4	Enum	none	H
3	Group name	-	12	Char[]	none	H+4
4	Serial Port Identifier, see *Appendix C, **Logs**, Table 67* on *Page 150*	THISPORT	4	Enum	none	H+16
5	Filename	NUL	12	Char[]	none	H+20

Table 45: Group Action

Binary Value	ASCII Value	Description
0	START	Start the specified group
1	STOP	Stop the specified group

B.27 LOG Request Logs from the Receiver

Many different types of data can be logged using several different methods of triggering the log events. Every log element can be directed to any combination of the three COM ports and three USB ports. The ONTIME trigger option requires the addition of the *period* parameter. See *the OEMV Firmware Reference Manual and the DL-V3 Firmware Reference Manual* for further information and a complete list of data log structures. The *LOG* command tables in this section show the ASCII command format.

The optional parameter [hold] prevents a log from being removed when the UNLOGALL command, with its defaults, is issued. To remove a log which was invoked using the [hold] parameter requires the specific use of the UNLOG command. To remove all logs that have the [hold] parameter, use the UNLOGALL command with the *held* field set to 1.

The [port] parameter is optional. If [port] is not specified, [port] is defaulted to the port that the command was received on.

✉ 1. The OEMV family of receivers can handle 30 logs at a time. If you attempt to log more than 30 logs at a time, the receiver responds with an Insufficient Resources error.

2. Maximum flexibility for logging data is provided to the user by these logs. The user is cautioned, however, to recognize that each log requested requires additional CPU time and memory buffer space. Too many logs may result in lost data and degraded CPU performance. Receiver overload can be monitored using the idle-time field and buffer overload bits of the Receiver Status in any log header.

3. Polled log types do not allow fractional offsets or ONTIME rates faster than 1Hz.

4. Use the ONNEW trigger with the MARKTIME, MARK2TIME, MARKPOS or MARK2POS logs.

5. Only the MARKPOS, MARK2POS, MARKTIME or MARK2TIME logs, and ‘polled’ log types are generated ‘on the fly’ at the exact time of the mark. Synchronous and asynchronous logs output the most recently available data.

6. If you do use the ONTIME trigger with asynchronous logs, the time stamp in the log does not necessarily represent the time the data was generated, but rather the time when the log is being transmitted.

Abbreviated ASCII Syntax:Message ID: 1

```
LOG [port] message [trigger [period [offset [hold]]]]
```

Factory Default:

log com1 rxstatuseventa onnew 0 0 hold

log com2 rxstatuseventa onnew 0 0 hold

log com3 rxstatuseventa onnew 0 0 hold

log aux rxstatuseventa onnew 0 0 hold

log usb1 rxstatuseventa onnew 0 0 hold

log usb2 rxstatuseventa onnew 0 0 hold

log usb3 rxstatuseventa onnew 0 0 hold

Abbreviated ASCII Example 1:

log com1 bestpos ontime 7 0.5 hold

The above example shows BESTPOS logging to COM port 1 at 7 second intervals and offset by 0.5 seconds (output at 0.5, 7.5, 14.5 seconds and so on). The [hold] parameter is set so that logging is not disrupted by the UNLOGALL command.

To send a log only one time, the trigger option can be ignored.

Abbreviated ASCII Example 2:

log com1 bestpos once 0.000000 0.000000 nohold

Refer to the *Command Formats* section of the *OEMV Firmware Reference Manual* for additional examples.

✉ 1. In **CDU** there are two ways to initiate data logging to the receiver's serial ports. You can either enter the LOG command in the *Console* window, or use the interface provided in the *Logging Control* window. Ensure the Power Settings on your PC are not set to go into Hibernate or Standby modes. Data is lost if one of these modes occurs during a logging session.

2. Only the ASCII/Abbreviated ASCII log table is included in this manual. Please refer to the LOG command in the *OEMV Family Firmware Reference Manual* for binary log details.

Field	Field Name	ASCII Value	Description	Field Type
1	LOG (ASCII) header	-	This field contains the command name or the message header depending on whether the command is abbreviated ASCII or ASCII respectively.	-
2	port	See *Table 46, Detailed Serial Port Identifiers* on *Page 123*	Output port (default = THISPORT)	Enum
3	message	Any valid message name, with an optional A or B suffix.	Message name of log to output	Char [ ]
4	trigger	ONNEW	Output when the message is updated (not necessarily changed)	Enum
		ONCHANGED	Output when the message is changed	
		ONTIME	Output on a time interval	
		ONNEXT	Output only the next message	
		ONCE	Output only the current message. (default)	
		ONMARK	Output when a pulse is detected on the mark 1 input, MK1I	
5	period	Any positive double value larger than the receiver's minimum raw measurement period	Log period (for ONTIME trigger) in seconds (default = 0)	Double
6	offset	Any positive double value smaller than the period.	Offset for period (ONTIME trigger) in seconds. If you wished to log data at 1 second after every minute you would set the period to 60 and the offset to 1 (default = 0)	Double
7	hold	NOHOLD	Allow log to be removed by the UNLOGALL command (default)	Enum
		HOLD	Prevent log from being removed by the UNLOGALL command	

Table 46: Detailed Serial Port Identifiers

ASCII Port Name	Hex Port Value	Decimal Port Value [a]	Description
NO_PORTS	0	0	No ports specified
COM1_ALL	1	1	All virtual ports for COM port 1
COM2_ALL	2	2	All virtual ports for COM port 2
COM3_ALL	3	3	All virtual ports for COM port 3
THISPORT_ALL	6	6	All virtual ports for the current port
ALL_PORTS	8	8	All virtual ports for all ports
XCOM1_ALL	9	9	All virtual COM1 ports
XCOM2_ALL	10	10	All virtual COM2 ports
USB1_ALL	d	13	All virtual ports for USB port 1
USB2_ALL	e	14	All virtual ports for USB port 2
USB3_ALL	f	15	All virtual ports for USB port 3
AUX_ALL	10	16	All virtual ports for the AUX port [b]
XCOM3_ALL	11	17	All virtual COM3 ports
COM1	20	32	COM port 1, virtual port 0
COM1_1	21	33	COM port 1, virtual port 1
. . .			
COM1_31	3f	63	COM port 1, virtual port 31
COM2	40	64	COM port 2, virtual port 0
. . .			
COM2_31	5f	95	COM port 2, virtual port 31
COM3	60	96	COM port 3, virtual port 0
. . .			
COM3_31	7f	127	COM port 3, virtual port 31
USB	80	128	USB port, virtual port 0
. . .			
USB_31	9f	159	USB port, virtual port 31
SPECIAL	a0	160	Unknown port, virtual port 0
. . .			
SPECIAL_31	bf	191	Unknown port, virtual port 31
THISPORT	c0	192	Current COM port, virtual port 0
. . .			

Continued on Page 124

ASCII Port Name	Hex Port Value	Decimal Port Value [a]	Description
THISPORT_31	df	223	Current COM port, virtual port 31
FILE	e0	224	User-specified file destination, 0 [c]
FILE_1	e1	225	User-specified file destination, 1 [c]
. . .			
FILE_31	ff	255	User-specified file destination, 31 [c]
XCOM1	1a0	416	Virtual COM1 port, virtual port 0
XCOM1_1	1a1	417	Virtual COM1 port, virtual port 1
. . .			
XCOM1_31	1bf	447	Virtual COM1 port, virtual port 31
XCOM2	2a0	672	Virtual COM2 port, virtual port 0
XCOM2_1	2a1	673	Virtual COM2 port, virtual port 1
. . .			
XCOM2_31	2bf	703	Virtual COM2 port, virtual port 31
USB1	5a0	1440	USB port 1, virtual port 0
USB1_1	5a1	1441	USB port 1, virtual port 1
. . .			
USB1_31	5bf	1471	USB port 1, virtual port 31
USB2	6a0	1696	USB port 2, virtual port 0
. . .			
USB2_31	6bf	1727	USB port 2, virtual port 31
USB3	7a0	1952	USB port 3, virtual port 0
. . .			
USB3_31	7bf	1983	USB port 3, virtual port 31
AUX	8a0	2208	AUX port, virtual port 0 [b]
. . .			
AUX_31	8bf	2239	AUX port, virtual port 31 [b]
XCOM3	9a0	2464	Virtual COM3 port, virtual port 0
. . .			
XCOM3_31	9bf	2495	Virtual COM3 port, virtual port 31

a. Decimal port values 0 through 16 are only available to the UNLOGALL command and cannot be used in the UNLOG command, or in the binary message header.

b. The AUX port is available on OEMV-2-based and OEMV-3-based products.

c. DL-V3 only. Refer to the *DL-V3 Firmware Reference Manual* and **CDU**'s Help file.

B.28 LOGFILE Open or Close File on CF Card

A *logfile* is a file on the CF card with properties as defined in *Section C.1, PDC Files* on *Page 149*. The *logfile* command opens a logfile, associates a virtual channel with a logfile, or closes a logfile. Only one logfile can be open at a time. A logfile cannot be reopened for further logging after it has been closed.

The *logfile open* command associates a virtual channel(s) with a logfile.

• If *channel* is specified, *channel* is associated with the logfile. If *channel* is not specified, all available virtual channels *FILE_n* are associated with the logfile.

• If *file* is specified, the virtual channel(s) is associated with a logfile named *file*. *File* is specified in a *base.ext* format, where *base* is maximum 8 characters and the optional *ext* is maximum 3 characters. The extension used for file creation is “pdc”. If *file* is not specified, a default filename is created for the logfile as follows:

- The first four characters are taken from the last four digits of the DL-V3 serial number.
- The second three characters are three digits representing the UTC day-of-year (that is, in the range 001-366).
- The last character is an alphanumeric character denoting the session ID, assigned in the sequence 0,…,9,A,…,Z. The first available session ID is used (that is, a session ID which results in a filename which does not conflict with an existing file on the CF card).

• If no channel was previously associated with the logfile (that is, the logfile has not been previously opened), the logfile is opened. If the logfile has been previously associated with a virtual channel(s) (that is, the log file is open), the virtual channel(s) is associated with the already open logfile. This command fails if a logfile is already open and a new logfile needs to be opened in the course of execution of this command.

• You must specify *channel* if you wish to specify *file* which is a valid ASCII value in File Port Channel, see *Table 54* on *Page 134*. This resolves the ambiguity as to which of the two fields has been entered.

• The *logfile close* terminates an association of a virtual channel(s) with a logfile.

- If *channel* is specified, association of virtual channel *channel* with the logfile is terminated. If *channel* is not specified, association of all virtual channels with the logfile is terminated, and the logfile is closed.
- If *file* is specified, the association(s) is terminated only if the association is with a logfile named *file*. If *file* is not specified, the association(s) is terminated for any logfile.
- If the association which has been terminated is the last one for the logfile, the logfile is closed.

- You must specify *channel* if you wish to specify *file* which is a valid ASCII value in File Port Channel, see *Table 54* on *Page 134*. This resolves the ambiguity as to which of the two fields has been entered.

Syntax

`logfile open|close [channel file]`

Message ID = 157

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Log File Action, see *Table 47*	-	4	Enum	none	H
3	File Port Channel, see *Table 54* on *Page 134*	FILE_ALL	4	Enum	none	H+16
4	Filename	NUL	12	Char[]	none	H+4

Table 47: Log File Action

Binary Value	ASCII Value	Description
0	OPEN	Associate the specified channel with a file
1	CLOSE	Terminate the specified channel-file association

Table 48: LOGFILE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
logfile	none	none	NO

B.29 METHUMID Specify Air Humidity

The *methumid* command allows you to specify air humidity. Humidity specified with the *methumid* command does not affect receiver operation. Rather, it allows you to create a record of atmospheric conditions for post-processing purposes.

The *methumid set* command specifies air humidity at *humid*. This command only stores the humidity value in volatile memory, and does not automatically generate a record. The humidity value can then be displayed/recorded by requesting the *met* log.

The *methumid clear* and the *methumid default* commands clear the humidity setting.

Syntax

`methumid set [`*`humid`*`]`

`methumid default|clear`

Message ID = 163

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Humidity	0	4	Float	percent	H+4

Table 49: METHUMID Default Configuration

Parameter	Power-On	Freset	Stored in NVM
methumid	clear	clear	NO

B.30 METPRESS Specify Air Pressure

The *metpress* command allows you to specify air pressure. Air pressure specified with the *metpress* command does not affect receiver operation. Rather, it allows you to create a record of atmospheric conditions for post-processing purposes.

The *metpress set* command specifies air pressure at *press*. This command only stores the pressure value in volatile memory, and does not automatically generate a record. The humidity value can then be displayed/recorded by requesting the *met* log.

The *metpress clear* and the *metpress default* commands clear the air pressure setting.

Syntax

`metpress set [press]`

`metpress default|clear`

Message ID = 164

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Pressure (in hectopascals or kilopascals where: 1 kPa = 10 hPa)	0	4	Float	kPa or hPa[a]	H+4

a. You may use hPa or kPa in your float input depending on your preference

Table 50: METPRESS Default Configuration

Parameter	Power-On	Freset	Stored in NVM
metpress	clear	clear	NO

B.31 METTEMP Specify Air Temperature

The *mettemp* command allows you to specify ambient temperature. Temperature specified with the *mettemp* command does not affect receiver operation. Rather, it allows you to create a record of atmospheric conditions for post-processing purposes.

The *mettemp set* command specifies air temperature at *temp*. This command only stores the temperature in volatile memory, and does not automatically generate a record. The temperature can then be displayed/recorded by requesting the *met* log.

The *mettemp clear* and the *mettemp default* commands clear the temperature setting.

The *mettemp default* command clears the temperature setting.

Syntax

`mettemp set [`*`temp`*`]`

`mettemp default|clear`

Message ID = 165

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header			-	-	0
2	Parameter Update, see *Table 34* on *Page 107*		4	Enum	none	H
3	Temperature	0	4	Float	Celsius or Fahrenheit [a]	H+4

a. You may use Celsius or Fahrenheit in your float input, depending on your preference

Table 51: METTEMP Default Configuration

Parameter	Power-On	Freset	Stored in NVM
metpress	clear	clear	NO

B.32 PROJECT Add or Clear a Project

The *project* command allows you to add or clear a project. If a project has been added via the *project* command prior to issuing a *groupuse start* command, a *projectdefb* log is automatically logged to the default group destination by the *groupuse start* sequence.

Project add defines a project with parameters *project*, *agency* and *observer.*

Project clear undefines a project, and prevents the *projectdefb* log from being logged to the default group destination by the *groupuse start* sequence.

Syntax

`project add project [agency [observer]]`

`project clear`

Message ID = 211

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Project Action, see *Table 52*	-	4	Enum	none	H
3	Project	-	32	Char[]	none	H+4
4	Agency	NUL	32	Char[]	none	H+36
5	Observer	NUL	32	Char[]	none	H+68

Table 52: Project Action

Binary Value	ASCII Value	Description
0	ADD	Add a new project into the PDC (default)
1	CLEAR	Clear projects from the PDC

Table 53: PROJECT Default Configuration

Parameter	Power-On	Freset	Stored in NVM
project	clear	clear	NO

B.33 RENAME Rename a File on the CF Card

The *rename* command allows you to rename a file on the CF card.

The *rename* command renames a file named *filename* to *newfilename*. The *rename* command fails if *newfilename* already exists, or if *filename* is open.

Syntax

`rename` *`filename newfilename`*

Message ID = 201

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Source filename	12	Char[]	none	H
3	Destination filename	12	Char[]	none	H+12

B.34 RESET Perform a Hardware Reset

The OEMV *reset* command is extended to include DL-V3 features.

B.35 SATLIMIT Set Minimum Satellites in Position Solution

The *satlimit* command allows you to set the minimum number of SVs used in the position solution, for a specific set of messages to be passed through a particular FILE_*n* virtual channel.

The following messages are affected by the satlimit filter:

- BESTPOS
- BESTVEL
- MATCHEDPOS
- MARKPOS
- PSRVEL
- RANGE
- RANGECMP
- RTKPOS
- RTKVEL

The satlimit filter does not guarantee that *every* message in the above list which passes through this filter is forwarded/rejected as desired. As the tracking environment changes on the GPS receiver, there is an approximately 2 second delay between the time that a change occurs in the number of SVs used n position solution and the time that the filter reflects this change. Consequently, during this short period messages may be incorrectly forwarded or rejected.

The *satlimit set* command sets the minimum number of SVs for the specified channel(s) to *minsv.* The satlimit configuration for a particular channel can be set before or while the channel is associated with a logfile. The satlimit configuration for a particular channel is cleared when that channel's association with a logfile is terminated via the *logfile* command.

The *satlimit default* command sets the satlimit value for the specified channel(s) to 0.

The *satlimit clear* command sets the satlimit value for the specified channel(s) to 0.

Syntax

`satlimit set file_all|file|file_`*`n`* *`minsv`*

`satlimit default|clear file_all|file|file_`*`n`*

Message ID = 212

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	4	Enum	None	H
3	File Port Channel, see *Table 54*	4	Enum	None	H+4
4	Satellite limit	4	Int	None	H+8

Table 54: File Port Channel

Binary Value	ASCII Value	Description
0	NO_PORT	No port specified
7	FILE_ALL	All virtual channels for file target
224	FILE	File target, virtual channel 0
…	…	...
255	FILE_31	File target, virtual channel 31

Table 55: SATLIMIT Default Configuration

Parameter	Power-On	Freset	Stored in NVM
satlimit	clear	clear	NO

B.36 SITE Control Site Occupations

The *site* command allows you to control site occupations.

The *site enter* command defines the site-occupation start time for a site record *name*. This command does not result in a site record being entered into the logfile – the site record is written to the logfile when the *site leave* command is received.

The *site cancel* command cancels a previously-defined site. This command does not delete site records already written to a logfile with previous *site enter* and *site leave* commands. Rather, if at a site, as indicated by a preceding *site enter* command, the *site cancel* command terminates the site occupation without writing a site record to the logfile.

The *site leave* command ends occupation of a previously-defined site. If at a site, as indicated by a preceding *site enter* command, the *site leave* command terminates the site occupation and write a site record (*sitedefb*) to the logfile. There is no limit on the number of *sitedef* logs entered into a single log file.

- The FirstGPSWeek/Sec fields of the *sitedef* record are set to correspond to the time of the first *position* log (`bestpos`, `matchpos`, `range`, `rangec`, `rangedelta`, `rtkdata`) received with the number of SVs used in generation of these logs > 0, between `site enter` and `site leave` commands.
- LastGPSWeek/Sec fields of the *sitedef* log are set to correspond to time of the last *position* log received with the number of SVs used in generation of these logs > 0, between `site enter` and `site leave` commands.
- If no *position* logs are received with the number of SVs used in generation of these logs > 0 between `site enter` and `site leave` commands:
    - the FirstGPSWeek/Sec and LastGPSWeek/Sec fields of the *sitedef* log are set to correspond to the times at which the `site enter` and `site leave` commands were issued, respectively,
    - the SITE_ST_INVALID bit (0x01) is set in the SiteStatus field of the *sitedef* log
- If no *position* logs are received with the number of SVs used in generation of these logs > 0 within 30 seconds after a `site enter` but such logs are received before a `site leave` command:
    - the SITE_ST_STARTTRUNCATE bit (0x02) is set in the SiteStatus field of the *sitedef* log
- If no *position* logs are received with the number of SVs used in generation of these logs > 0 within 30 seconds before a `site leave` but such logs are received at some time after a `site enter` command:
    - the SITE_ST_ENDTRUNCATE bit (0x04) is set in the SiteStatus field of the *sitedef* log
- If both of the above conditions apply, (that is, if no *position* logs are received with the number of SVs used in generation of these logs > 0 within 30 seconds after a `site enter` but such logs are received before a `site leave` command and if no *position* logs are received with the number of SVs used in generation of these logs > 0 within 30 seconds before a `site leave` but such logs are received at some time after a `site enter` command):

- both, the SITE_ST_STARTTRUNCATE and SITE_ST_ENDTRUNCATE bits are set in the SiteStatus field of the *sitedef* log

Syntax

`site enter` *`name`*

`site leave|cancel`

Message ID = 166

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Site Mode, see *Table 39* on *Page 113*	4	Enum		H
3	Site name	32	Char[]		H+4
4	Reserved for future use	12	Char[]		H+36
5		12	Char[]		H+48
6		12	Char[]		H+60
7		12	Char[]		H+72
8		12	Char[]		H+84

Table 56: Site Mode

Binary Value	ASCII Value	Description
0	ENTER	Enter a site into PDC (default)
1	LEAVE	Leaving site
2	CANCEL	Cancel this site from the PDC

Table 57: SITE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
site	cancel	cancel	NO

B.37 SITEUPDATENUMBER Set Occupied Site Number

The *siteupdatenumber* command allows you to configure the site number information (SiteNumber field in the `sitedef` log) once the site has been occupied (by issuing a *site enter* command).

The *siteupdatenumber set* command sets the site number for an occupied site to *sitenumber.*

The *siteupdatenumber default* and the *siteupdatenumber clear* commands clear the site number for an occupied site.

The *siteupdatenumber clear* command clears the site number for an occupied site.

Syntax

`siteupdatenumber set [`*`sitenumber`*`]`

`siteupdatenumber default|clear`

Message ID = 171

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Site number	NUL	8	Char[]	none	H+4
4	Reserved for future use	NUL	12	Char[]	none	H+12

Table 58: SITEUPDATENUMBER Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Site Number	clear	clear	NO

B.38 SITEUPDATENAME Set Occupied Site Name

The *siteupdatename* command allows you to configure the site name information (SiteName field in the `sitedef` log) once the site has been occupied (by issuing a *site enter* command).

The *siteupdatename set* command sets the site name for an occupied site to *sitename.*

The *siteupdatename default* command sets the name to “SITE”.

The *siteupdatename clear* command has no effect.

Syntax

`siteupdatename set` *`sitename`*

`siteupdatename default|clear`

Message ID = 170

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Site name	-	32	Char[]	none	H+4
4	Reserved for future use	NUL	12	Char[]	none	H+36

Table 59: SITEUPDATENAME Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Site Name	clear	clear	NO

B.39 SITEUPDATEANTHEIGHT Set Occupied Site Height

The *siteupdateantheight* command allows you to configure the site antenna height information (AntHeight field in the `sitedef` log) once the site has been occupied (by issuing a *site enter* command).

The *siteupdateantheight set* command sets the site antenna height for an occupied site to *antheight*.

The *siteupdateantheight default* and the *siteupdateantheight clear* commands clear the site antenna height for an occupied site.

Syntax

`siteupdateantheight set [`*`antheight`*`]`

`siteupdateantheight default|clear`

Message ID = 167

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Antenna height	0	4	Float	none	H+4
4	Reserved for future use	NUL	12	Char[]	none	H+8

Table 60: SITEUPDATEANTHEIGHT Default Configuration

Parameter	Power-On	Freset	Stored in NVM
AntHeight	clear	clear	NO

B.40 SITEUPDATEANTTYPE Set Occupied Site Antenna

The *siteupdateanttype* command allows you to configure the site antenna type information (AntType field in the `sitedef` log) once the site has been occupied (by issuing a *site enter* command).

The *siteupdateanttype set* command sets the site antenna type for an occupied site to *anttype*.

The *siteupdateanttype default* and the *siteupdateanttype clear* commands clear the site antenna type for an occupied site.

The *siteupdateanttype clear* command clears the site antenna type for an occupied site.

Syntax

`siteupdateanttype set [`*`anttype`*`]`

`siteupdateanttype default|clear`

Message ID = 168

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Antenna type	NUL	16	Char[]	none	H+4
4	Reserved for future use	NUL	12	Char[]	none	H+20

Table 61: SITEUPDATEANTTYPE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
AntType	clear	clear	NO

B.41 SITEUPDATEATTRIBUTE Set Occupied Site Attributes

The *siteupdateattribute* command allows you to configure the site attribute information (Attrib field in the `sitedef` log) once the site has been occupied (by issuing a *site enter* command).

The *siteupdateattribute set* command sets the site attribute for an occupied site to *attrib*.

The *siteupdateattribute default* and the *siteupdateattribute clear* commands clear the site attribute for an occupied site.

Syntax

`siteupdateattribute set [`*`attrib`*`]`

`siteupdateattribute default|clear`

Message ID = 169

Field	Data	Value Used if Not Specified	Bytes	Format	Units	Offset
1	Header	-		-	-	0
2	Parameter Update, see *Table 34* on *Page 107*	-	4	Enum	none	H
3	Attribute	0	4	Int	none	H+4
4	Reserved for future use	NUL	12	Char[]	none	H+8

Table 62: SITEUPDATEATTRIBUTE Default Configuration

Parameter	Power-On	Freset	Stored in NVM
Attribute	clear	clear	NO

B.42 SOFTPOWER Simulate a Power-Button Off

The *softpower* command allows you to simulate a power-button Off.

The *softpower now* command simulates a power-button Off. The *softpower now* command does not set the “power button pressed” bit in the receiver status word.

Syntax

```
softpower now
```

Message ID = 213

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Softpower, see *Table 63*	4	Enum	-	H

Table 63: Softpower

Binary Value	ASCII Value	Description
1	NOW	Simulate a power-button Off immediately.

B.43 WRITE Create User Data Logs

The *write* command/log allows you to create logs which contain user data.

The *write* command allows you to supply user data for the *write* log. Upon receipt of the *write* command, the receiver generates a *write* log to all destinations which have been configured to send *write* logs with a *log write onnew* command.

All of the supplied arguments are echoed in the generated *write* log.

If written to a logfile, the *previous* argument is overwritten to indicate the file offset (from the beginning of the file) of the previous *writeb* or *writehexb* log. The first record in a logfile has this field set to 0.

length specifies the number of bytes supplied as *data*.

data is up to 1024 bytes, and is ASCII data if the *write* command is issued in ASCII but can be binary in a binary *write* message.

Syntax

`write` *`previous type length data`*

Message ID = 257

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Previous	4	Ulong	Bytes	H
3	Type	4	Ulong		H+4
4	Length	4	Ulong	Bytes	H+8
5	Data	Max. 1024	Char[]		H+16

B.44 WRITEFILE Create/Append Files on CF Card

The *writefile* command allows you to create files on the CF card or append data to an existing file on the CF card.

The *writefile* command writes *data* to a file named *filename* on the CF card. If a file named *filename* does not exist, the file is created. If a file named *filename* already exists, data is appended to the end of the file. Only simple filenames (maximum 8 characters and an optional 3-character extension) are supported. *data* is up to 1024 bytes, and is ASCII data if the *writefile* command is issued in ASCII but can be binary in a binary *writefile* message.

length specifies the number of bytes supplied as *data*.

Syntax

`writefile` *`filename length data`*

Message ID = 204

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Filename	12	Char[]		H
3	Length	4	Ulong	Bytes	H+12
4	Data	Max. 1024	Char[]		H+16

B.45 WRITEFILEHEX Create/Append Data to CF Card

The *writefilehex* command allows you to create files on the CF card or append data to an existing file on the CF card in Hexbyte format.

The *writefilehex* command writes *data* to a file named *filename* on the CF card. If a file named *filename* does not exist, the file is created. If a file named *filename* already exists, data is appended to the end of the file. Only simple filenames (maximum 8 characters and an optional 3-character extension) are supported. *data* is up to 1024 joined hexadecimal pairs if the *writefilehex* command is issued in ASCII, and is 1024 bytes in a binary *writefilehex* message.

length specifies the number of bytes supplied as *data*.

Syntax

`writefilehex` *`filename length data`*

Message ID = 240

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Filename	12	Char[]		H
3	Length	4	Ulong	Bytes	H+12
4	Data	Max. 1024	Hexbyte		H+16

B.46 WRITEHEX Create User Data Logs

The *writehex* command/log allows you to create logs which contain user data.

The *writehex* command allows you to supply user data for the *writehex* log. Upon receipt of the *writehex* command, the receiver generates a *writehex* log to all destinations which have been configured to send *writehex* logs with a *log writehex onnew* command.

All of the supplied arguments are echoed in the generated *writehex* log.

If written to a logfile, the previous argument is overwritten to indicate the file offset (from the beginning of the file) of the previous *writeb* or *writehexb* log. The first record in a logfile has this field set to 0.

length specifies the number of bytes supplied as *data*.

data is up to 1024 joined hexadecimal pairs if the *writehex* command is issued in ASCII, and is 1024 bytes in a binary *writehex* message.

Syntax

`writehex` *`previous type length data`*

Message ID = 205

Field	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Previous	4	Ulong	Bytes	H
3	Type	4	Ulong		H+4
4	Length	4	Ulong	Bytes	H+8
5	Data	Max. 1024	Hexbyte		H+12

Appendix C Logs

The DL-V3 firmware generates the logs in *Table 64* (repeated in *Table 65* on *Page 148* in the order of their binary messages IDs), in addition to those of the OEMV Family log set. Refer also to the *OEMV Family Firmware Reference Manual* available from our website at:

http://www.novatel.com/support/docupdates.htm

Table 64: DL-V3 Logs in Alphabetical Order

Message ID	ASCII Log	Description
187	CURRENTSET	Set *currentfile* and *currentgroup* command configuration
159	DIRENT	CF card file list
798	EXTLEVELS	Extended hardware levels
158	FILECHANNEL	Log file channel configuration
147	FILEHDR	Log file header
8192	FILETRANSFER	CF card file transfer packet
754	GROUPCOMCONFIG	COM port configuration information
148	GROUPDEF	Log group configuration
150	METDEF	Meteorological parameters
156	PROJECTDEF	Project definition
799	PWRSTATUS	Power levels and status
93	RXSTATUS	DL-V3 status
94	RXSTATUSEVENT	DL-V3 status event notification
153	SITEDEF	Site configuration
37	VERSION	Hardware versions, software versions, and serial numbers
257	WRITE	User-generated information
205	WRITEHEX	User-generated information

Table 65: DL-V3 Logs in Order of their Message IDs

Message ID	ASCII Log	Description
37	VERSION	Hardware versions, software versions, and serial numbers
93	RXSTATUS	DL-V3 status
94	RXSTATUSEVENT	DL-V3 status event notification
147	FILEHDR	Log file header
148	GROUPDEF	Log group configuration
150	METDEF	Meteorological parameters
153	SITEDEF	Site configuration
156	PROJECTDEF	Project definition
158	FILECHANNEL	Log file channel configuration
159	DIRENT	CF card file list
187	CURRENTSET	Set *currentfile* and *currentgroup* command configuration
205	WRITEHEX	User-generated information
257	WRITE	User-generated information
754	GROUPCOMCONFIG	COM port configuration information
798	EXTLEVELS	Extended hardware levels
799	PWRSTATUS	Power levels and status
8192	FILETRANSFER	CF card file transfer packet

For a complete listing and description of the other logs that the DL-V3 is capable of generating, please consult the *OEMV Family Firmware Reference Manual*. It also contains procedures and explanations related to data logging.

✉ Before proceeding to describe these logs, mention should be made of the DL-V3 data file format (*.PDC). Please see *PDC Files* on *Page 149*.

C.1 PDC FILES

In a PDC file, the sequence of data exists in the following format:

Header
FILEHDRB
GPS Logs
SITELOGB #1
GPS Logs
: .
GPS Logs
SITELOGB #n
GPS Logs
EOF

Site records' meteorological logs (MET) may occur at arbitrary locations throughout the file. The records are linked to allow easy extraction. The file header information block consists of 128 bytes, see *Table 66.*

Table 66: PDC Log Header

Item	Type	Size	Description	Range	Offset
Description	char	60	File Description. ^Z can be included to indicate that the description is less than 60 characters.		0
EOF	byte	1	C:\ TYPE does not pass this point (artificial End of File)	^Z	60
Signature	char	7	"NOVATEL"		61
FileCode	byte	1	Indicates the type of file.		68
Version	byte	1	Version number	0+	69
Revision	byte	1	Revision number	0 to 99	70
Reserved	byte	57	Reserved for future use		71

The HDRB and GRPB logs are binary versions of the HDRA and GRPA logs described in the following sections.

Table 67: Serial Port Identifiers

Port Identifier		Description
ASCII	Binary	
COM1	1	COM port 1
COM2	2	COM port 2
COM3	3	COM port 3
THISPORT	6	The current COM port
FILE_ALL	7	All virtual ports which may be associated with a file on the CF card
ALL	8	All COM ports
USB1 [a]	13	USB port 1
USB2 [a]	14	USB port 2
USB3 [a]	15	USB port 3
AUX	16	Auxiliary (AUX) port
FILE_0	224	File on the CF card, virtual port 0
...		
FILE_31	255	File on the CF card, virtual port 31

a. The only other field that applies when a USB port is selected is the echo field. A place holder must be inserted for all other fields to use the echo field in this case.

Table 68: Parity

Binary	ASCII	Description
0	N	No parity
1	E	Even parity
2	O	Odd parity

Table 69: Handshaking

Binary	ASCII	Description
0	N	No handshaking
1	XON	XON/XOFF software handshaking
2	CTS	CTS/RTS hardware handshaking

Table 70: Serial Port Interface Modes

Binary Value	ASCII Mode Name	Description
0	NONE	The port accepts/generates nothing
1	NOVATEL	The port accepts/generates NovAtel commands and logs
2	RTCM	The port accepts/generates RTCM corrections
3	RTCA	The port accepts/generates RTCA corrections
4	CMR	The port accepts/generates CMR corrections
5	Reserved	
6		
7		
8	RTCMNOCR	RTCM with no CR/LF appended [a]
9	CDGPS	The port accepts GPS*C data [b]
10	TCOM1	INTERFACEMODE tunnel modes. To configure a full duplex tunnel, configure the baud rate on each port. Once a tunnel is established, the baud rate does not change. Special characters, such as a BREAK condition, do not route across the tunnel transparently and the serial port is altered. Refer to the COM command in the *OEMV Family Firmware Reference Manual*. Only serial ports may be in a tunnel configuration: COM1, COM2, COM3 or AUX may be used. For example, configure a tunnel at 115200 bps between COM1 and COM3: COM AUX 115200 COM COM1 115200 INTERFACEMODE COM3 TCOM1 NONE OFF INTERFACEMODE COM1 TCOM3 NONE OFF The tunnel is fully configured to receive/transmit at a baud rate of 115200 bps.
11	TCOM2	
12	TCOM3	
13	TAUX [c]	
14	RTCMV3	The port accepts/generates RTCM Version 3.0 corrections
15	NOVATELBINARY	The port only accepts/generates binary messages. If an ASCII command is entered when the mode is set to binary only, the command is ignored. Only properly formatted binary messages are responded to and the response is a binary message.

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Binary Value	ASCII Mode Name	Description
16-17	Reserved	
18	GENERIC	The port accepts/generates nothing. SEND/SENDHEX commands from another port generate data on this port. Any incoming data on this port can be seen with PASSCOM logs on another port, refer to the *OEMV Family Firmware Reference Manual.*

a. An output interfacemode of RTCMNOCR is identical to RTCM but with the CR/LF appended. An input interfacemode of RTCMNOCR is identical to RTCM and functions with or without the CR/LF.
b. CDGPS has three options for output of differential corrections - NMEA, RTCM, and GPS*C. If you have a ProPak-V3 receiver, you do not need to use the INTERFACEMODE command with CDGPS as the argument. The CDGPS argument is for use with obsolete external non-NovAtel CDGPS receivers. These receivers use GPS*C (NavCanada's proprietary format differential corrections from the CDGPS service).
c. The AUX port, and therefore TAUX mode, is only available on OEMV-2-based and OEMV-3-based products.

C.2 CURRENTSET CURRENTFILE/CURRENTGROUP Configuration

The CURRENTSET log contains the current file, current filetransfer packet, current file dumpmode, and current group setting for the receiver.

Structure: Message ID = 187
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	File	Current file as set by the CURRENTFILE command, see *Page 89*	12	Char[ ]	-	H
3	FilePacket	Current packet as set by the CURRENTFILE command	4	Ulong	-	H+12
4	FileDumpMode	Dump mode as set by the CURRENTFILE command, see *Table 19, Dump Mode* on *Page 89*	4	Enum	-	H+16
5	Group	Current group as set by the CURRENTGROUP command, see *Page 90*.	12	Char[ ]	-	H+20

C.3 DIRENT CF Card File List

The DIRENT log contains the current file contents of the receiver's CF card. Up to 512 files can be listed using this message.

The date and time for the DIRENT log is in UTC (Universal Coordinated Time). If the DL-V3 receiver has no almanac, UTC is unavailable.

The Date of Last Change field has 4 decimal digits reserved for the year, followed by 2 decimal digits reserved for the month, and 2 decimal digits for the day.

Example: Date of September 5, 2001

Date of Last Change field for this date when converted to a Ulong has a value of 20010905. The following steps can be used to obtain the various parts of the Date of Last Change field:

Ulong Year = (Ulong)(DateOfLastChange / 10000)

Ulong Month = (Ulong)((DateOfLastChange - (Year * 10000)) / 100)

Ulong Day = (Ulong)(DateOfLastChange - (Year * 10000) - (Month * 100))

The Time of Last Change field is similar to the Date of Last Change field, in that the value of the field has 2 decimal digits reserved for the hour, followed by 2 decimal digits for the minutes, and 2 decimal digits for the seconds.

Example: Time of 16:01:25

Time of Last Change field when converted to a Ulong has a value of 160125. The following steps can be used to obtain the various parts of the Time of Last Change field:

Ulong Hour = (Ulong)(TimeOfLastChange / 10000)

Ulong Minutes = (Ulong)((TimeOfLastChange - (Hour * 10000)) / 100)

Ulong Seconds = (Ulong)(TimeOfLastChange - (Hour * 10000) - (Minutes * 100))

Structure:	Message ID = 159
	Log Type: Polled

Field	Data	Bytes	Format	Units	Offset
1	Header, see *Page 149*		-	-	0
2	Filename	12	Char[ ]	none	H
3	Size (bytes)	4	Ulong	bytes	H+12
4	Size (packets)	4	Ulong	packets	H+16
5	Date of Last Change	4	Ulong	yyyymmdd	H+20
6	Time of Last Change	4	Ulong	hhmmss	H+24

C.4 EXTLEVELS Extended Hardware Levels

The EXTLEVELS log contains extended hardware level information for the receiver.

Voltage fields are reported to three decimal places (mV precision). The temperature field is reported to one decimal place.

Structure: Message ID = 798
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	GPS temp	GPS subsystem temperature	4	Float	Celsius	H
3	ant current	Antenna current	4	Float	A	H+4
4	core volt	GPS subsystem CPU core voltage	4	Float	V	H+8
5	supply volt	GPS subsystem supply voltage	4	Float	V	H+12
6	rf volt	5V RF supply voltage	4	Float	V	H+16
7	int lna volt	Internal LNA voltage	4	Float	V	H+20
8	lna volt	LNA voltage (internal or external)	4	Float	V	H+24
9	Reserved for future use		4	Ulong	-	H+28
10			4	Float	-	H+32
11			4	Float	-	H+36
12	disk space	Remaining space on CF card	4	Ulong	bytes	H+40
13	Reserved for future use		4	Float	-	H+44
14			4	Float	-	H+48
15			4	Float	-	H+52
16			4	Float	-	H+56
17			4	Float	-	H+60
18			4	Float	-	H+64

C.5 FILECHANNEL Log File Channel Configuration

The FILECHANNEL log contains configuration of all file channels on the receiver.

Structure: Message ID = 158
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	DiskSpace	Number of free bytes on the CF card	4	Ulong	bytes	H
3	FCModel	CF card model	40	Char[ ]	-	H+4
4	FCVersion	CF card firmware version	8	Char[ ]	-	H+44
5	DiskCapacity	Total number of bytes on the CF card	4	Ulong	bytes	H+52
6	Reserved for future use		16	Char[ ]	-	H+56
7	#Channels	Number of channels associated with files	4	Ulong	-	H+72
8	Channel	File port channel, see *Table 54* on *Page 134*	4	Enum	-	H+76
9	SatLimit	Number of SV filter	4	Int	-	H+80
10	Reserved for future use		4	Ulong	-	H+84
11			4	Ulong	-	H+88
12	FileName	Name of open logfile	12	Char[ ]	-	H+92
	Next File Port offset = H + 76 + (N*28)					

C.6 FILEHDR Logfile Header

The FILEHDR log contains header information for the file specified by *currentfile*.

Structure: Message ID = 147
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	FileName	File name at creation	12	Char[ ]	-	H
3	FileSize	File size	4	Ulong	bytes	H+12
4	MinSats [a]	Minimum SVs used for position logs	4	Ulong	-	H+16
5	StartGPSWeek [a]	GPS Week of first log	4	Ulong	-	H+20
6	EndGPSWeek [a]	GPS Week of last log	4	Ulong	-	H+24
7	StartGPSmSec [a]	GPS Seconds of first log	4	GPSs [b]	ms, s	H+28
8	EndGPSmSec [a]	GPS Seconds of last log	4	GPSs [b]	ms, s	H+32
9	Reserved for future use		4	Int	-	H+36
10			8	Double	-	H+40
11			4	Ulong	-	H+48
12			4	Ulong	-	H+52
13	FileStatus	File status information, see *Table 71* on *Page 159*	4	Hexulong	-	H+56
14	VersionP	File position of the first *versionb* log	4	Ulong	-	H+60
15	TimeP	File position of the first *timeb* log	4	Ulong	-	H+64
16	ProjectP	File position of the first *projectdefb* log	4	Ulong	-	H+68
17	GroupP	File position of the first *groupdefb* log	4	Ulong	-	H+72

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Field	Data	Description	Bytes	Format	Units	Offset
18	SiteP	File position of the last *sitedefb* log	4	Ulong	-	H+76
19	MetP	File position of the last *metdefb* log	4	Ulong	-	H+80
20	WriteP	File position of the last *writeb* or *writehexb* log.	4	Ulong	-	H+84
21	Reserved for future use		4	Ulong	-	H+88
22			4	Ulong	-	H+92
23			4	Ulong	-	H+96
23			4	Ulong	-	H+100

a. These fields only reflect the set of messages/logs filtered by the SATLIMIT filter, see *Page 133*.
b. GPSs format represents GPS time of the week (Ulong milliseconds in binary logs, floating-point seconds in ASCII logs).

Table 71: File Status

File Status Bit	Description	Bit=0	Bit=1
0x00000001	File access status	OK	error
0x00000002	Flag to indicate if *rangea/b* and/or *rangecmpa/b* logs are present in the file	absent	present
0x00000004	Flag to indicate if *rawephema/b* logs are present in the file	absent	present
0x00000008	Flag to indicate if *almanaca/b* logs are present in the file	absent	present
0x00000010	Flag to indicate if *ionutca/b* logs are present in the file	absent	present
0x00000020	Flag to indicate if *bestposa/b* and/or *rtkposa/b* logs are present in the file	absent	present

C.7 FILETRANSFER Log File Contents

The FILETRANSFER log contains partial, or complete, file contents of the DL-V3 log file that is currently set as the *currentfile*. If the *currentfile* specified for the receiver is open (if logging is in progress), fields 2 and 3 of the FILETRANSFER log are set to zero (0). If a *currentfile* for the receiver is not set or specified, fields 2 and 3 of the FILETRANSFER log are set to zero (0).

The Packet ID field ranges from 0 to (the number of packets - 1). The first packet of a file that spans more than one FILETRANSFER is numbered 0, and increments until all file packets are received.

The Sequence# field in the binary log header counts in the inverse direction, and contains the number of packets remaining in the current FILETRANSFER sequence, with the last packet having Sequence# set to 0. If there are more packets left in the transfer sequence than the capacity of the Sequence# field, the Sequence # field is set to its maximum value.

✉ The Data field is variable in size. The last data array in the file typically contains fewer than 1024 bytes, but all previous data arrays contain exactly 1024 bytes. This means that the binary FILETRANSFER message itself is also variable in size. Please check the header information to determine the message size and the Length field to determine the number of valid bytes in the Data field.

Structure: Message ID = 8192

Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*	H	-		0
2	Packet ID	Packet identification number from 0 to (the number of packets - 1)	4	Ulong	-	H
3	Length	Number of valid bytes in the Data field	4	Ulong	Bytes	H+4
4	Data	Data array	(Max. 1024)	Hexbyte	-	H+8

C.8 GROUPCOMCONFIG COM Port Configuration Information

The `groupcomconfig` log contains COM port configuration information for the *currentgroup* specified for the receiver.

If no valid *currentgroup* selection is specified, this log lists COM port configurations for all groups present on the receiver.

Structure: Message ID = 754
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*	-	-	-	0
2	Group name	Group name	12	Char[ ]		H
3	# ports	Number of ports	4	Long		H+12
4	Port	Serial port identifier, see *Table 67* on *Page 150*	4	Enum		H+16
5	Status	Com config status word, see *Table 72* on *Page 162*	4	HexUlong		H+20
6	Baud	Communication baud rate	4	ULong		H+20
7	Parity	See *Table 68* on *Page 150*	4	Enum		H+24
8	Databits	Number of data bits	4	ULong		H+28
9	Stopbits	Number of stop bits	4	ULong		H+32
10	Handshake	See *Table 69* on *Page 150*	4	Enum		H+36
11	Echo	When echo is on, the port is transmitting any input characters as they are received. 0 = OFF 1 = ON	4	Enum		H+40
12	Breaks	Breaks are turned on or off 0 = OFF 1 = ON	4	Enum		H+44
13	Rx_type	The status of the receive interface mode, see *Table 70, Serial Port Interface Modes* on *Page 151*	4	Enum		H+48

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Field #	Data	Description	Bytes	Format	Units	Offset
14	Tx_type	The status of the transmit interface mode, *Table 70, Serial Port Interface Modes* on *Page 151*	4	Enum		H+52
15	Responses	Responses are turned on or off 0 = OFF 1 = ON	4	Enum		H+56
16	comvout	COMVOUT action, *Table 18* on *Page 88*	4	Enum		H+60
17	Reserved	Reserved field	4	ULong		H+64
18…	Next port offset = H + 16 + (#port x 56)					

Table 72: GROUPCOMCONFIG Status Word

Status Bit	Description	Bit=0	Bit=1
0x0000 0001	Com port parameters configured	not-configured	configured
0x0000 0002	Interfacemode parameters configured	not-configured	configured
0x0000 0004	Comvout parameters configured	not-configured	configured

C.9 GROUPDEF Log Group Configuration

The GROUPDEF log contains configuration information for a *group* definition on the receiver, for the *group* identified by the *currentgroup* setting. If no valid *currentgroup* selection is specified, this log lists information for all groups present on the receiver.

✉ 1. This log structure is backwards-compatible with existing PDC and OEMV firmware. There are changes to this log from previous versions in fields 9, 10 and 20.

2. This log no longer contains all of the information that defines a *group*. A GROUPCOMCONFIG log is also needed to complement the information in the GROUPDEF log.

Structure: Message ID = 148
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	GroupName	Group name	12	Char	-	H
3	SessionName	Session name (set to null)	8	Char	-	H+12
4	AntSN	Antenna serial number	16	Char	-	H+20
5	AntType	Antenna type	16	Char	-	H+36
6	AntHeight	Antenna height	4	Float	Metres	H+52
7	GroupEcutoff	Group elevation cut-off angle (set in the GROUPECUTOFF command)	4	Float	Degrees	H+56
8	SatLimit	Number of SV filter	4	Integer	-	H+60
9	GroupStatus1	Group Status1 word, see *Table 75* on *Page 166*	4	HexUlong	-	H+64
10	GroupStatus2	Group Status2 word, see *Table 76* on *Page 167*	4	Ulong	-	H+68
11	Lat	Latitude [a]	8	Double	(Degrees) (s)	H+72
12	Lon	Longitude [a]	8	Double	(Degrees) (s)	H+80

Continued on Page 164

Field	Data	Description	Bytes	Format	Units	Offset
13	Ht	Height [a]	8	Double	(m)	H+88
14	Site#	Site number	8	Char	-	H+96
15	SiteName	Site name	32	Char	-	H+104
16	DGPS Type	DGPS ID type, see *Table 73* on *Page 165*	4	Enum	-	H+136
17	DGPS ID	5 char ID string or “ANY” ANY type defaults: RTCM - 0 RTCA - AAAA CMR - 0 The following range values are in affect: $0 \leq$ CMR ID ≤ 31 $0 \leq$ RTCM ID ≤ 1023 RTCA: any four character string containing only alpha (a-z) or numerical characters (0-9)	5	Char	-	H+140
18	Reserved for future use		1	UChar	-	H+145
19			2	UShort	-	H+146
20	ComInterface	COM1/COM interface modes, see	4	ULong	-	H+148
21			8	Double	-	H+152
22			4	Int	-	H+160
23	#Specs	Number of log specifications to follow	4	Ulong	-	H+164
24	Message ID	Message ID: 2 LSB Message Format: 2 MSB where 0 = Binary 1 = ASCII	4	Ulong	-	H+168
26	Trigger	Log trigger, refer to the LOG command in the *OEMV Family Firmware Reference Manual*	4	Enum	-	H+172
27	Rate	Log rate	4	Float	Seconds	H+176

Continued on Page 165

Field	Data	Description	Bytes	Format	Units	Offset
28	Port	Serial port identifier, see *Table 67* on *Page 150*.	4	Enum	-	H+180
29	Reserved for future use		4	Float	-	H+184
30			2	Ushort	-	H+188
31			1	Uchar	-	H+190
32			1	Uchar	-	H+191
	Next Log Spec Offset = H + 168 + (N * 24)					

a. A Group Status1(field 9) output of `Position Average Enable` indicates that these GROUPDEFB fields are used to represent averaging options. Analogously, a Group Status1 output of `Position Fix Enable` indicates that fields represent the fixed position itself.

Table 73: DGPS Type

DGPS Type Binary	DGPS Type ASCII	Description
0	RTCM	RTCM ID Type
1	RTCA	RTCA ID Type
2	CMR	CMR ID Type
10	AUTO	Automatic type

Table 74: COM1/COM2 Interface Modes

Value	Description
0x0000 00FF	COM1 Rx interface mode. The 1-byte binary value corresponds to the enumerated *Serial Port Interface Modes* table. [a]
0x0000 FF00	COM1 Tx interface mode. The 1-byte binary value corresponds to the enumerated *Serial Port Interface Modes* table. [a]
0x00FF 0000	COM2 Rx interface mode. The 1-byte binary value corresponds to the enumerated *Serial Port Interface Modes* table. [a]
0xFF00 0000	COM2 Tx interface mode. The 1-byte binary value corresponds to the enumerated *Serial Port Interface Modes* table. [a]

a. Refer to the *INTERFACEMODE* command in the *OEMV Family Firmware Reference Manual*

Table 75: Group Status1 Word

Group Status Bit	Description	Bit=0	Bit=1
0x01	Position fix flag	disabled	enabled
0x02	Position average enable flag	disabled	enabled
0x04	Survey type flag	static	kinematic
0x08	DGPSTxId configured flag	disabled	configured
0x10	Satlimit filter flag	not set	set
0x010000	COM1 interface mode flag	disabled	configured
0x020000	COM2 interface mode flag	disabled	configured
0x040000	COM1 responses flag	disabled	enabled
0x080000	COM2 responses flag	disabled	enabled
0x700000	COM1 Tx interface mode – the 3-bit binary value corresponds to the values in “Serial Port Interface Modes”, see *Table 70* on *Page 151*	N/A	N/A
0x03800000	COM1 Rx interface mode – the 3-bit binary value corresponds to the values in “Serial Port Interface Modes”	N/A	N/A
0x1c000000	COM2 Tx interface mode – the 3-bit binary value corresponds to the values in “Serial Port Interface Modes”	N/A	N/A
0xe0000000	COM2 Rx interface mode – the 3-bit binary value corresponds to the values in “Serial Port Interface Modes”	N/A	N/A

Table 76: Group Status2 Word

Group Status Bit	Description	Bit=0	Bit=1
0x0000 0001	COM1 COM parameters configured flag	not configured	configured
0x0000 0002	COM2 COM parameters configured flag	not configured	configured
0x0000 0004	COM3 COM parameters configured flag	not configured	configured
0x0000 0008	AUX COM parameters configured flag	not configured	configured
0x0000 0010	Reserved	not configured	configured
0x0000 0020		not configured	configured
0x0000 0040		not configured	configured
0x0000 1000	COM1 *interfacemode* configured flag	not configured	configured
0x0000 2000	COM2 *interfacemode* configured flag	not configured	configured
0x0000 4000	COM3 *interfacemode* configured flag	not configured	configured
0x0000 8000	AUX *interfacemode* configured flag	not configured	configured
0x0001 0000	Reserved	not configured	configured
0x0002 0000		not configured	configured
0x0004 0000		not configured	configured
0x0100 0000	COM1 *comvout* configured flag	not configured	configured
0x0200 0000	COM2 *comvout* configured flag	not configured	configured
0x0400 0000	COM3 *comvout* configured flag	not configured	configured
0x0800 0000	AUX *comvout* configured flag	not configured	configured

C.10 METDEF Meteorological Parameters

Structure: Message ID = 150
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	MetP	File position of the previous *metdefb* log	4	Ulong	bytes	H
3	Met Status	Meteorological log status information, see *Table 77*	4	Hexulong		H+4
4	Temp	Temperature, see also the METTEMP command on *Page 129*	4	Float	Celsius	H+8
5	Press	Pressure, see also the METPRESS command on *Page 128*	4	Float	hPa	H+12
6	Humid	Relative humidity, see also the METHUMID command on *Page 127*	4	Float	%	H+16

Table 77: Meteorological Log Status

Met Status Bit	Description	Bit=0	Bit=1
0x00000001	Temperature field flag	NOT VALID	VALID
0x00000002	Pressure field flag	NOT VALID	VALID
0x00000004	Humidity field flag	NOT VALID	VALID

C.11 PROJECTDEF Project Definition

Structure: Message ID = 156
Log Type: Polled

Field	Data	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	Project	Project description	32	Char		H
3	Agency	Agency description	32	Char		H+32
4	Observer	Observer description	32	Char		H+64

C.12 PWRSTATUS Power and Status Settings Summary

The PWRSTATUS log contains a summary of power and status settings for the DL-V3.

Voltage fields are accurate to ±5 mV.

✉ 1. When an external source is present, the power supply is cut off when the available system voltage is less than 9.0 V. Due to variances between units, and variance in voltage due to temperature, the exact cutoff voltage may vary. The DL-V3 is operational at 9.0 V.

2. The power supply to the DL-V3 COM3 port refers to the power status to the *Bluetooth* connection on the port. See additional comments in the *comvout* section on *Page 87*.

3. The DL-V3 contains a power regulator between the power connector on the front of the DL-V3 and the internal OEMV-3 card. A power supply of +9 to +28 V DC can be applied to the DL-V3 but before power reaches the OEMV-3 card, it is regulated, see *Figure 38* below. The RXHWLEVELS and EXTRXHWLEVELS logs output the post-regulated voltage for the OEMV-3 card. The PWRSTATUS log outputs the voltage for the DL-V3 system.

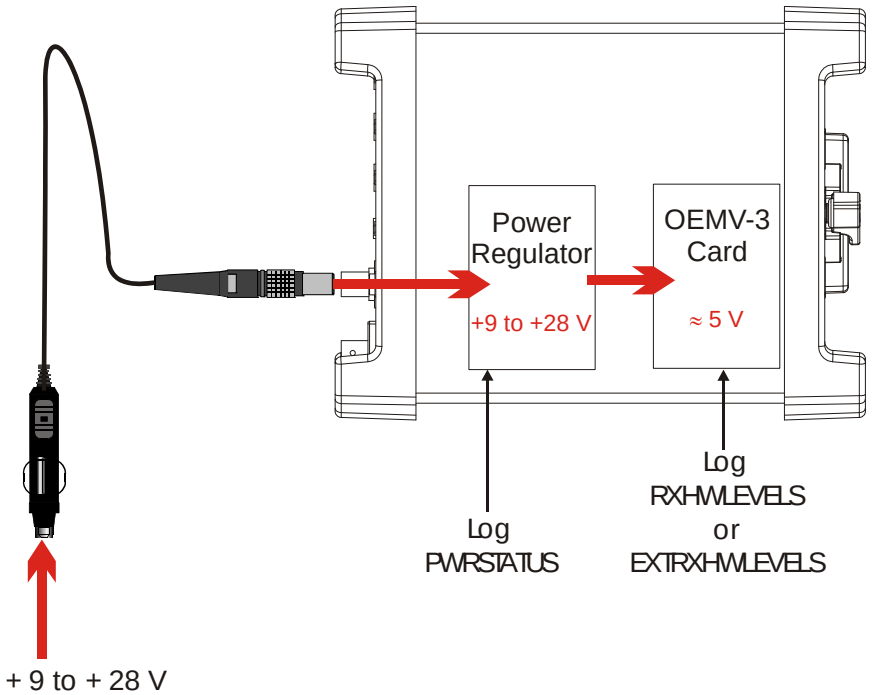


Figure 38: DL-V3 Voltage Parameter Logs

Structure: Message ID = 799

Log Type: Polled

Field #	Data	Bytes	Format	Units	Offset
1	Header		-	-	0
2	Port power status, see *Table 78* on *Page 171*	4	HexUlong	-	H+0
3	RXSTATUS auxiliary word 2, see *Table 79* on *Page 172*	4	HexUlong	-	H+4
4	RXSTATUS auxiliary word 3, *Table 80* on *Page 173*	4	HexUlong	-	H+8
5	Reserved	4	Float	V	H+12
6	Reserved	4	Float	V	H+16
7	External source voltage	4	Float	V	H+20
8	Reserved	4	Ulong	-	H+24
9	Reserved	4	Ulong	-	H+28
10	Reserved	4	Ulong	-	H+32
11	Reserved	4	Ulong	-	H+36
12	Reserved	4	Ulong	-	H+40
13	Reserved	4	Ulong	-	H+44
14	Reserved	4	Ulong	-	H+48

Table 78: Port Power Status

Power Status (Bits)	Description	Bit = 0	Bit = 1
0x00000001	Reserved		
0x00000002			
0x00000004	Peripheral power on COM2	Disabled	Enabled
0x00000008	Reserved		
0x00000010	Peripheral power on COM3	Disabled	Enabled
0x00000020	Reserved		
0x00000040	Peripheral power on AUX	Disabled	Enabled
0x00000080	Reserved		

C.13 RXSTATUS DL-V3 Status

The AUXILIARY2 and AUXILIARY3 status words of the RXSTATUS log are defined as in *Table 79* on *Page 172* and *Table 80* on *Page 173*, to indicate DL-V3 functionality. The corresponding priority, set and clear masks can be defined via the STATUSCONFIG command. Refer to the RXSTATUS log and STATUSCONFIG command in the *OEMV Family Firmware Reference Manual*.

✉ 1. These auxiliary word definitions replace those used in the DL-4 receivers.

2. The corresponding priority, set and clear masks can be defined via the OEMV STATUSCONFIG command.

Table 79: Auxiliary 2 Status Word

AUX2 Bit	Description	Bit=0	Bit=1	Trigger
0x00000001	DL-V3 status	not ready	ready	XCOM1 is initialized and ready for use
0x00000002	Shutdown indicator	no shutdown	shutting down	Press the power button or issue any of the *softpower*, *freset* or *reset* commands
0x00000004	DL-V3 boot status	boot in progress	boot done	All start-up events are complete
0x00000008	CF card status	not initialized	initialized	CF card removal or installation
0x00000010	File(s) status	all files closed	file(s) open	-
0x00000020	Site status	not occupied	occupied	-
0x00000040	Power button status	not pressed	pressed	Press the power button
0x00000080	Reserved			-
0x00000100				-
0x00000200	External power	not in use	in use	-

Continued on Page 173

AUX2 Bit	Description	Bit=0	Bit=1	Trigger
0x00000400	Reserved			-
0x00000800				-
0x00001000				-
0x00002000				-
0x00004000	Groupuse execution status	not in progress	in progress	-
0x00008000	Data quality status	not acceptable	acceptable	-
0x00010000	Reserved			-

Table 80: Auxiliary 3 Status Word

AUX3 Bit	Description	Bit=0	Bit=1	Trigger
0x00000001	Power source status	OK	fail	< 9 Volts
0x00000002	Reserved			-
0x00000004				-
0x00000008	CF card status	OK	error	Unable to initialize CF card and file services are unavailable
0x00000010	CF card full status	OK	error	CF card memory is full
0x00000020	API unrecoverable software error	OK	error	An unknown API software error has occurred and correct system behavior is no longer guaranteed
0x00000040	Peripheral power overload	OK	overload	Power > 1 Amp
0x00000080	Logfile name conflict	no conflict	conflict	On creation of the current logfile, the desired default name was already in use [a]

Continued on Page 174

AUX3 Bit	Description	Bit=0	Bit=1	Trigger
0x00000100	CF card - disk space low	OK	warning	There are less than 15 minutes of logging remaining at the current disk space consumption rate
0x00000200	High temperature error	OK	shutting down	Temperature > +85°C
0x00000400	Low temperature error	OK	shutting down	Temperature < -40°C

a. This should only apply when a logfile is opened via a *groupuse* command. This flag indicates that a default replacement filename was automatically generated instead of the system default.

C.14 RXSTATUSEVENT DL-V3 Status Event Notification

The RXSTATUSEVENT log set, refer to the *OEMV Family Firmware Reference Manual*, is extended to indicate DL-V3 functionality.

C.15 SITEDEF Site Configuration

Structure: Message ID = 153
Log Type: Polled

Field	Field Name	Description	Bytes	Format	Units	Offset
1	Header	Log header, see *Page 149*		-	-	0
2	SiteP	File position of the previous *sitedefb* log	4	Ulong	bytes	H
3	SiteNumber	Site number	8	Char		H+4
4	SiteName	Site name	32	Char		H+12
5	Attrib	Attribute code	4	Int		H+44
6	AntHeight	Antenna height	4	Float	m	H+48
7	AntType	Antenna type and measurement method	16	Char		H+52
8	FirstGPSWeek	Date of arrival	4	Ulong	GPS wk	H+68
9	LastGPSWeek	Date of departure	4	Ulong	GPS wk	H+72
10	FirstGPSSec	Time of arrival	4	GPSs [a]	ms, s	H+76
11	LastGPSSec	Time of departure	4	GPSs [a]	ms, s	H+80
12	SiteStatus	Site status, see *Table 81*	4	Hexulong		H+84
13	Reserved for future use		4	Ulong		H+88

a. GPSs format represents GPS time of the week (ULong milliseconds in binary logs, floating-point seconds in ASCII logs).

Table 81: Site Status

SiteStatus Bit	Bit Name	Description	Bit=0	Bit=1
0x00000001	SITE_ST_INVALID	No valid logs	logs received	no logs
0x00000002	SITE_ST_STARTTRUNCATE	Site occupation start time truncation flag	not truncated	truncated
0x00000004	SITE_ST_ENDTRUNCATE	Site occupation end time truncation flag	not truncated	truncated

C.16 VERSION HW & SW Versions and Serial Numbers

The Component Type of the VERSION log, refer to the *OEMV Family Firmware Reference Manual*, is extended to include DL-V3 information as in *Table 82*.

Table 82: Component Type

Binary Value[a]	ASCII Value	Description
0	UNKNOWN	Unknown Component
1	GPSCARD	OEMV GPSCard Component
3	ENCLOSURE	DL-V3 Receiver
8	USERINFO	User-application information component
981073925 (0x3A7A0005)	DB_USERAPPAUTO	Auto-starting user-application firmware

a. Unused numbers are reserved for future use.

C.17 WRITE User-Generated Information

Please see the WRITE command on *Page 143*.

C.18 WRITEHEX User-Generated Information

Please see the WRITEHEX command on *Page 146*.

Appendix D Ethernet Configuration

This section details the ethernet configuration for the DL-V3 including automatic Ethernet configuration on start-up.

On power-up, or after a FRESET command, the DL-V3 automatically configures the Ethernet device. This configuration includes the following settings:

- Static IP address: 192.168.1.223
- Subnet mask: 255.255.255.0
- Ethernet Line 1 speed: 115 200 bps

If the receiver is turned off, or power is removed, the Ethernet or *Bluetooth* mode on COM3 is returned to whichever mode was applied before power-down when it is powered up again. When you issue a FRESET command, COM3 defaults to *Bluetooth* mode.

D.1 Physical Set-Up

Below are the configuration methods described in this section and the hardware you require to set them up:

- Configuration Via Network Cable
  - DL-V3 with power cable and serial communications cable
  - User-supplied laptop with an available Ethernet port, serial port (or USB port with NovAtel serial to USB drivers) and the Lantronix software, described below, installed
  - Sheilded CAT5 Ethernet cross-over cable (or use a switch with a straight through Ethernet cable)
- Configuration Via Serial and Network Parameters
  - DL-V3 with power cable
  - User-supplied laptop with the Lantronix software, described below, installed
  - Serial null-modem cable to connect from the laptop and switch between COM1 and COM2 on the DL-V3. You can avoid switching if you have two serial connections on your laptop and two null-modem cables. Also, if your laptop has only USB connectors, you need a USB to serial adaptor between the null-modem cable and the laptop's USB connector.
  - Sheilded CAT5 Ethernet cross-over cable (or use a switch with a straight through Ethernet cable)

In both cases, first install the **Com Port Redirector (CPR) Manager** program onto the laptop you intend to use with your DL-V3 from the Lantronix website at: http://www.lantronix.com/device-networking/utilities-tools/.

Figure 39 below shows the two methods of physically providing an Ethernet connection between your laptop and DL-V3. The top shows a direct connection using a sheilded CAT5 Ethernet cross-over cable and the bottom shows two straight-through sheilded CAT5 Ethernet cables with a DSS-5+ port

switch in between them.

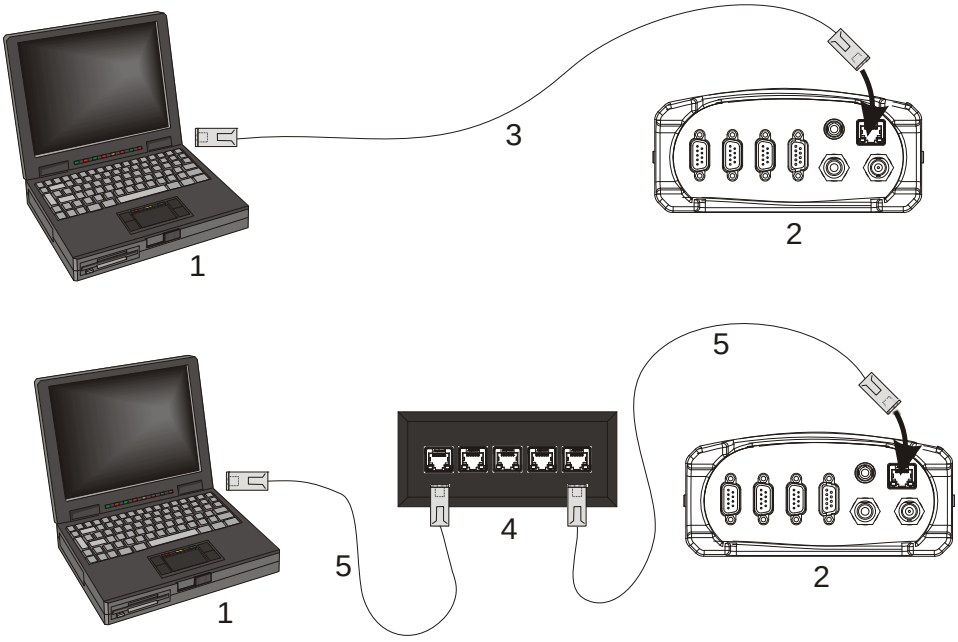


Figure 39: Sheilded CAT5 Ethernet Cable Connection

Reference	Description
1	User-supplied laptop computer with Ethernet connector
2	DL-V3 (powered)
3	User-supplied sheilded CAT5 Ethernet cross-over cable
4	User-supplied DSS-5+ Port Switch
5	User-supplied sheilded CAT5 Ethernet straight-through cables

D.2 Configuration Overview

The DL-V3's Ethernet settings are auto-configured on start-up. The static IP of 192.168.1.223 is provided.

It is not necessary to change the IP address provided but if you need to, you must configure it via network cable, see the next section.

D.2.1 Configuration Via Network Cable

To physically connect the DL-V3 to Ethernet, follow these steps:

1. Connect a sheilded CAT5 cross-over cable to a laptop with a free Ethernet port
2. Connect the other end of the sheilded CAT5 crossover cable to the DL-V3's Ethernet port

3. Connect the power cable to the DL-V3 and power-up the unit

D.2.2 Enable Ethernet on the DL-V3 Receiver

From the laptop, connect the DL-V3 to a serial, or USB, cable. Open communication with the receiver using HyperTerminal or **CDU**. Issue the following command (to switch COM3 from *Bluetooth* to Ethernet operation):

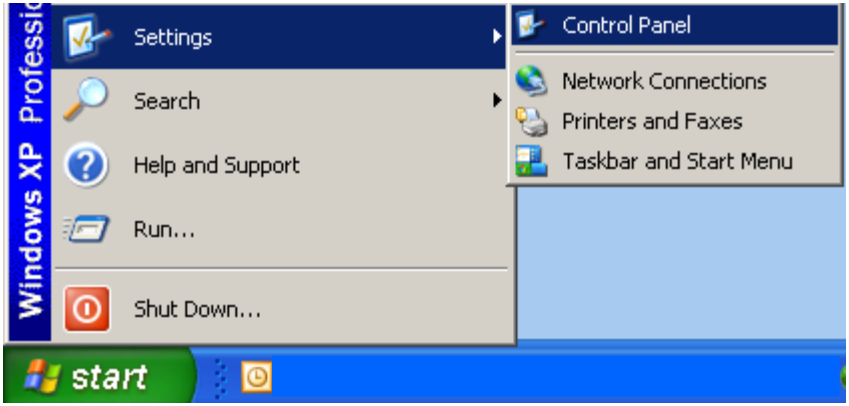
```
APPCONTROL BLUETOOTH 1
```

COM3 switches from the *Bluetooth* to the Ethernet device in the DL-V3. You can see this because the Ethernet LED, labelled  , on the DL-V3 glows orange.

D.2.3 Windows XP Network Settings

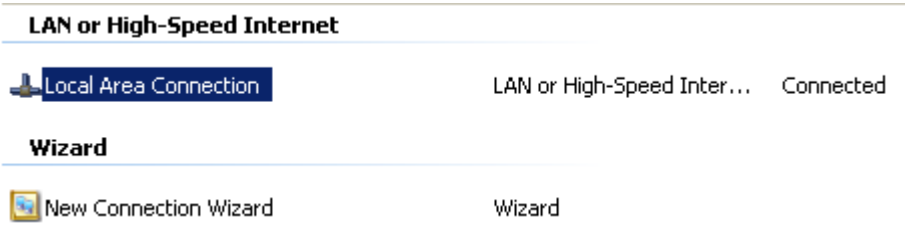
If using TCP/IP networking on a Windows XP-based PC/laptop, Windows may be configured to obtain an IP address automatically. However, an alternate IP must be configured manually rather than having an automatically generated private IP address. To do this, follow these steps:

1. Click on the *Start* button in Windows and select *Settings* | *Control Panel*.

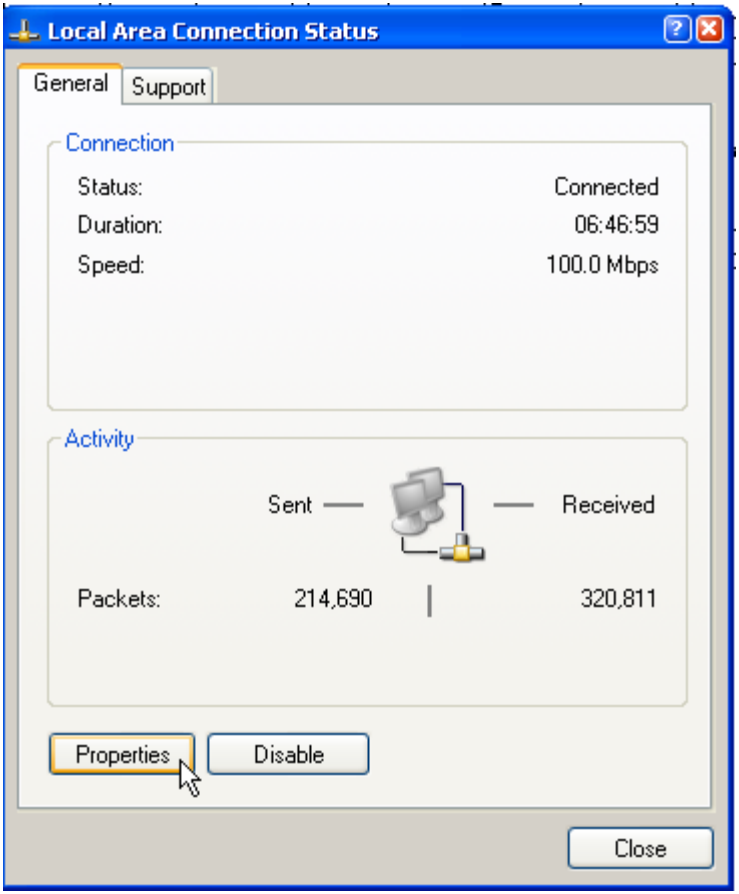


2. Select *Network Connections* in *Control Panel*, and double-click on it.

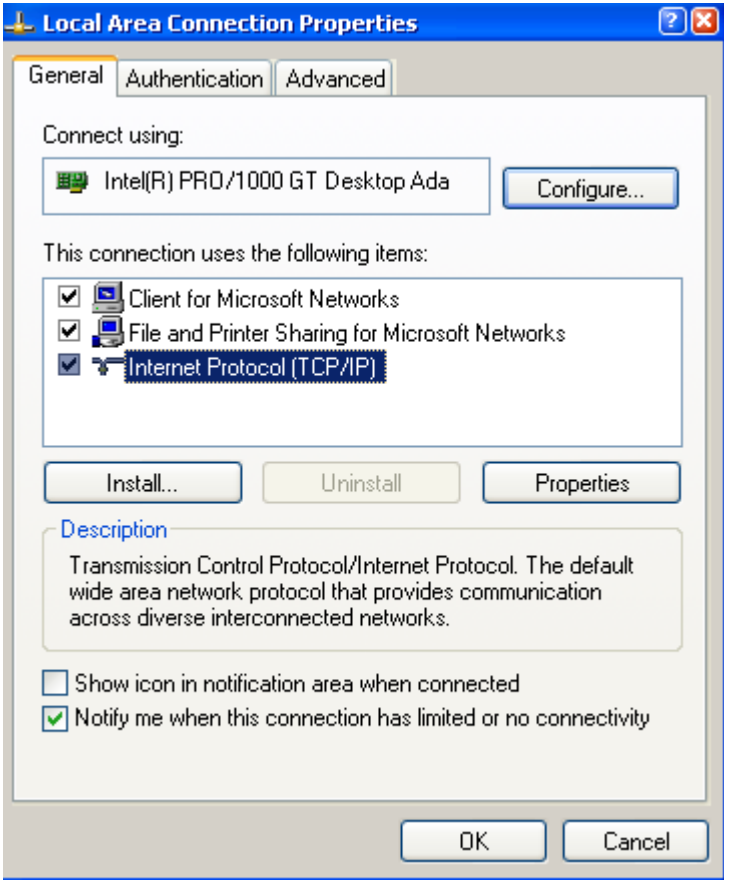
3. Highlight *Local Area Connection* and double-click on it.



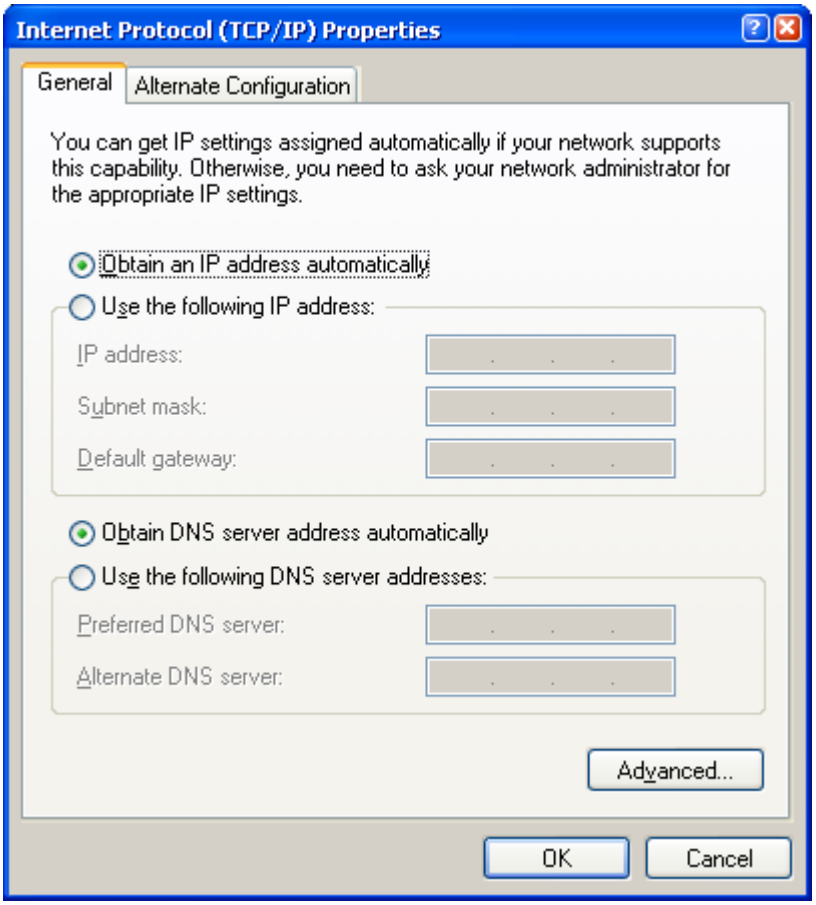
4. Click on *Properties* in the *General* tab in the *Local Area Connection* dialog that appears. The *Local Area Connection Properties* dialog appears.



5. Select *Internet Protocol (TCP/IP)* and click on the *Properties* button. The *Internet Protocol TCP/IP Properties* dialog appears.

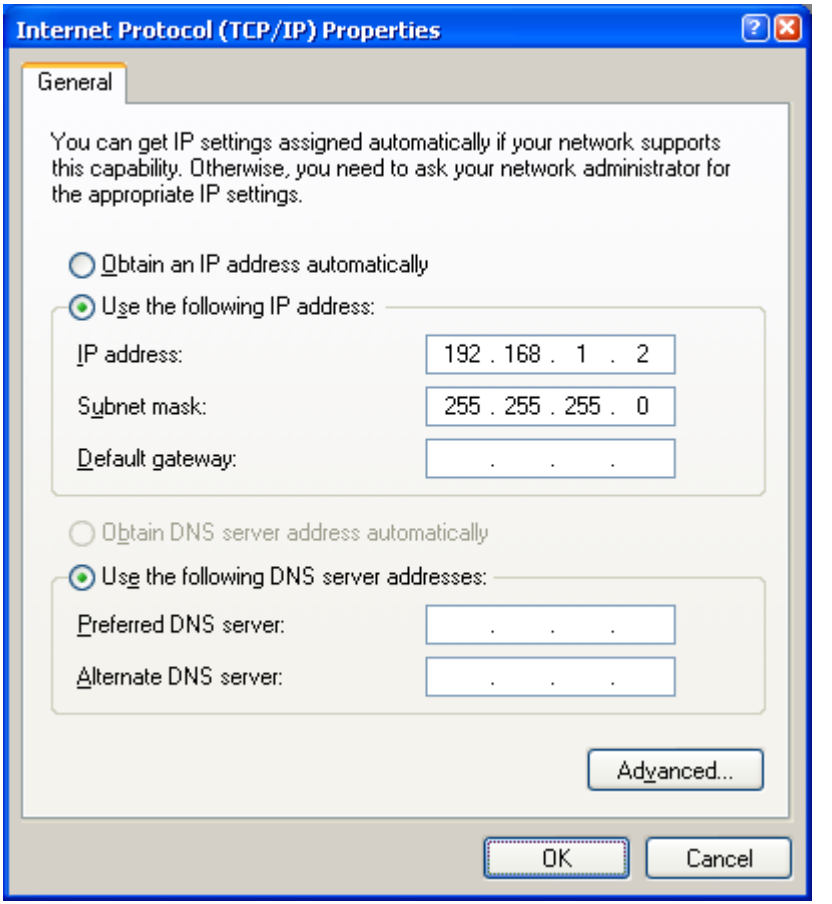


6. Ensure the *Obtain an IP address automatically* and *Obtain DNS server address automatically* radio buttons are selected in the *General* tab.



7. Select the *Alternate Configuration* tab in the *Internet Protocol (TCP/IP) Properties* dialog.

✉ *Step 7*, above, is very important. If the *Alternate Configuration* tab is not selected, this procedure will not work.



8. Ensure that the *User Configured* radio button is selected. Change the settings to something similar to the fictional examples shown on this page (check with your Network Administrator for details) and click *OK*.

✉ 1. The described IP address, and its respective submask and gateway, are for a private Auto IP, class B, designated IP address and you should obtain yours from your Network Administrator.

2. The 2 in the IP address above can be any digit between 1 and 255 except 223 so that the DL-V3 and PC/laptop do not have the same IP address.

3. **Record your IP Address and Network Mask numbers for future use.**

9. Click *OK* when you are returned to the *Local Area Connection Properties* dialog.
10. Click *Close* to complete the network configuration.
11. Restart the laptop for the settings to take effect.

D.2.3.1 Network Settings Configuration

Use a web browser to connect the PC/laptop, via the Ethernet cross-over cable, to the Ethernet port on the DL-V3.

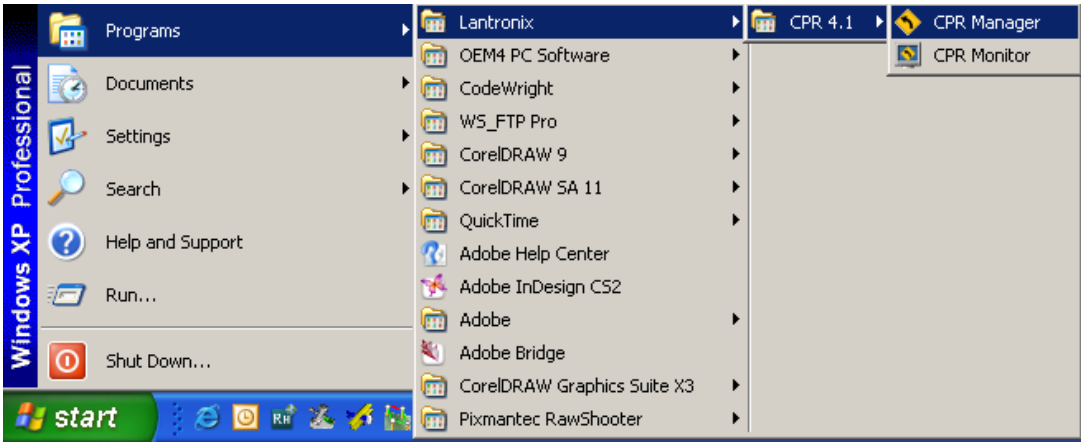
Type *http://192.168.1.223* in the *Address* field of the web browser. The authentication dialog prompts you for the username and password. Use *admin* as the username and *PASS* as the password. The Lantronix Ethernet device page opens where the Ethernet settings can be changed manually.

Use the *appcontrol option 12 9* command in **CDU** to reset the Ethernet settings back to their defaults.

The Ethernet device is now ready to communicate with the DL-V3. In order for a client to communicate with the Ethernet device using existing communications tools such as HyperTerminal, the Ethernet device's IP address must be mapped to a virtual serial port within the Lantronix Port Redirector utility. *Section D.2.4, Lantronix Port Redirector Software*, starting below, describes the configuration process.

D.2.4 Lantronix Port Redirector Software

Run the Lantronix COM Port Redirector (CPR) Manager software from the *Start* | *All Programs* | *Lantronix* menu.



The main *CPR Manager* screen appears, see *Figure 40* on *Page 186*. Select the *General Tests* tab.

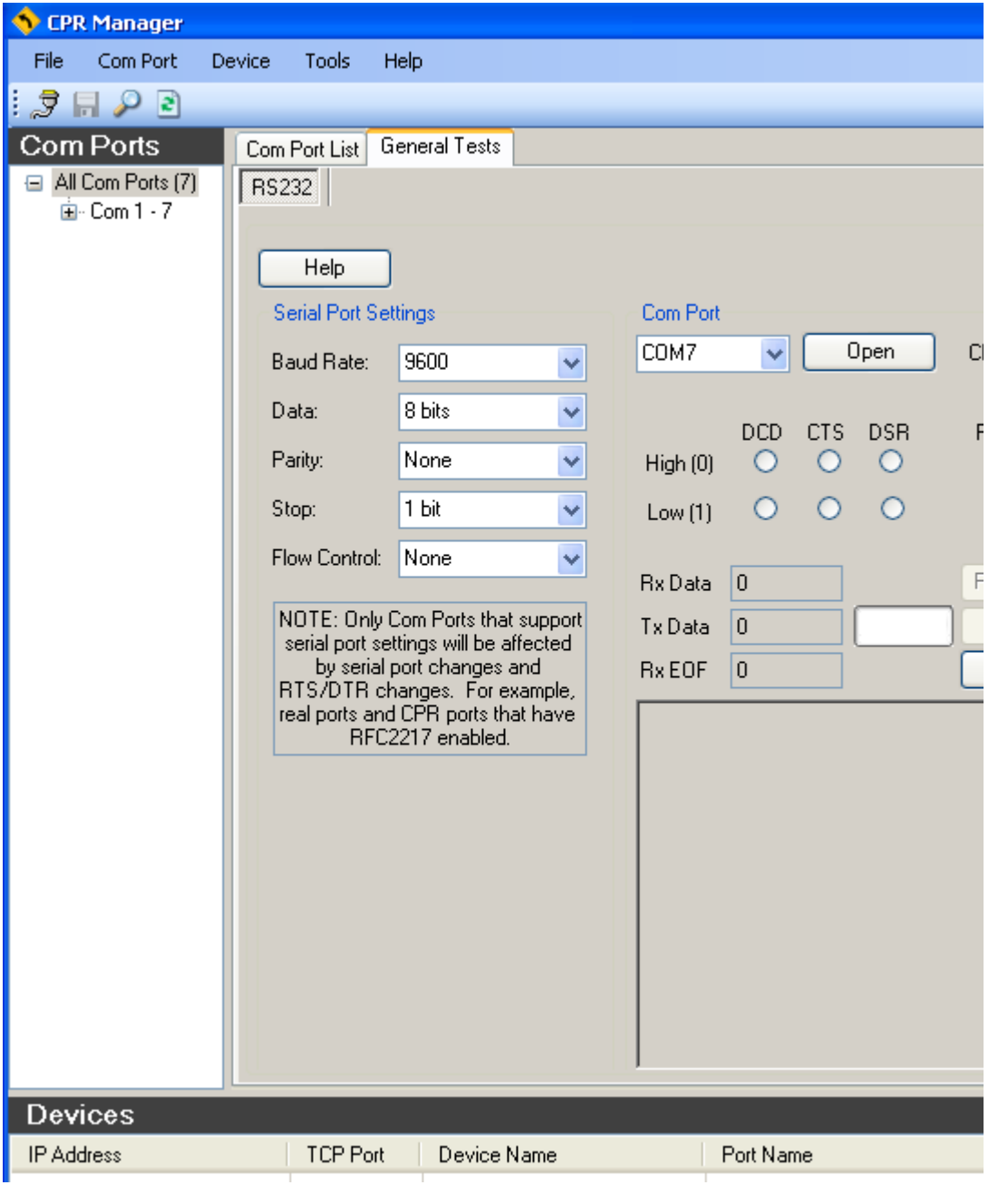


Figure 40: Lantronix COM Redirector Manager

D.2.4.1 Add the DL-V3 Ethernet Device's IP Address and Port

Add the IP address in the *IP Address* column of the *CPR Manager* dialog, 192.168.1.2, as configured in Step #7 on *Page 184*.

For the port setting, in the *TCP Port* column use 10001. Click *OK* to return you to the main *Lantronix Redirector Configuration* dialog shown in *Figure 40*.

See also the *"Network Settings Configuration"* section starting on *Page 185* and *Section D.2, Configuration Overview* on *Page 179*.

D.2.4.2 Configure Virtual Serial Port

In the *CPR Manager* dialog, select *COM Port* | *Add and Remove* from the main menu.

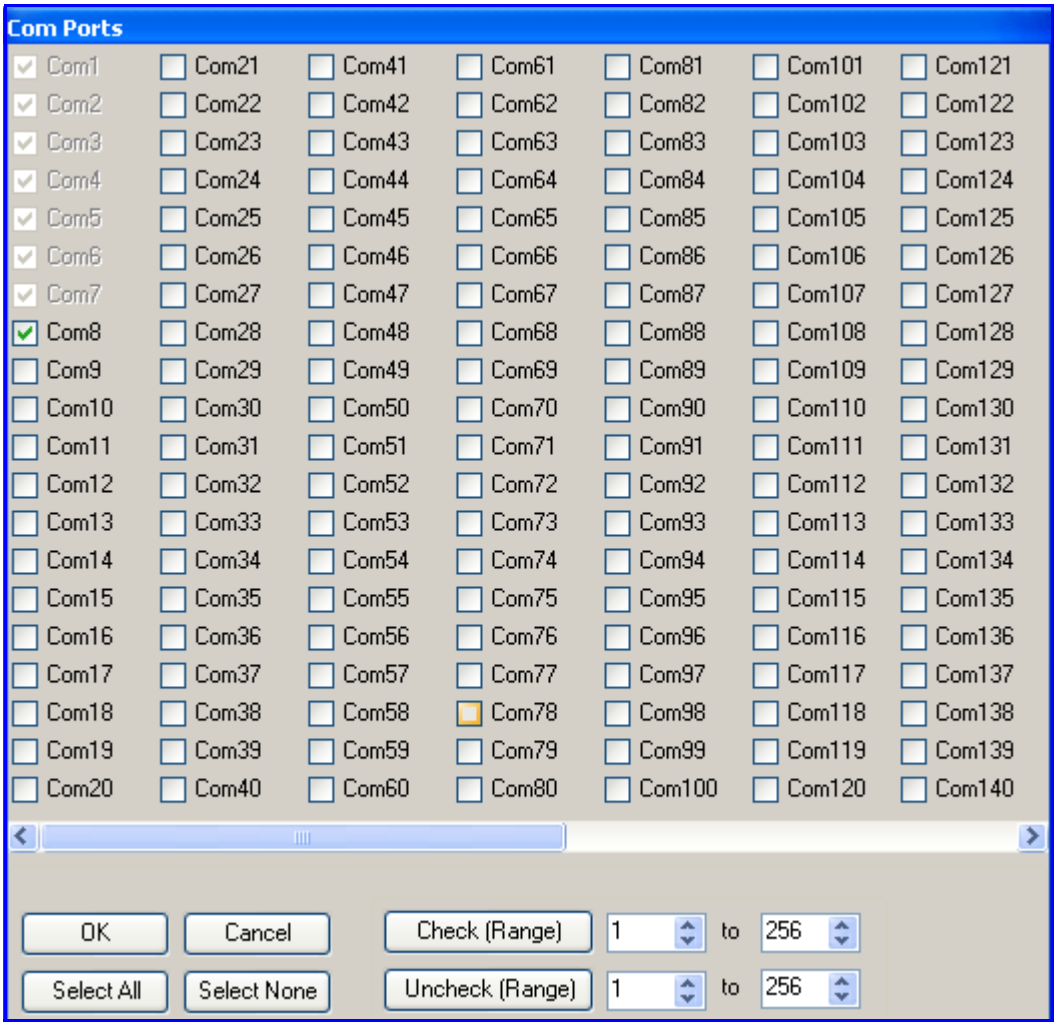


Figure 41: Lantronix Port Redirector: Com Setup Screen

The *Com Ports* dialog appears, see *Figure 41* above. Select a COM port to use as the virtual serial port for the Ethernet device. Notice that you are unable to select previously assigned ports. Click *OK* to return you to the main *CPR Manager* dialog.

D.2.4.3 Redirector Configuration Completion

After completing the steps in the three sections starting on *Page 187* through to the section above, click the *Save* button in the *Lantronix Redirector Configuration* dialog, shown in *Figure 40* on *Page 186*, and follow the prompts. Click the Close button to close the Redirector program. The Windows system may require a reboot when a new COM port is selected.

The system is now ready to be used with HyperTerminal, **CDU**, or other serial communications software. Ensure that the serial settings are identical to those configured for the Ethernet device, that is 115200 baud, 8 data bits, no stop bits, 1 parity bit, hardware flow control and the same PC/laptop COM port as selected in the *"Configure Virtual Serial Port"* section on *Page 187*.

D.3 Alternative Serial Configuration

Serial Command Mode is an alternative method to configure the Ethernet network and serial settings. This method is complicated by the fact that there is no direct access to the Ethernet device because it is an embedded part connected internally to COM3. The following paragraphs describe the detailed process of configuring the Ethernet via the Serial Command Mode.

D.3.1 Physical Connections

To physically connect the Ethernet to the DL-V3, follow these steps:

1. Connect a serial **null-modem** cable from your Laptop to the DL-V3 COM1 port
2. Connect a serial **null-modem** cable from your Laptop to the DL-V3 COM2 port

---

✉ 1 serial null-modem cable may be connected from the laptop and switch between COM1 and COM2 on the DL-V3. You can avoid switching if you have two serial connections on your laptop and two null-modem cables. Also, if your laptop has only USB connectors, you need a USB to serial adaptor between the null-modem cable and the laptop's USB connector.

---

3. Connect the power cable to DL-V3 power port, power and switch on the unit with the  button on its front.

D.3.2 PC/Laptop Software

HyperTerminal communications software is recommended for COM1 communications to the DL-V3. From Window's *Start* menu, select *Programs* | *Accessories* | *Communications* | *HyperTerminal*. The HyperTerminal default communications parameters should be set to those listed *Table 83* on *Page 189*.

Table 83: HyperTerminal Default Parameters

Parameter	Setting
BAUD	9600
DATA BITS	8
PARITY	N
STOP BITS	1
FLOW CONTROL	NONE
ASCII SETTINGS	Disable echo typed characters locally

COM1 is used to tunnel to COM3 to gain direct access to the Ethernet.

COM2 is used to issue NovAtel commands to the DL-V3 using HyperTerminal communications software. The communications parameters should be set to the defaults for DL-V3 COM2. Typically, 9600, 8, N, 1, no parity and local echo on.

D.3.3 DL-V3 Commands

D.3.3.1 Switch to Ethernet Device

Once communication has been established between your laptop serial port (or USB port with a USB-to-serial port adaptor) and COM2 on the DL-V3, enter the following commands:

- LOG VERSION *see Page 177*

✉ Record the OEMV-3 part serial number (PSN) for future use (associated with the Ethernet Media Access Control (MAC) address).

- APPCONTROL BLUETOOTH 1 *see Pages 85-86*

✉ Switch COM3 peripheral to Ethernet. On the front of the DL-V3, the *Bluetooth* LED no longer glows blue but instead the Ethernet LED glows orange.

- LOG COMCONFIG *refer to the OEMV Firmware Reference Manual*

✉ COMCONFIG shows you the current port settings (the default baud setting for COM3 is 115200). The COM commands below ensure both COM1 and COM3 are set to 9600 baud.

- COM COM1 9600 N 8 1 *refer to the OEMV Firmware Reference Manual*
- COM COM3 9600 N 8 1
- LOG COMCONFIG

✉ The COMCONFIG command should verify that COM3 is now set to 9600 baud.

D.3.3.2 Establish a Communications Tunnel

Still on COM2, enter the following commands:

- INTERFACEMODE COM3 TCOM1 NONE OFF *refer to the OEMV Firmware Reference Manual*
- INTERFACEMODE COM1 TCOM3 NONE OFF

D.3.3.3 Reset Ethernet

Still on COM2, enter the following command:

- APPCONTROL OPTION 12 1 *see Pages 85-86*

This command forces the Ethernet to reset. Wait only a second for the Ethernet to power up again.

D.3.3.4 Establish Serial Command Mode in Ethernet

Switch the null-modem cable connection on the DL-V3 from the COM2 port to the COM1 port. Follow this procedure very carefully.

1. Select *File* | *Properties* in the HyperTerminal menu. The *Connections Properties* dialog appears.
2. Click on the *Settings* tab in the *Connections Properties* dialog.
3. Click on the *ASCII Setup* button in the *Settings* tab. The *ASCII Setup* dialog appears.
4. Ensure that the *Echo typed characters locally* check box is unchecked. Normally it is useful to see what you are typing but for the following step we are only interested in what the Ethernet device returns to the screen.
5. Click on the *OK* buttons until you return to the main HyperTerminal window.
6. Type the character '!' and wait for a returned '!' character to appear. If it does not, repeat entering the ! and continue until a ! is returned to the screen. Immediately after observing the ! character returned, type:

   • xyz

✉ 1. Do not hit the Enter key after typing the z, simply wait for the prompt to appear

2. If the ! character never appears, go back to the *"Reset Ethernet"* section above*D.3.3.3.*

---

7. Follow steps 1 through 3 above again and then go on to step 8 now that we are typing commands again, and want to see characters as we type them.
8. Ensure that the *Echo typed characters locally* check box **is** checked this time.
9. Click on the *OK* buttons until you return to the main HyperTerminal window.
10. Enter the following command in the main window (that is in Command Mode)

• enable

Figure 42 shows an example of the Ethernet communication in command mode. The xyz and enable commands can be seen near the top. The other commands that follow are shown in the next section. Refer back to *Figure 42*, as you follow the next section's instructions, to see if you get the expected results. If not, return to the *"Reset Ethernet"* section on *Page 190* and try again.

```
char *acCmds[] =
  {                              // expect:
     "xyz",                      // >
     "enable\r",                 // (enable)#
     "configure\r",              // (config)#
     "if 1\r",                   // (if-1)#
     "ip address I N",           // (if-1)#
     "no dhcp\r",                // (if-1)#
     "speed auto\r",             // (if-1)#
     "write\r",                  // (if-1)#
     "exit\r",                   // (config)#
     "exit\r",                   // (enable)#
     "line 1\r",                 // (line-1)#
     "databits 8\r",             // (line-1)#
     "flowcontrol hardware\r",   // (line-1)#
     "speed 115200\r",           // (line-1)#
     "write\r",                  // (line-1)#
     "exit\r",                   // (enable)#
     "reload\r",                 // Are you sure (yes/no)?
     "yes\r",                    // Rebooting...
     0
  };
```

✉ ***I*** : IP Address
Example: 193.168.1.1

N: Network Mask
Example: 255.255.255.0

✉ At this point you must change the baud rate to 115200 for hyperterminal on COM3 and COM1

Figure 42: Command Mode Example

D.3.4 Network Configuration in Command Mode

✉ 1. Text within brackets < > denote optional parameters.

2. An IP address must be formatted in dotted quad IP address notation and be valid for the network. An example of dotted quad notation is: 192.168.0.254

3. Refer to the *Lantronix XPORT-AR User Guide* for a full command set. Lantronix website details are on *Section D.1, Physical Set-Up* on *Page 178*.

11. *(continued from Page 191)* Enter the following Ethernet command-mode commands on COM1, to configure the network settings:

    • show

✉ 1. Record the MAC address. It should appear as a set of six hexadecimal value pairs separated by colons. For example:

   00:20:4A:44:55:66

2. The show command is not shown in *Figure 42* on *Page 191*.

    • configure

    • if 1

    • ip address <IP> <network mask>

    • ip default-gateway <gateway IP address>

    • no dhcp

    • speed auto

    • exit

    • exit

    • write

    • line 1

    • databits 8

    • flowcontrol hardware

    • speed 115200

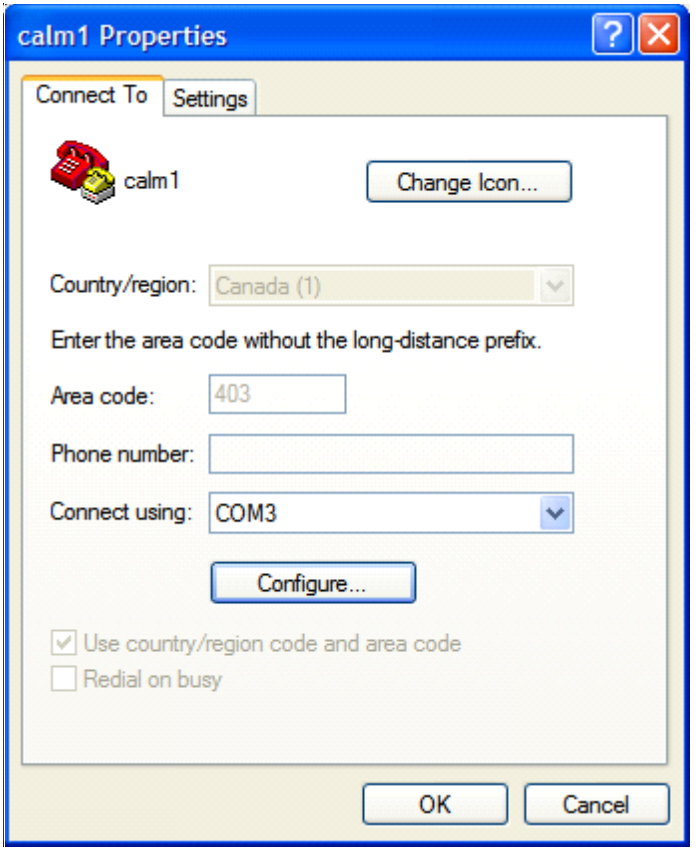
12. Change the baud rates to re-establish communications with the Ethernet device now that the Ethernet is set to 115200, but the tunneled serial ports on the DL-V3 are still at 9600 baud. In addition, HyperTerminal's baud rate is also still set to 9600.

13. Switch the null-modem cable connection on the DL-V3 from the COM1 port to the COM2 port.
14. Enter the following commands on COM2:

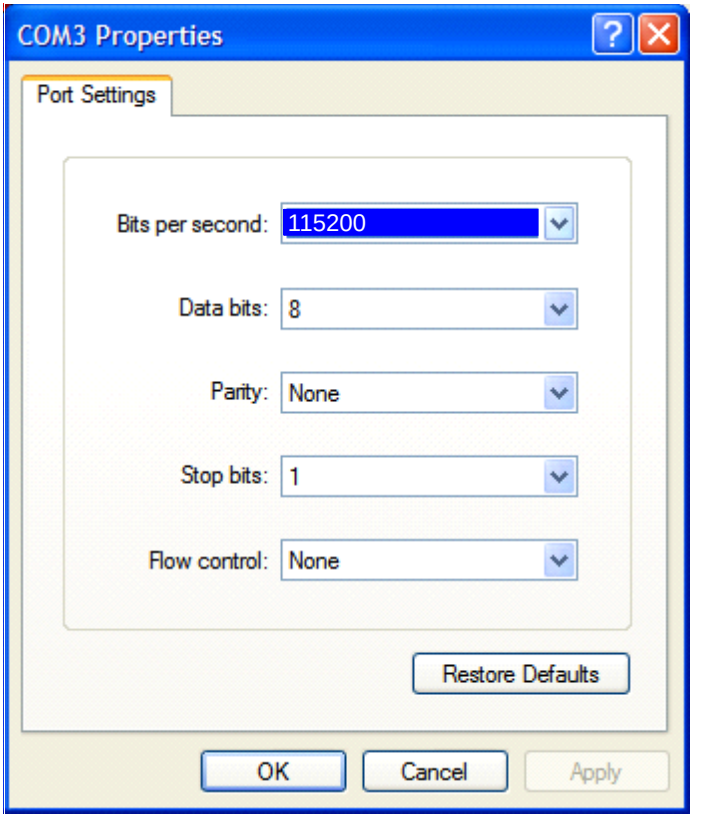
- COM COM1 115200
- COM COM3 115200
- LOG COMCONFIG

✉ The COMCONFIG command verifies that the baud rate on COM1 and COM3 are now 115200.

15. Select *Call* | *Disconnect* from the main menu to disconnect the communications so that a new baud rate can be configured.
16. Choose *File* | *Properties* from the main menu.



17. Click on the *Configure...* button in the *Properties* dialog.



18. Choose 115200 in the *Bits per second:* field.
19. Click *OK*.
20. Switch the null-modem cable connection on the DL-V3 from the COM2 port to the COM1 port.
21. Re-connect HyperTerminal and type the following commands to COM1:

    • exit

✉ Type YES when asked to reboot or reload the system. For example, after you see: `reload\r`

    • yes

22. Switch the null-modem cable connection on the DL-V3 from the COM1 port to the COM2 port
23. Type RESET on COM2, or push and hold the power button on the DL-V3 and wait for the LEDs to indicate that the unit is powering off before releasing the power button, or physically remove power from the DL-V3. This step restores COM1 and COM3 by resetting the unit.

This concludes the Ethernet configuration via Serial Command Mode. Next, see the *Lantronix Port Redirector Software* section starting on *Page 185* to configure Lantronix Port-Redirector software to configure a Lantronix virtual serial port in Windows XP.

Appendix E *Bluetooth* Configuration

Bluetooth is a wireless radio communication standard designed for use over short ranges (within 100 m). This appendix describes how to:

- Enable *Bluetooth* on the DL-V3 receiver
- Set up a PC/laptop with a *Bluetooth* adaptor
- Locate a *Bluetooth*-enabled DL-V3 in range
- Communicate with the DL-V3 using *Bluetooth*
- Stop communicating with the DL-V3 using *Bluetooth*

E.1 Enable *Bluetooth* on the DL-V3 Receiver

From a PC/laptop, connect the DL-V3 to a serial, or USB, cable. Open communication with the receiver using HyperTerminal or **CDU**. Issue the following command (to switch COM3 from Ethernet to *Bluetooth* operation):

```
APPCONTROL BLUETOOTH 0
```

COM3 switches from the Ethernet to the *Bluetooth* device in the DL-V3. You can see this because the *Bluetooth* LED, labelled , on the DL-V3 flashes blue.

If the receiver is turned off, or power is removed, the Ethernet or *Bluetooth* mode on COM3 is returned to whichever mode was applied before power-down when it is powered up again. When you issue a FRESET command, COM3 defaults to *Bluetooth* mode.

E.2 Set Up a PC/Laptop with a *Bluetooth* Adaptor

If your PC/laptop is already *Bluetooth*-equipped and ready, proceed to *Section E.3* on *Page 196*

1. With the PC/laptop powered on, install the driver(s) from the disc that came with your *Bluetooth* adapter.

2. Connect the *Bluetooth* adapter. An example of a D-Link USB adapter is shown in *Figure 43:*

Figure 43: *Bluetooth* Adapter for PC/Laptop

Within two minutes of connecting the USB adapter, the *Bluetooth* icon appears in the Windows task bar as shown in *Figure 44* below.

Figure 44: *Bluetooth* Standby: White

Continue on to the next section when you see the white *Bluetooth* icon. If the *Bluetooth* Icon is red, see *Figure 45* below, then the *Bluetooth* installation is on your PC/laptop is incorrect and you should return to Step #1.

Figure 45: *Bluetooth* Error: Red

E.3 Locate a *Bluetooth*-Enabled DL-V3 in Range

✉ Ensure that your PC/laptop is equipped with a built in, or external-plug-in, *Bluetooth* adapter and is already configured with the appropriate *Bluetooth* driver.

3. Power on the DL-V3.

4. Double-click on the *Bluetooth* icon in the task bar, see *Figure 44* on *Page 195*, or select *Programs | My Bluetooth Places* from the *Start* menu in Windows. The *My Bluetooth Places* window opens.

5. Click on the *Search for devices in range* option from the *Bluetooth Tasks* side bar on the left of the *My Bluetooth Places* window. *Bluetooth*-enabled devices within range appear in the *Entire Bluetooth Neighborhood* folder, see *Figure 46* below.

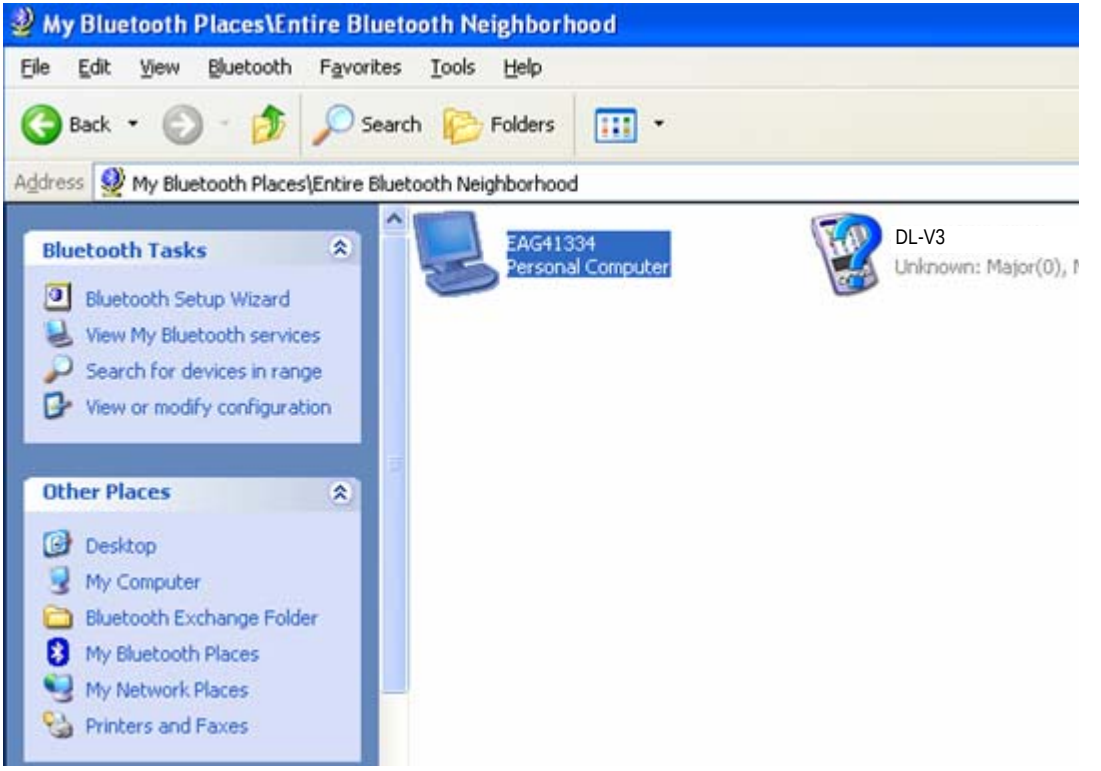


Figure 46: My *Bluetooth* Places Window

6. Double-click on the DL-V3 device icon in the *Entire Bluetooth Neighborhood* window, see *Figure 46* on *Page 196*. The PC/laptop searches for available services. If *Bluetooth* is working properly, COM port service appears.

7. Double-click on the COM3 icon. In order to use the serial COM port, the DL-V3 must be paired with the PC/laptop to use the COM3 port. The *Bluetooth* PIN Code Request dialog appears.

8. Enter the DL-V3 default pin number of four zeroes (0000), see *Figure 47* below:

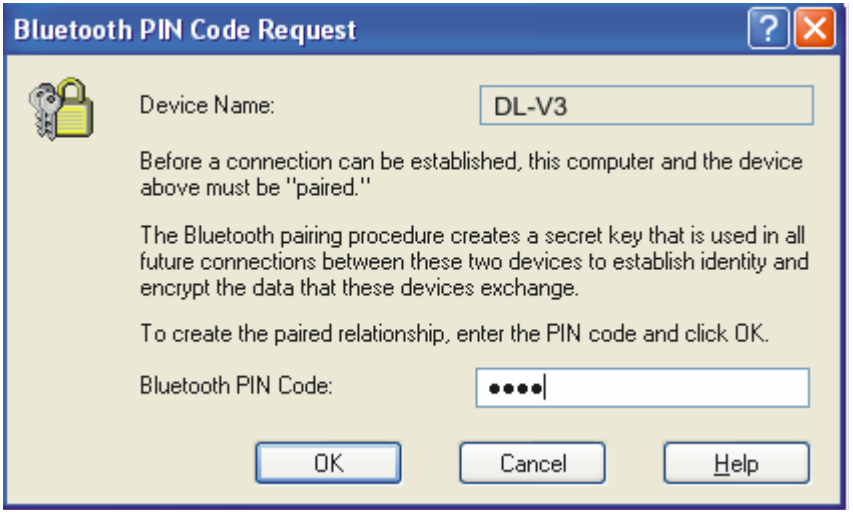


Figure 47: *Bluetooth* PIN Code Request

If the code is correct, a new *COM* dialog opens to show which PC/laptop COM port has been assigned to the *Bluetooth* link. For example, in *Figure 48*, the PC/laptop port is COM21.

Figure 48: COM3: PC/Laptop COM Port Assignment

9. Type the following into the command prompt to test if the connection has worked:

```
cpterm /c##
```

   Where ## is the PC/laptop COM port number assigned in *Step #8*, see *Figure 48* on *Page 197*.

10. Type the following VERSION log request into the command prompt to ensure that the connection works:

```
log version
```

    The *Bluetooth* icon in the task bar turns green when it is connected, see *Figure 49* below.

Figure 49: *Bluetooth* Connected: Green

E.5 Stop Communicating with the DL-V3 Using *Bluetooth*

11. Double-click on the *Bluetooth* icon in the task bar, see *Figure 44* on *Page 195*, or select *Programs | My Bluetooth Places* from the *Start* menu in Windows. The *My Bluetooth Places* window opens.

12. Click on the *Search for devices in range* option from the *Bluetooth Tasks* side bar on the left of the *My Bluetooth Places* window. *Bluetooth*-enabled devices within range appear in the *Entire Bluetooth Neighborhood* folder, see *Figure 46* on *Page 196*.

13. Double-click on the DL-V3 device icon in the *Entire Bluetooth Neighborhood* window, see *Figure 46* on *Page 196*. The PC/laptop searches for available services. If *Bluetooth* is working properly, COM port service appears.

14. Right-click on the *COM3* icon and select the *Disconnect Serial COM Port* option. A COM3 dialog box appears, see *Figure 50* on *Page 199*, to confirm that you want to disconnect.

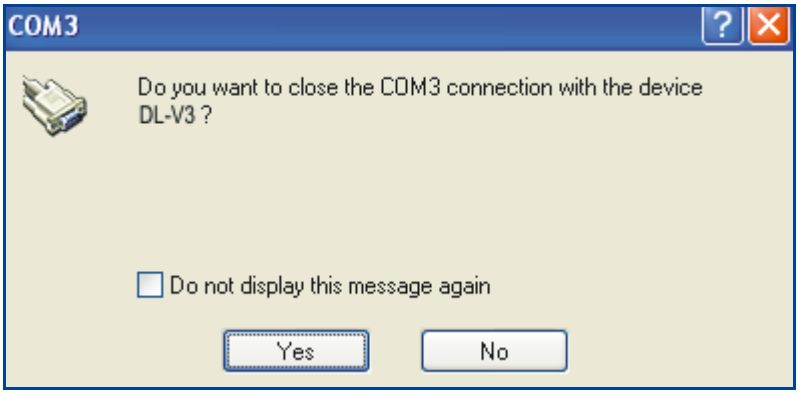


Figure 50: COM3: Disconnect?

15. Click on the *Yes* button in the *COM3* dialog and the DL-V3's *Bluetooth* is unpaired from your PC/laptop. When the DL-V3 and PC/laptop *Bluetooth* are unpaired, the *Bluetooth* icon in the task bar appears white, see *Figure 44* on *Page 195*.

Appendix F Replacement Parts

The following are a list of the replacement parts available for your NovAtel DL-V3 receiver. Should you require assistance, or need to order additional components, please contact your local NovAtel dealer or Customer Service representative.

F.1 DL-V3

Part Description	NovAtel Part
I/O strobe cable (*Figure 37* on *Page 80*)	01017660
Straight through serial data cable (*Figure 36* on *Page 79*)	01017659
Null-modem serial data cable (*Figure 35* on *Page 78*)	01017658
Power cable: LEMO 4-pin socket to 12V power outlet plug (*Figure 34* on *Page 77*)	01017663

F.2 Accessories

Part Description		NovAtel Part
OEMV Family Compact Disc with PC utilities including **CDU**		01018054
OEMV Family Installation and Operation User Manual		OM-20000093
OEMV Family Firmware Reference Manual		OM-20000094
Optional NovAtel Antennas:	Model 702 (L1/L2)	GPS-702
	Model 701 (L1-only)	GPS-701
	Model 702L (L1/L2/L-band)	GPS-702L
	Model 702GG (L1/L2/GLONASS)	GPS-702-GG
	Model 701GG (L1/GLONASS)	GPS-701-GG
	Model 702GGL (L1/L2/GLONASS/L-band)	GPS-702-GGL
	Model 701GGL (L1/GLONASS/L-band)	GPS-701-GGL
	Model 538 (L1/GLONASS/L-band)	ANT-538
	Model 537 (L1)	ANT-537
	Model 536 (L1)	ANT-536-C
	Model 534 (L1/L2/L-band)	ANT-534-C
	Model 533 (L1/L2)	ANT-533
	Model 532 (L1/L2)	ANT-532-C
Optional RF Antenna Cable:	5 meters	GPS-C006
	15 meters	GPS-C016
	30 meters	GPS-C032
AC Adaptor:	120/240VAC 15 Watts, 12 V DC adaptor	40023114

F.3 Manufacturer's Part Number

The following original manufacturer's part number is provided for information only and is not available from NovAtel as a separate part:

Product	Part Description	Company	Part Number
DL-V3 Power Cable (*Figure 34* on *Page 77*)	4-pin socket connector	LEMO	FGG.0B.304.CLAD52Z

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