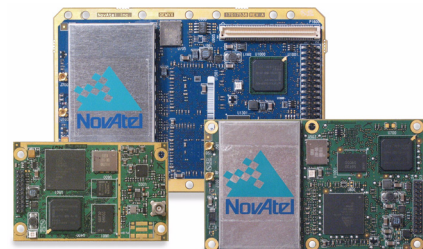


OEMV-1™, OEMV-1G™, OEMV-1DF™, OEMV-2™ or OEMV-3™ Card

QUICK START GUIDE



This guide provides the basic information you need to set up and begin using your new OEMV® family card. For more information on the installation and operation of your receiver, refer to the *OEMV Family User Manuals* on the NovAtel CD, which also contains technical specifications for the OEMV family cards. To order a printed copy of the manuals, free of charge, follow the instructions on the enclosed *User Manuals* postcard. The most up-to-date versions of these manuals can be found on our website at:

<http://www.novatel.com/Downloads/docupdates.html>

The OEMV CD contains installation programs for NovAtel PC utilities including **CDU** (Control and Display Unit), OEMV Software Development Kit, with *OEMV Sample Source Code* and Universal Serial Bus (USB) drivers with installation instructions. The latest version of the PC utilities are available at:

<http://www.novatel.com/support/fwsupdates.htm>

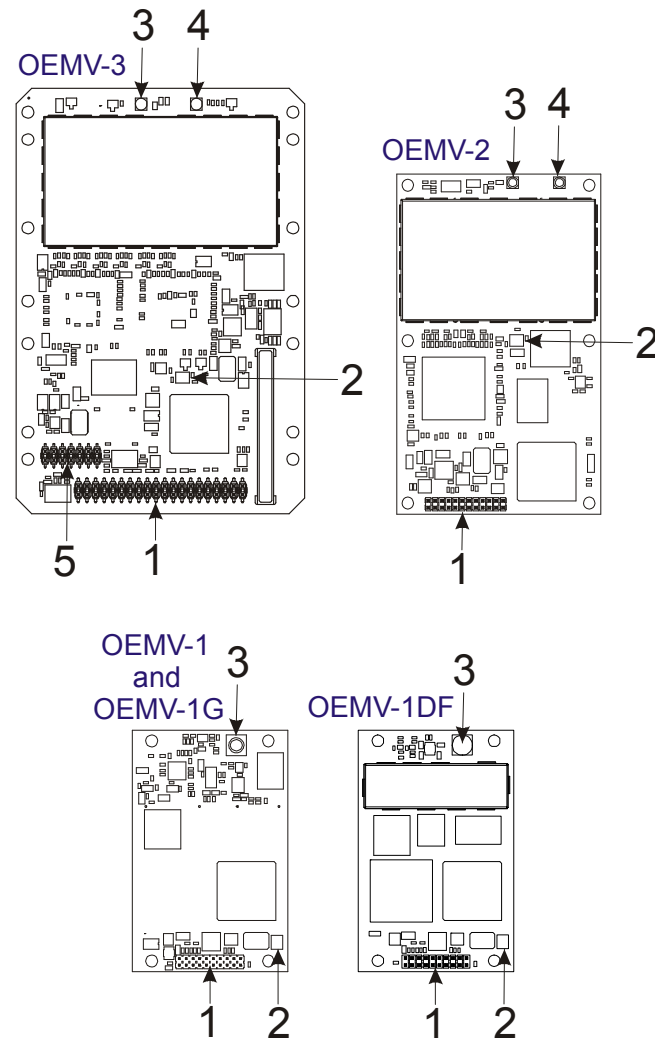
BOX CONTENTS

In addition to this *Quick Start Guide*, the following is provided with your OEMV family card:

- 1 ESD wrist strap
- 1 *OEMV Family Quick Reference Guide*
- 1 postcard for requesting printed user manuals
- 1 NovAtel CD

OEMV FAMILY CARDS

Figure 1 shows the cards, their connectors and indicators.



(see legend at top of next column)

Ref. #	Description
1	Power/data/signal connector (OEMV-1/OEMV-1G/OEMV-1DF: 20-pin; OEMV-2: 24-pin; OEMV-3: 40-pin)
2	LED status indicator
3	RF signal in/LNA power out (OEMV-1/OEMV-1G/OEMV-1DF: MCX; OEMV-2/OEMV-3: MMCX)
4	External oscillator input (MMCX)
5	CAN bus connector with transceiver

Figure 1: Connector and Indicator Locations

☒ To create a common ground, tie all digital grounds (GND) to the power supply ground.

ADDITIONAL EQUIPMENT REQUIRED

The following additional equipment is required for basic setup:

- A Windows-based computing device with an RS-232 DB-9 or USB port
- A power supply between 4.5 and 18 VDC for the OEMV-3 card, and 3.3 VDC for the OEMV-1, OEMV-1G, OEMV-1DF and OEMV-2 cards, capable of providing at least 5W
- An enclosure to protect against environmental conditions and RF interference
- A wiring harness to provide power to the receiver, access to the data and strobe signals, and one or more DB-9 connectors for serial communication with a PC or other data communications equipment
- A null-modem cable
- A quality GNSS antenna, such as NovAtel's 702GG
- An antenna cable with a male MCX (OEMV-1, OEMV-1G and OEMV-1DF) or MMCX (OEMV-2 and OEMV-3) connector at the receiver end.
- An external power supply is required for LNA power output for use with active GNSS antennas (mandatory for OEMV-1 series card and optional for OEMV-3, if voltages other than +5 VDC are required).

INSTALLING THE PC UTILITIES

Once the OEMV card is connected to the PC, antenna, and power supply, install NovAtel's PC Utilities.

1. Start up the PC.
2. Insert the NovAtel CD in the CD-ROM drive of the computer.
3. Select *Install the OEMV 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 then the *Browse* button to locate *Setup.exe* on the CD drive.
4. Install the PC Utilities by advancing through the steps provided in the *NovAtel PC Utilities* setup program.

SETTING UP YOUR OEMV FAMILY CARD

Complete the following steps to connect and power your OEMV family card. Refer to *OEMV Family Installation and Operation User Manual* for more information on steps 2 through 5.

1. Install the OEMV family card and the wiring harness in a secure enclosure to reduce environmental exposure and RF interference, making sure to protect against ESD.

CAUTION: If you do not take the necessary precautions against **Electrostatic Discharge (ESD)**, including use of the **ESD wrist strap** provided, you may damage the OEMV card and void your warranty



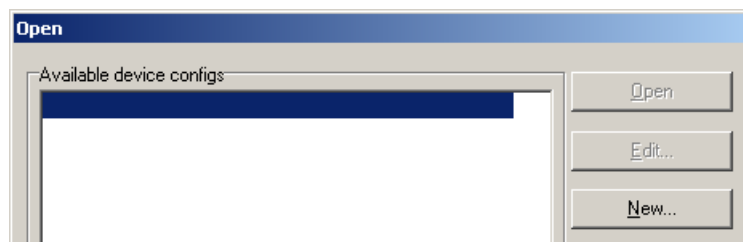
2. Reconfigure the ports if necessary. COM1 on the OEMV-1, OEMV-1G and OEMV-1DF cards is configured in LVTTTL mode while COM1 on the OEMV-2 and OEMV-3 cards is configured in RS-232 mode by default. COM1 on the OEMV-3 can be reconfigured to RS-422 or LVTTTL using jumpers.
3. Mount a GNSS antenna on a secure, stable structure with an unobstructed view of the sky.

- Connect the GNSS antenna to the OEMV family card using a coaxial cable.
- Connect a serial port on the receiver to a serial port on the PC, or other computing device, using a null modem cable.
- Connect a power supply to the OEMV family card.
- Plug in and/or turn on the power supply.

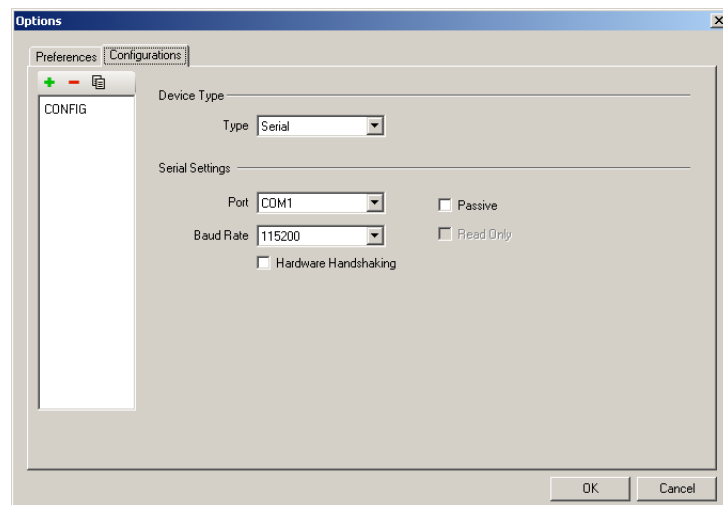
ESTABLISHING RECEIVER COMMUNICATION

To open communication with the receiver:

- Launch **NovAtel CDU** from the *Start* menu specified during the installation process. The default location is *Start | All Programs | NovAtel PC Software | NovAtel CDU*.
- In the *Device* menu, select **Open**. The *Open* screen displays. If you have not entered any configurations, the *Available device configs* table will be empty:

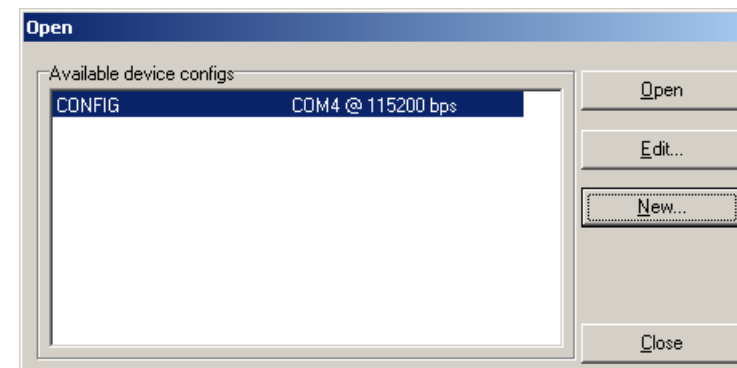


- To enter a new configuration, click **New**. The *Options* screen displays, with a proposed configuration name:



- Double-click the configuration name to edit it, if desired.
- Select the device *Type* from the drop-down list. In most cases, the device type will be *Serial*.
- Select the *Port* to which the OEMV card is connected.
- Select the *Baud Rate*. Select *115200* if you are not sure.
- Cancel the *Passive* and *Hardware Handshaking* checkboxes.

- Click **OK** to save the configuration. The *Open* screen is immediately displayed. The newly saved configuration is now shown in the *Available device configs* table:

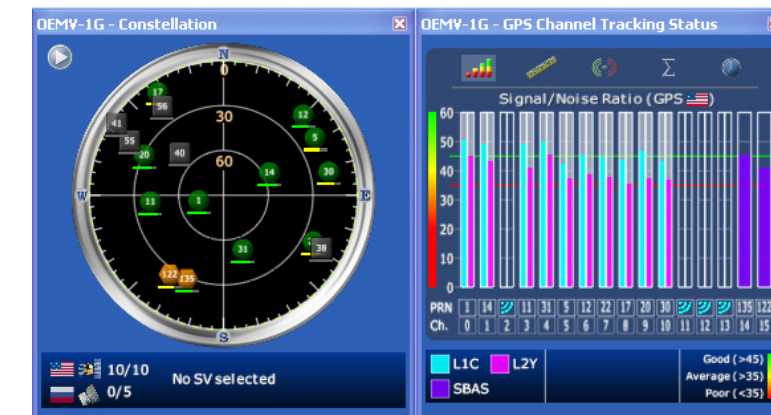


- To open communications with the OEMV card, select the desired configuration in the *Available device configs* table, then click **Open**.

As **CDU** establishes a communication session with the receiver, it displays a progress box. Once **CDU** is connected, the progress box disappears and several windows open, including the *Console* window. **CDU** is now ready to be used to view status information, enter commands, or log data.

USING CDU

CDU provides access to information about your receiver and its position, which is displayed in windows accessed from the *View* menu. For example, select *Position Window* from the *View* menu to display the position solution of the receiver. To show details of the GNSS and geostationary (SBAS) satellites being tracked, select a *Tracking Status Window (GPS or GLONASS)* from the *View* menu. Select *Help* from the main menu for more details on **CDU**, its windows and features.



DETERMINING WHEN THE POSITION IS VALID

When the receiver has a valid position, the *Solution Status* field in **CDU**'s *Position* window shows *Computed*.



ENTERING COMMANDS

The OEMV family cards use a comprehensive command interface. Commands can be sent to the receiver using the *Console* window in **CDU**, which is opened from the *View* menu. Enter commands in the text box at the bottom of the Console window.



The following information is important when entering commands:

- Commands can be entered in three formats: ASCII (log bestposa), Abbreviated ASCII (log bestpos), and Binary (log bestposb). Abbreviated ASCII is the best format to use when you are working with the receiver directly. For data collection, use ASCII or Binary.
- Press the *Enter* key to send the command string to the receiver.
- Commands are not case sensitive.

The *OEMV Family Quick Reference Guide* provided with the receiver lists the available commands and the parameters they use for the *Abbreviated ASCII* format.

LOGGING DATA

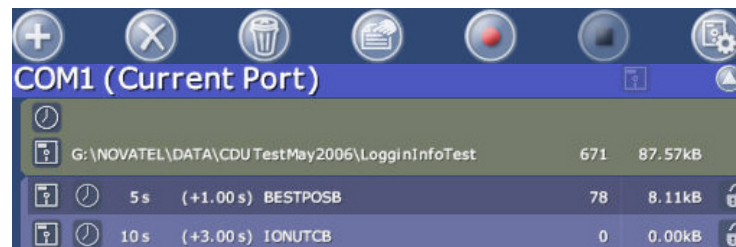
An extensive collection of logs has been created to capture the data your OEMV family card receiver processes. These logs can be directed to any OEMV family card's serial ports and can be automatically generated when new or changed data becomes available or at regular intervals. The available logs are listed in the *OEMV Family Quick Reference Guide*.

To log data, use the `LOG` command. For example, to log the pseudorange position to COM 2 every 30 seconds, enter the following:

```
LOG COM2 PSRPOS ONTIME 30
```

Logs can be generated in one of three formats: ASCII, Abbreviated ASCII, or Binary. Refer to the *OEMV Family Firmware Reference Manual (OM-20000094)* for information on the `LOG` command, specifying the output format, and the detailed contents of each log.

If you prefer, **CDU** provides a graphical interface for configuring data logging. Select *Logging Control Window* from the *Tools* menu. In the *Logging Control* window, you can select which logs to capture and choose to which ports to send the data. In addition, you can specify a file in which to save the data.



ENABLING SBAS

All models of OEMV family cards are capable of SBAS positioning. This positioning mode is enabled using the `SBASCONTROL` command, as follows:

```
SBASCONTROL ENABLE AUTO
```

Once enabled, the *Solution type* field shown in **CDU's** *Position* window changes from *Single* to *SBAS*, and you may see SBAS satellites in the *Constellation* window, as shown below. OEMV family cards will track available SBAS satellites, including WAAS, EGNOS and other SBAS systems.

Latitude	51.116695592° ±	0.82m
Longitude	-114.038813659° ±	0.69m
Hgt. (MSL)	1062.639m ±	1.95m
Solution type	SBAS	



ENABLING L-BAND (OEMV-1 and OEMV-3 only)

L-Band equipped receivers allow you to achieve sub-meter accuracy. To use this positioning mode, you must enable L-band tracking to the Canada-Wide Differential GPS (CDGPS) or OmniSTAR signal. A subscription to OmniSTAR is required to use the OmniSTAR VBS, XP or HP service (visit <http://www.omnistar.com> with your OmniSTAR serial number ready, which you can obtain using the `LBANDINFO` log). The CDGPS signal is free and available without subscription over North America (visit <http://www.cdgps.com>).

The `ASSIGNLBAND` command allows you to set OmniSTAR or CDGPS base station communication parameters. It should include a relevant frequency and data rate. The frequency assignment can be made in Hz or kHz. For example:

```
Hz: assignlband omnistar 1557855000 1200
```

```
kHz: assignlband omnistar 1557855 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: `log lbandstat`. For example, if you are receiving CDGPS, the fifth field after the header should be `00c2`:

```
lbandstata com1 0 43.5 finesteering 1295  
149951.671 00000000 976f 34461;  
1547546977 46.18 4541.0 0.00 00c2 00f0...
```

To specify the correction source, use the `PSRDIFFSOURCE` command as shown in the examples below:

```
PSRDIFFSOURCE OMNISTAR or,
```

```
PSRDIFFSOURCE CDGPS
```

otherwise it is left at the default `AUTO`.

-
- ✉ SBAS and L-Band corrections can be accomplished with one receiver and are exceptions to the base/rover concept. Refer to the *OEMV Family Firmware Reference Manual* for more on individual L-Band, GLONASS or SBAS commands and logs.
-

REAL-TIME KINEMATIC (RTK) POSITIONING

Corrections can be transmitted from a base station to a rover station to significantly improve position accuracy to centimeter level 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 receive correction messages from a base station to calculate differential GNSS positions.

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 19200 bits per second, and less than 4.0 s latency, is recommended.

Once your base and rover are set up, you can configure them for RTCA, RTCAOBS2, RTCM, RTCMV3, CMR+ or CMR corrections. Below is an RTCM example (replace the latitude, longitude and height coordinates shown with those of your base):

Base

```
interfacemode com2 none rtkm off
fix position 51.11358042 -114.04358013
1059.4105
log com2 rtkm3 ontime 10
log com2 rtkm22 ontime 10 1
log com2 rtkm1819 ontime 1
log com2 rtkm1 ontime 5
```

Rover

```
interfacemode com2 rtkm none off
```

RT-2™ (OEMV-2, OEMV-3 and OEMV-1DF) and RT-20® (OEMV-1, OEMV-1G, OEMV-1DF, OEMV-2 and OEMV-3), all with AdVance® RTK, are real-time kinematic software products developed by NovAtel. Optimal RTK performance is achieved when both the base and rovers are NovAtel products, however, AdVance RTK will operate with equipment from other manufacturers if you are using RTCM, RTCMV3, CMR or CMR+ messaging.

RT-2 and RT-20 are supported by GPS-only and GPS+GLONASS OEMV-based models. RT-20 with GPS+GLONASS provides faster convergence.

✉ For more base/rover configurations, search the key words “rover base” on our Knowledge Database at:

<http://www.novatel.com/support/knowledgedb.htm>

USING OEMV CAN FUNCTIONALITY

The CAN (Controller Area Network) bus is a vehicle bus standard designed to allow devices to communicate within a vehicle without the requirement for a host computer. OEMV receivers can function as nodes on existing CANs.

OEMV-1, OEMV-1G, OEMV-1DF and OEMV-3 cards are equipped with CAN bus transceivers, and external transceivers are not required to connect these cards to the network. The OEMV-2 card requires an external CAN transceiver. All OEMV cards require proper bus termination, which the user will need to provide. Refer to the *OEMV Family Installation and Operation User Manual* for further information.

OEMV higher-layer support is available through NovAtel's optional API software. Contact NovAtel Customer Service for details.

EXTERNAL OSCILLATOR (OEMV-2 and OEMV-3 only)

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

To install, connect a cable from the external oscillator to the card's external oscillator input. The receiver does not have to be powered down during this procedure. If you are handling the OEMV card directly, observe antistatic practices.

Once the external oscillator has been connected, issue the EXTERNALCLOCK command to define the clock model (for example, cesium, rubidium or ovenized crystal). If the input clock rate is 5 MHz, you must issue the EXTERNALCLOCK command to change the 10 MHz default rate.

POST PROCESSING

Post-mission data processing refers to the processing of GNSS data collected by the receiver after the data-collection session is complete.

OEMV-based output is compatible with post-processing software from the Waypoint Products Group, NovAtel Inc. For details, visit our website at:

http://www.novatel.com/products/waypoint_pps.htm

QUESTIONS OR COMMENTS

If you have any questions or comments regarding your OEMV card, contact NovAtel using one of these methods:

Email: support@novatel.com

Web: www.novatel.com

Phone: 1-800-NOVATEL (U.S. & Canada)
403-295-4900 (International)

Fax: 403-295-4901



Quick Start Guide:



OEMV Family Cards:



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