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/fwswupdates.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.

### 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

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 LVTTL 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 LVTTL using jumpers.

3. Mount a GNSS antenna on a secure, stable structure with an unobstructed view of the sky.

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

ESTABLISHING RECEIVER COMMUNICATION

To open communication with the receiver:
1. Launch NovAtel CDU from the Start menu specified during the installation process. The default location is Start | All Programs | NovAtel PC Software | NovAtel CDU.
2. 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:

   ![Available device configs table](image)

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

   ![Options screen](image)

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

9. 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:

   ![Available device configs table](image)

10. 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.

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 PSRPOSITION ONTIME 30
```

Logs can be generated in one of three formats: ASCII, Abbreviated ASCII, and Binary. Abbreviated ASCII is the best format to use when you are working with the receiver directly. For data collection, use ASCII or Binary.

- 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.

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.

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 https://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: `assignlbmark omnistar 1557585000 1200`
- kHz: `assignlbmark omnistar 1557585 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:

```
lbandstatus 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
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 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 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

**Rover**

interfacemode com2 rtcm none off

RT-2™ (OEMV-2, OEMV-3 and OEMV-1DF) and RT-20® (OEM-1, OEM-1G, OEM-1DF, OEM-2 and OEM-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](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](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](http://www.novatel.com)
- **Phone**: 1-800-NOVATEL (U.S. & Canada) 403-295-4900 (International)
- **Fax**: 403-295-4901

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