



DIGITAL DISPATCH

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# **USER MANUAL**

**VECTOR 530 GPRS**

**Version 1.2**

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## REVISION HISTORY

Version	Date	By	Page No.	Description
1	Dec 17, 2004	NG		Initial release.
1.1	Mar 3, 2005	SD	11	Removed 5V SIM Card reference from Section 3.2.
1.21	June 8, 2005	SD	12 19	Added to the antenna requirements. Added Appendix D
1.22	June 13, 2005	SD	12	Added to the antenna requirements



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## 1 Introduction

This manual provides important operational and safety information for Vector 530 Mobile Data Terminal (MDT) equipped with the North American GSM / GPRS 850/1900 MHz **WaveCOM Q2426B GPRS** modem.

The Vector 530 is an affordable and easy to use Mobile Data Terminal (MDT) designed to meet the needs of today's dispatching and transport businesses using GPRS Public Data Networks as its communications medium.

## 2 Product Features

### 2.1 Technical Specifications

- Dimensions : 200mm (L) x 125mm (H) x 40mm (D)
- Weight : 700g approx
- Enclosure : Lightweight Injection molded plastic
- Processor : Intel 80C186, 20Mhz
- Memory : 512KB SDRAM, 512 KB Flash memory, 2KB EEPROM optional 32MB Flash disk for data storage.
- Display : 240 x 64 pixel graphical LCD for multi-language, multi-font support 4 LED's for icon labels.
- Keyboard : Numeric keypad, 5 function keys, 4 cursor keys, power button.
- Audio : Integrated speaker with optional text-to-speech hardware support.
- GPS : Internal 8 channel GPS receiver with external antenna accuracy: < 6m (50%), <9m (90%).
- Public data modem: WaveCOM Q2426B modem EGSM/GPRS 850/1900 MHz version with 32Mb of flash memory and 4Mb of SRAM (32/4).
- Application Downloads: Over-the-air or Direct Serial connection.
- Integrated magnetic card reader: Single track on track 1 or track 2.



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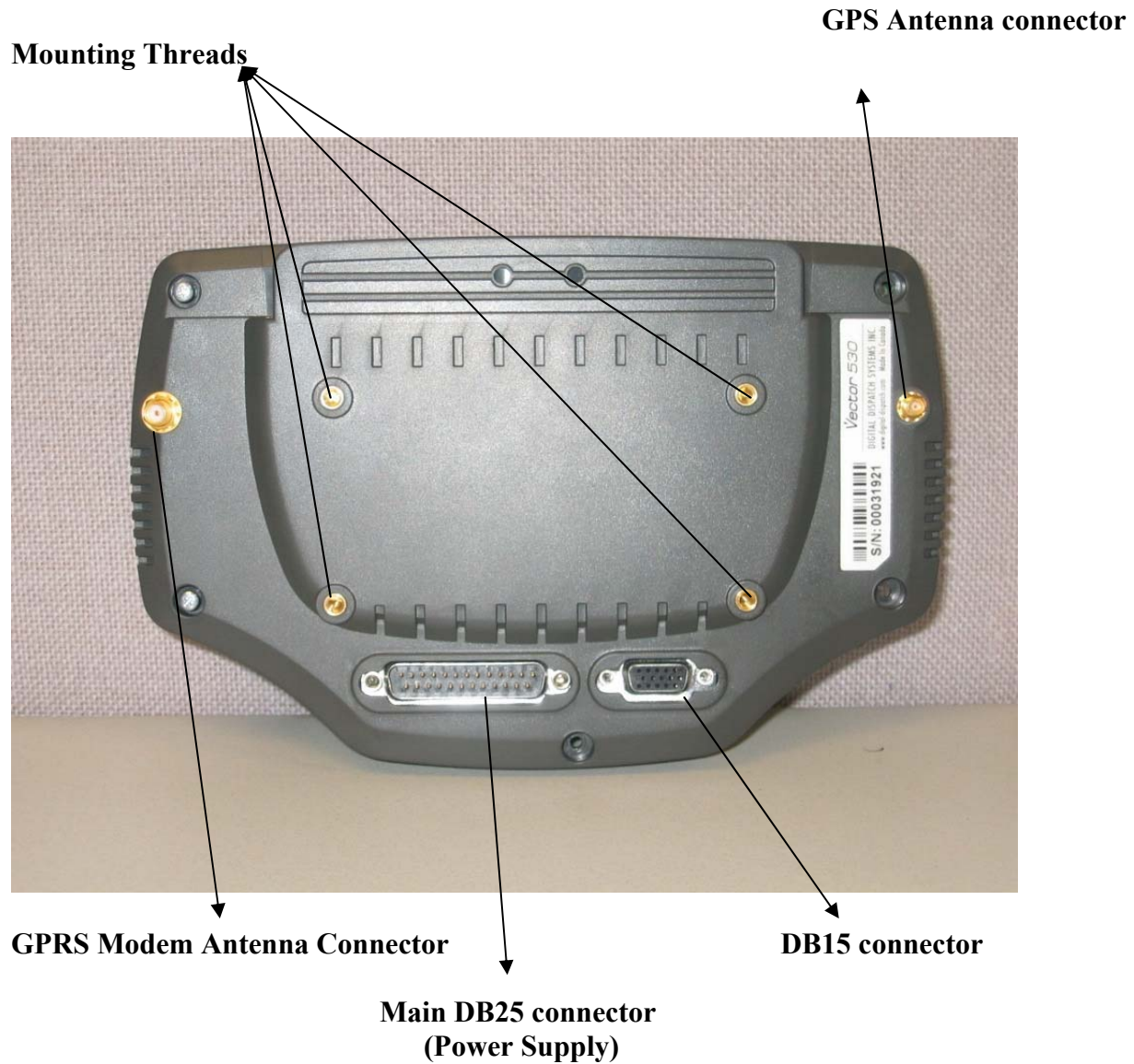
- Interfaces: 4 RS-232C ports (2 internal, 2 external), 3 digital inputs/ 3 digital outputs.
- Options: SmartCAM (In-Vehicle Surveillance), Smartprint (Mobile Printer), SmartPay (In-vehicle debit / Smart Card support).
- Electrical Requirements: Input Voltage: 13.8 VDC (10-17 VDC range), Current: Less than 600 mA at 12VDC.
- Environmental : Operating Temperature : -20 deg C to + 70 deg C
- Storage Temperature : -40 deg C to + 80 deg C
- Relative Humidity : 5% to 80% (non- condensing)

### 2.2 Device Layout



**Vector 530 Front Panel Layout**

### Rear View



## Top View

Credit Card Swipe



### 2.3 Power Supply

Then unit is designed to operate normally from +10V up to +18V DC power source or car battery. The nominal input voltage is 13.8V

### 2.4 Chassis Ground

The vehicle chassis ground (negative terminal of battery) is the recommended grounding point for vehicle installation. There should be no residue to prevent proper grounding to the battery.



### 3 GPRS/GSM Modem Features

The Vector 530 GPRS-NA achieves high speed wireless connectivity by integrating the WaveCOM WISMO QUIK series Q2426B GPRS modem.

#### **Please note**

**the Q2426B modem features outlined in this section are as per the details supplied by the WaveCOM, the modem module manufacturer.**

- Size: 58.4x32.2x3.9mm
- 2 Watts E-GSM 900/GSM 850 radio section running under 3.6 Volt.
- 1 Watt GSM 1800/1900 radio section running under 3.5 Volts.
- Digital section running under 2.8 Volts.
- 3V only SIM interface (for 5V SIM interface with external adaptation).
- Real Time Clock with Calendar.
- Battery Charge management.
- Echo Cancellation + noise reduction.
- Full GSM or GSM/GPRS software stack.
- Hardware GPRS Class 10 capable.
- Complete shielding
- Complete interfacing through a 60-pin connector:
  - Power supply
  - Serial Link
  - Audio
  - SIM card interface
  - Keyboard
  - LCD (not available with AT commands)

The WaveCOM Wismo Quik Q2426B has 2 external connections:



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- RF connection pads (to the antenna)
- 60-pin General Purpose Connector (GPC) to Digital, Keyboard, Audio and Supply.

### **3.1 RF Functionality**

The Radio Frequency (RF) interface complies with GSM 850 / PCS 1900 recommendation.

- Rx (GSM 850) : 869 to 894 MHz
- Rx (PCS 1900) : 1930 to 1990 MHz
- Tx (GSM 850) : 824 to 849 MHz
- Tx (PCS 1900) : 1850 to 1910 MHz.

The Radio Frequency (RF) part is based on a specific dual band chip including:

- Low-IF Receiver
- Dual RF Synthesizer
- Digital IF to baseband Converter
- Offset PLL Transmitter
- (logarithmic) Power Amplifier controller
- Dual band power amplifier module

### **3.2 SIM Interface**

The SIM interface is fully compliant with GSM11.11 recommendations regarding the SIM functions.

Five signals are available from the SIM interface:-

SIM\_VCC: SIM power supply-Pin 9.

SIM\_RST: SIM reset-Pin 5.

SIM\_CLK: SIM Clock-Pin 3.

SIM\_DATA: I/O port- Pin 7.



SIM \_PRES: SIM card detect-Pin 50.

### 3.3 RF Interface

The impedance is 50 Ohms nominal and the DC impedance is 0 Ohm.

### 3.4 RF Connections

There are two possible ways to connect an antenna to the module:

- The antenna can be directly connected to the module on the “Antenna pad” by using a spring contact.
- The antenna can be connected to the module through a coaxial cable. The coaxial cable is connected to both the “Round pad” and the “Ground pad”.

### 3.5 RF Performance

RF performance is compliant with the recommendation GSM 05.05.

The main parameters for the **Receiver** are:

GSM850 Reference Sensitivity = -104dBm Static and TU High.

PCS1900 Reference Sensitivity = -102dBm Static and TU High.

Selectivity @ 200kHz: > +9dBc

Selectivity @ 400kHz: > +41dBc

Linear Dynamic Range: 63dB

Co-Channel Rejection: >=9 dBc.

And for the **Transmitter**:

Maximum Output power (GSM850) : 33dBm +/- 2dB at ambient temperature.

Maximum Output power (PCS1900) : 30dBm +/- 2dB at ambient temperature.

Minimum Output power (GSM850) : 5dBm +/- 5dB at ambient temperature.

Minimum Output power (PCS1900) : 0dBm +/- 5dB at ambient temperature.

## 3.6 Antenna Specifications

The antenna must fulfill the following requirements:

A dual band patch antenna shall work in these frequency bands and have the following characteristics:

- a minimum cable lead length of 3 meters
- Impedance: 50 Ohms
- VSWR Rx MAX =1.5: 1
- VSWR Tx MAX = 1.5:1
- Typical radiated gain: 0dBi on azimuth plane
- Frequency Tx : 824 to 849 MHz(GSM850) and 1850 to 1910 MHz(PCS1900)
- Frequency Rx : 869 to 894 MHz(GSM850) and 1930 to 1990 MHz(PCS1900)
- a threaded SMA Plug Connector. See Figure 3-1 below.



**Figure 3-1. SMA Plug**

## **APPENDIX A: SAFETY RECOMMENDATIONS (for information only)**

### **IMPORTANT: For the efficient and safe operation of this unit, please read this information carefully.**

This unit makes use of GSM/GPRS standard for cellular technology. There has been some concerns about possible health effects of using GSM terminals. Although research on health effects from RF energy has focused on the current RF technology for many years, scientists have begun research regarding newer radio technologies such as GSM/GPRS.

After the existing research had been reviewed and after compliance to all applicable safety standards had been tested, it has been concluded that the product was fitted for use.

If you are concerned about exposure to RF energy there are things you can do to avoid the exposure by operating your terminal efficiently by following the below guidelines.

- a) **Efficient Terminal Operation:** Operate the unit with the antenna fully extended and do not hold /cover or obstruct the antenna when the unit is in use. Holding the antenna affects the call quality and may cause the modem to operate at a higher power level than needed.
- b) **Aircraft:** Do not attempt to power up the unit on the aircraft. To prevent possible interference with aircraft systems, Federal Aviation Administration (FAA) regulations prohibit using the modem in any way while airborne.
- c) **Children:** Do not allow children to play with the terminal. It is not a toy. Children could hurt themselves while –playing with the antenna for example or damage the modem.
- d) **Blasting areas:** To avoid interfering with blasting operations, turn your unit OFF when in a <<blasting area>> or in areas posted: <<turn off two way radio>>. Construction crew often use remote control RF devices to set off explosives.
- e) **Potentially explosive atmosphere:** Turn your terminal OFF when in any area with a potentially explosive atmosphere. It is rare, but your modem or its accessories could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injuries or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas such as petrol stations; below decks on boats; fuel or chemical transfer or storage facilities; and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.



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Do not transport or store flammable gas, liquid, or explosives, in the compartment of your vehicle which contains your terminal or accessories.

Before using your terminal in a vehicle powered by liquefied petroleum gas (such as propane or butane) ensure that the vehicle complies with the relevant fire and safety regulations of the country in which the vehicle is to be used.

- f) **Changes or modifications:** Do not make changes or modifications to this unit without the expressed written consent of the manufacturer.

## APPENDIX B: INSTALLATION GUIDE

### CABLE INSTALLATION AND MOUNTING THE MDT IN THE VEHICLE

1. ~~Install the Radio Pigtail per the Wiring Interface Instructions for that specific model radio.~~ (no radio associated with PDN Module Equipped Vector 530's)

2. Install the MDT mount into the vehicle.

#### **CAUTION: DO NOT DRILL OR SCREW INTO EXISTING VEHICLE WIRING.**

3. Route the Power leads from the Cable assembly through the firewall of the vehicle and near the battery contacts. If drilling a new hole through the firewall be sure and install a rubber grommet so the sheet metal will not cut through the cable. When routing the wire under the hood make sure the cable is not near the exhaust manifold where it may become burnt and away from the distributor and computer module where it may pick up noise interference.

4. Cut the Power lead to the proper length so that it reaches the battery contacts as well as a ground.

5. Connect a Fuse holder to the **Red** and **Black** wires in the power lead. One fuse holder for both wires. Connect a terminal connector to the other wire of the fuse holder and connect to the **Battery +** terminal. This should be connected directly to the battery to prevent noise interference.

6. Connect a terminal connector to the **White** and **Green** wires of the Power lead and secure to the **grounding post** on the fender.

7. Tie wrap the power lead so that there will not be strain on the terminal connectors and so the wire is secure and will not rub on hot engine parts.

8. Connect P4 (DB15) of the wiring harness to the DB15 of the Radio. Tighten the screws finger tight.

9. A hidden emergency switch may be installed by connecting the **Green** wire of the meter DB9 pigtail to a normally closed switch, and then connecting the other end of the switch to the **White** wire of the meter pigtail. **IF THE EMERGENCY SWITCH IS NOT BEING**

**USED MAKE SURE THE GREEN AND WHITE WIRES OF THE METER PIGTAIL  
ARE CONNECTED TOGETHER.**



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10. Connect P5 (DB9) of the wiring harness to the meter pigtail.
11. On the meter pigtail join the Green, White and Red wires together and insulate the wires.
12. Connect P2 (DB9) to the smart meter DB9.
13. Connect P1 DB25 connector to the back of the MDT. DO NOT over tighten the set screws.
14. Connect the MDT to the mount.
15. Tie wrap any loose cabling up under the dash so that the driver or passengers will not step on it and cause unnecessary strain.
16. Perform Set Up and Tuning procedures if they have not yet been performed.

## **METER INTERFACE**

1. Connect the Green, White and Red wires of the meter pigtail together and insulate the wires.
2. Connect the meter pigtail to P5 of the wiring harness.
3. The BLACK wire is the meter status wire.
4. Connect P2 of the wiring harness to the DB9 serial port of the Smart meter.  
ONLY if a Smart Meter is used.

## **GPS ANTENNA MOUNTING AND CABLE ROUTING**

1. A suggested mounting place for the GPS antenna is under the top right light.
2. Ensure the top light is not coated with a metallic paint/coloring.
3. Ensure the top of the Antenna is not obstructed by metal, and is not too close to the bulbs.
4. The cable can then be run through the same hole as the existing wires
5. Ensure the cable is not pinched or cut in any way, and is threaded down the passenger side of the window pillar.
6. It is suggested the GPS antenna should not be too close to the GPRS antenna.

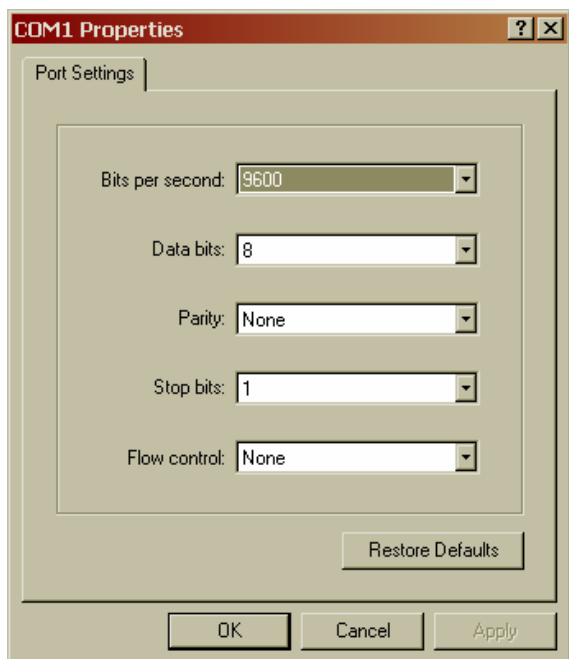


## APPENDIX C: TESTING THE GPRS MODEM

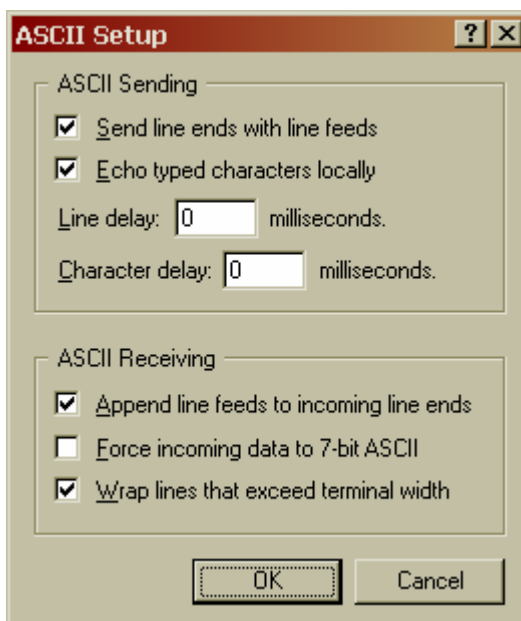
1. Connect the GPRS antenna to the SMA connector plug provided at the back of the Vector 530 unit.
2. Connect the Vector to a Windows PC using a serial cable.
3. Bring up Windows HyperTerminal on a PC to interact with the GPRS modem module.

### Hyperterminal Session Settings:

- COM Port Configuration of “9600 baud, 8, n, 1, none”
- Settings | ASCII Setup of:
  - Send line ends with line feeds
  - Echo typed characters locally
  - Append line feeds to incoming line ends
  - Wrap lines that exceed terminal width



**Figure 1a. HyperTerm COM Settings**



**Figure 1b. HyperTerm ASCII Terminal Settings**

4. Power Up the unit and carry out the following AT commands to test the functionality of the GPRS modem



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- ATD1234 ; dial
- ATA ; call answered
- AT+CFUN=1 ; or other means to detach then reattach the  
; unit from/to the network
- AT+CPIN="1234" ; to enter a PIN
- AT+CREG=1 ; to monitor registration



## Appendix D: FCC Part 15 Compliance Statement

### FCC Part 15.19 Compliance



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.

### FCC Part 15.21 Compliance

Modifications not expressly approved by Digital Dispatch void the user's authority to operate the equipment.

### FCC Part 15.105 Compliance

NOTE: 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.

### FCC RF Exposure Information

The mounting of this device and antenna must be done by professional installers to ensure that the user or nearby persons will maintain at least 20 cm from the antenna in normal use.