



# Hardware Installation Guide

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MultiConnect



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## INTRODUCTION

This document provides instructions and guidelines that should be followed for the successful installation of a Mentor MultiConnect.

### 1 Revision Tracking

Date	Description	Revision	Initials
March 15, 2004	Initial Release	1.0	JK
March 31, 2004	Updated compliance to FCC Class B	1.1	JK
	Added Canadian Compliance Statements		
April 8, 2004	Added additional safety warning to FCC statements	1.2	JK

### 2 General Precautions

Before using this product, be sure to carefully read all operating instructions. Save these instructions for future reference. Also be sure to heed all the warnings located throughout this document.

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#### NOTE

Mentor Engineering Inc. reserves the right to change specifications without notice. Please ensure you have the most recent revision of this Document

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#### CAUTION

Use only a damp cloth for cleaning. Never use any type of liquid or aerosol cleaner, or any type of organic solvent to clean this product.

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#### CAUTION

Only qualified, trained personnel should service the MultiConnect unit. Attempting to remove the cover or disassemble the product could expose you to dangerous high voltage points.

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**WARNING**

To avoid the risk of electric shock, never expose this product to water or operate in a high humidity environment. Never use the product around water (near a bathtub, kitchen sink, swimming pool or in the rain).

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**WARNING**

Do not attempt to operate a damaged device. If the product has been exposed to water, shows evidence of physical damage or is not operating properly unplug it from the power source and refer servicing to qualified service personnel.

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## FCC COMPLIANCE STATEMENT (USA)

### 1 FCC Class B Part 15

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

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 when the equipment is operated in a **residential** environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications, in which case the user will be required to correct the interference at their own expense.

The user of this equipment is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## EMISSIONS COMPLIANCE (CANADA)

### 1 MultiConnect: ICES-003, Class B

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

## POUR LES UTILISATEURS AU CANADA

### 1 MultiConnect: NMB-003, Classe B

Cet appareil numérique de la catégorie B est conforme à la législation Canadienne sur les appareils générateurs de parasites.

## REQUIRED ITEMS

For a typical installation in a vehicle, following items will be needed:

- MultiConnect Unit
- MultiConnect Power cable(s)
- In-line Cable Fuses
- Mounting Plate and Thumbscrews
- Mounting Plate Hardware (Not Supplied)

To assist with the installation, it is often necessary to have the following available:

- Laptop PC
- MultiConnect Debugging Cable
- Multimeter



## INSTALLATION

### 1 General

The MultiConnect is an external modem that can interface to any type of host via an RS232 interface. It is designed to be installed inside of a vehicle. It can be equipped with several different RF Modems. An RS232 RJ45 port is also available for operator debugging.

**MultiConnect System Diagram**

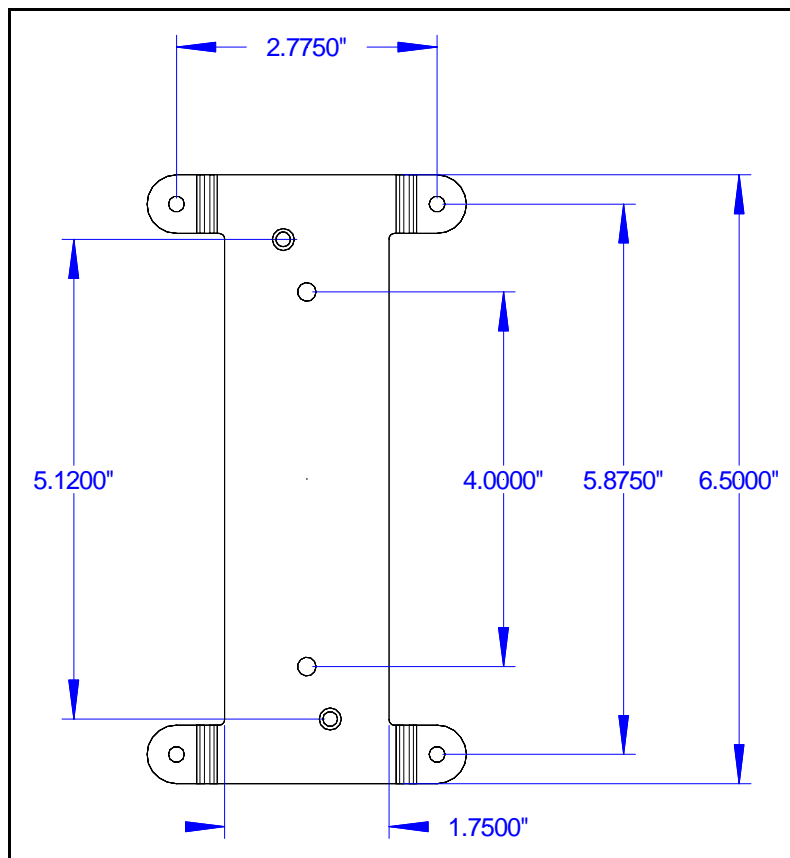


**Figure 1: Typical System Schematic**

## 2 MultiConnect Mounting Plate

The Mounting Plate is supplied with each unit, and allows the MultiConnect to be mounted in a variety of locations and orientations. The mounting location is application specific. The MultiConnect does not have an interactive user interface and thus can be installed out of sight (i.e. under a car seat, or in the trunk). Installing the MultiConnect out of sight not only increases the aesthetic properties of the installation but also limits the access by drivers and passengers to the cabling.

The Mounting plate is first fastened to the car interior using bolts or other appropriate means. Hardware has not been supplied for this step as it will vary depending on the thickness and type of material the mounting plate is attached to. The MultiConnect unit can then be attached to the mounting plate using the supplied thumbscrews.



**Figure 1: Mounting Plate Dimensions**

### Mounting Hardware:

- Mounting Plate and Thumbscrews (supplied)
- Mounting Plate Hardware (not supplied)  
4 x 0.17" Mounting Holes (Fits most #8 fasteners)

### 3 MultiConnect Connections

The cable cover on the MultiConnect unit can be removed by hand or by using a flathead screwdriver to loosen the two screws. Removing the cable cover gives access to the MultiConnect interface points, which are detailed below.



Figure 2: MultiConnect Interface points (Rear View)



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**Figure 3: MultiConnect Interface points (Front View)****3.1 Interface Summary**

1. Straight SMA Connector  
Modem Antenna
2. 18pin Micro Fit Connector (MOLEX 43045-1806)  
Power, Ignition Sense and Vehicle I/O
3. User Interface  
LEDs to indicate – DSR, DTR, RXD, TXD, ONI (modem on), PWR (IGN on).
4. 8 position Modular Jack - RJ45 (AMP 406525-1)  
RS232 Comm/Debug Port

**3.2 Vehicle Interface**

Details regarding the cabling interface for external MultiConnect host devices (Mentor Engineering's MDC or a PC for instance), are available as application notes specific to these functions. These notes are provided as required by Mentor Engineering, Inc. See Interface Point #2 above.

**4 Cabling**

The MultiConnect receives power via the Mentor supplied power cable (4-CAS-BBXVEHC075-00). Power and Ignition Sense lines need to be installed with the in-line fuses provided. See cable pin-out for details.

It is common practice to route the cabling through the vehicle so it is not visible to the driver and is protected from the environment. Mentor Engineering recommends that this practice be followed in all installations.

If an external host device (i.e. an MDC) is being used with the MultiConnect, the installer must ensure that there is a common ground between the devices. MultiConnect power leads can be crimped onto the power leads at the power input to the host device. Installing the power leads in this way will avoid the possibility of the ground potential at MultiConnect differing from the ground potential of the host device (due to current draw during a transmit cycle).

The MultiConnect should be installed to unswitched power. The unit can use the ignition line to power on and off automatically, or it can use a power control input so that the host device determines when the MultiConnect is on. The two methods can also be used in conjunction with each other.

The in-line power fuse is a 3-amp MINI blade fuse (2-FUS-MINI003A-01). The power fuse must be installed within 4" of the Vehicle Battery. The in-line ignition fuse is a 2-amp MINI blade fuse (2-FUS-MINI002A-01). The Vehicle ignition line must be fused with the in-line fuse provided or through the vehicle fuse box.

Note, a blown fuse will often indicate that there is either a problem with a connection to the MultiConnect or with the MultiConnect itself. Check all connections before replacing a fuse.

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**CAUTION**

For continued protection against risk of fire and equipment damage, replace only with the correct type and rating of fuse.

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Please refer to the Technical Data section of this manual for details on the voltage and current requirements of MultiConnect.

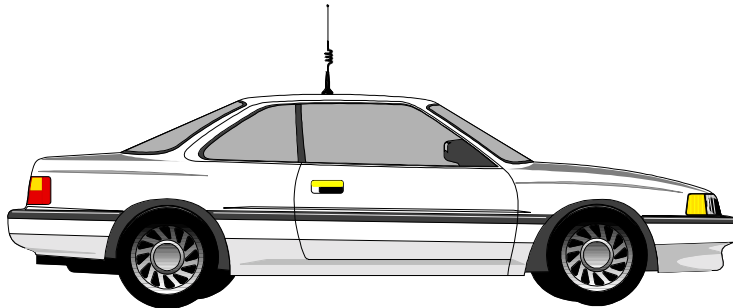
**5 Communications Device**

The MultiConnect can incorporate a variety of internal data modems such as GPRS, iDEN, CDPD, etc.

**6 Antenna Installation**

Antenna location has an extremely significant impact on the performance of a wireless modem. Mentor Engineering recommends using a roof top antenna installed in the center of the vehicle roof for best coverage and to meet SAR/MPE radiation specifications (See Following section: RF Radiation Specifications).

Antenna installation requirements vary between different antennas. Contact Mentor for specific Antenna information for your application. The following Figure shows the preferred location of a rooftop antenna.



cntrant.cdr

**Figure 4: Location of Roof Mount Antenna**

**6.1 General Antenna Guidelines**

- Position the antenna as high as possible on the body of the vehicle.
- Keep the RF cable as short as possible. Cut the excess cable during an installation. Do not wrap it up. Excess cable adds unnecessary loss to the signal.
- Ensure the antenna is in a vertical position during operation.
- Use proper RF connectors. Use a straight SMA connector when using a MultiConnect. (Refer to the SMA Connector Assembly documentation provided)

**WARNING**

Improper installation of the SMA connector can cause damage to the mating SMA connector on the MultiConnect unit.

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- Avoid sharp bends and moving objects in the coaxial cable path.
  - Position the antenna away from fuel caps.
  - Position the antenna such that there is separation from other antennas (e.g. AM/FM Radio, cellular etc.).
  - Follow the antenna manufacturer's guidelines exactly when installing antennas.
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**WARNING**

The MultiConnect, must be used with a Mentor authorized antenna in order to comply with FCC regulations. Improper antenna selection or positioning may result in excessive RF exposure which could harm the user.

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## RF RADIATION SPECS

### 1 FCC Radio Frequency Exposure Rules

Based on FCC rules 2.1091 and 2.1093 and FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, OET Bulletin 65 and its Supplement C, all radio units are subject to routine environmental evaluation for radio-frequency (RF) exposure prior to equipment authorization or use.

For mobile devices, defined as a transmitting device designed to be generally used such that a separation distance of at least 25 cm is maintained between the body of the user and the transmitting radiated structure, the human exposure to RF radiation can be evaluated in terms of Maximum Permissible Exposure (MPE) limits for field strength or power density in  $\text{mW}/\text{cm}^2$ .

### 2 How to Comply with FCC SAR/MPE Guidelines

In order to comply with FCC SAR/MPE Guidelines the antenna must be placed a minimum of 25 cm from the vehicles edge. To accomplish this, and to ensure optimum antenna performance Mentor Engineering recommends that antenna be installed in the center of the vehicle rooftop.

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#### WARNING

The user should be instructed to maintain the minimum distance from the antenna.

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### 3 SAR and MPE Limits

SAR limits for General Population/Uncontrolled exposure is 1.6W/kg for partial body exposure, averaged over 1 g of tissue and 4 W/kg for hands, wrists and feet averaged over 10 g of tissue. The limits for Occupational/Controlled exposure are more relaxed, i.e. 8 W/kg for partial body and 20 W/kg for hands, wrists and feet. The 1.6 W/kg limit applies for most MultiConnect applications.

The limit for MPE is  $0.6\text{mW}/\text{cm}^2$  at 900 MHz.

RF exposure distance is based on normal operating proximity to the user's or nearby persons' body. This distance is measured from any part of a radiating structure, generally the antenna, to the closest part of the body.

### 4 Labeling

If the antenna is installed at least 25 cm from the vehicle's edge no warning label is required.

If the antenna is not at least 25 cm from any vehicle edge, an additional RF radiation hazard label that warns the user or nearby persons to keep away from the antenna by the specified distance is required. This is because the minimum separation distance of the



final device configuration cannot be met due to occasional non-essential operating conditions or requirements.

An example statement is shown below.

“Warning: To meet the FCC RF exposure requirement for mobile transmitter end products, ensure that the antenna is at least 25 cm (10”) away from the user, or nearby persons, when transmitting.”

## **BASIC OPERATION**

### **1 Turning MultiConnect On**

Unit behaviour is dependant on the internal modem type and typical operation will vary. However, the unit generally turns on when the vehicle ignition line is active or when the Debug Cable is inserted.

### **2 General Handling and Maintenance**

Care should be taken in handling the MultiConnect to prolong product life. Caution should be used to prevent liquids from entering any openings on the unit. Liquid spills could seriously damage the internal contents of the unit.

#### **2.1 Cleaning Tips**

Use a soft lint free cloth moistened with water or mild detergent to clean the exterior of the unit. Do not apply cleaner directly to any unit opening.

**MULTICONNECT TECHNICAL DATA****1 Voltage**

Supply voltage 9 - 34 volts

**2 Current Consumption**

Standby 0.7mA  
Typical<sup>†</sup> 25mA  
Peak<sup>‡</sup> 3A

**3 Temperature Range**

Operating -30 to +60°C  
-22 to +140°F

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**WARNING**

Operation at temperatures outside this range is not recommended. Some modems are not intended for operation at the extremes.

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Storage -40 to +80°C  
-40 to +176°F

**4 Dimensions and Weight**

Approximate Size (L x W x H) 4.75" x 5.0" x 1.0"  
121 x 127 x 25 mm  
Weight (with typical modem) 0.77 lbs / 0.35 kg

**5 Compliance**

- FCC Class A Part 15

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**NOTE**

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<sup>†</sup> Typical Current Draw measured with device powered without a modem.

<sup>‡</sup> Peak Current draw will vary depending on Modem type and peripheral devices used.