

MENTOR ENGINEERING INC

Mobile Data Computer

Hardware Installation Guide

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Table of Contents

Introduction.....	1
What You Need	1
Installation.....	2
General	2
MDC Mounting Bracket	2
MDC Placement.....	3
MDC Connections.....	3
Communications Device.....	5
Basic Operation and Configuration	6
Turning the MDC On.....	7
Adjusting the Backlight.....	7
Accessing the MDC Maintenance Menus	7
Setting the MDC Time and Date	8
Adjusting the LCD Contrast	8
Setting the MDC ID.....	8
Setting Communications Parameters.....	9
Configuring and Testing in the Vehicle	10

Setting the MDC Modem Level	10
Setting the MDC ID.....	12
Testing the Communications	12
Technical Data.....	14

Introduction

This document provides instructions and guidelines that should be followed for the successful installation of Mentor Engineering's Mobile Data Computer (MDC).

What You Need

For a typical installation in a vehicle, you will need the following:

- MDC
- MDC installation cables (vehicle/power cable and communications adapter cable)
- Mounting bracket
- Cable tie-downs

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

- PC Laptop
- MDC programming cable
- Multimeter
- Radio service monitor (for systems using mobile radios for communications)

Installation

General

The MDCs are shipped pre-programmed with the appropriate communications and application software. In some cases, however, it is necessary to re-program the units with updated files prior to installing them. Please refer to the MDC Programming application note for details on re-programming the units.

MDC Mounting Bracket

The type of MDC mounting bracket will vary depending on the type of vehicle that the MDC is being installed in. It will also depend on whether or not an Express QWERTY keyboard is to be mounted with the MDC. The mounting brackets may be ordered through Mentor, or through a third party supplier. The following information provides the details necessary for ordering a mounting bracket along with an adapter plate for the MDC.

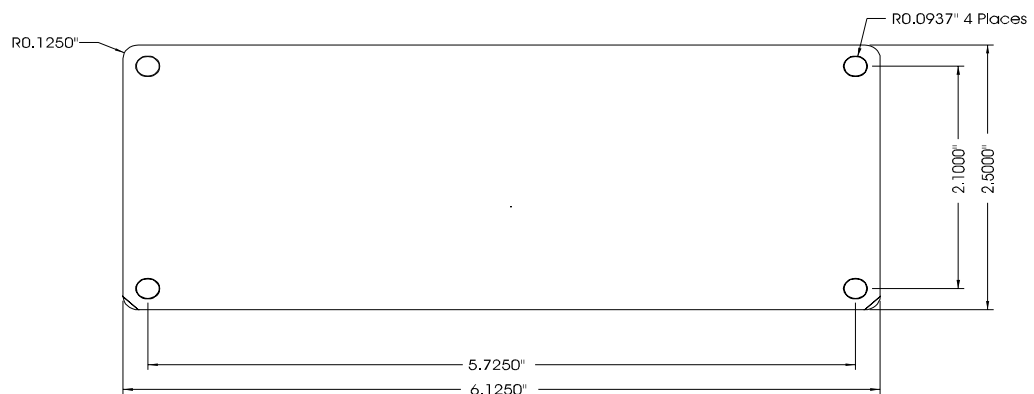


Figure 1 Mounting Bracket Adapter Plate

- MDC Mounting screws: 3/8" (10mm) #8 thumb screws
- Adapter Plate Material: 1/8" (3.2mm) aluminum

MDC Placement

The placement of the MDC should be carefully considered. It is important that the unit is mounted so that the driver of the vehicle can easily view and operate the MDC. Attention should be given to the placement to make sure the MDC does not interfere with regular driving functions.

MDC Connections

The interface points available on the MDC are grouped on six separate connectors according to their function.

MDC Rear View:

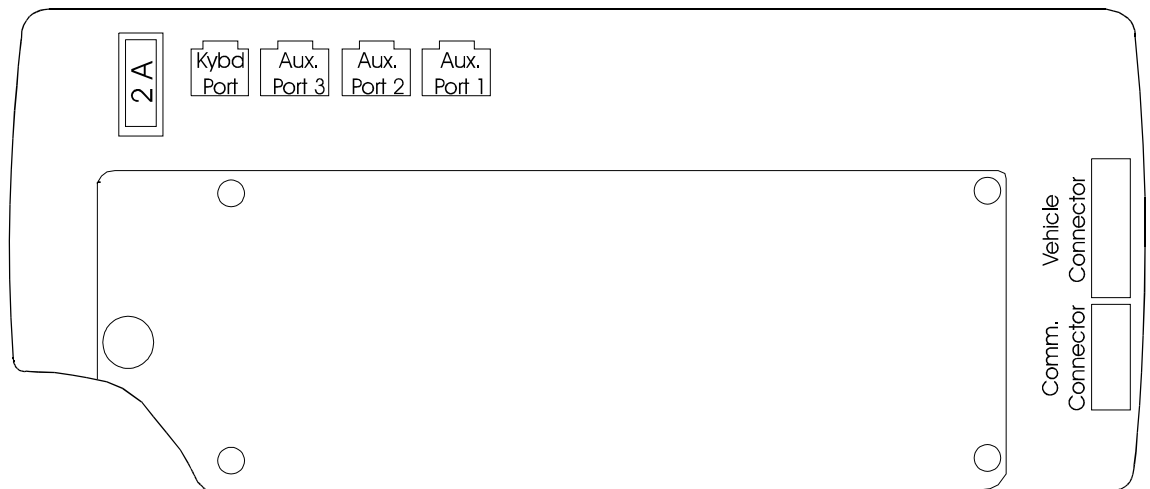


Figure 2 MDC Connectors

Connector Summary

1. Vehicle connector:
MDC power, general use I/O, odometer input and RS485 interface.
2. Communications connector:
General use I/O, internal modem to mobile radio connection points and an RS232 interface for external data modems.

3. Auxilliary port 1:
RS232 serial interface port used for MDC programming and for connection to external peripheral devices.
4. Auxilliary port 2:
RS232 serial interface port for connection to external peripheral devices.
5. Auxilliary port 3:
RS232 serial interface port for connection to external peripheral devices.
6. Keyboard port:
Interface port for connection to the Express Mini QWERTY keyboard.

In the most basic MDC installation, only the vehicle and communications connectors will to be required.

Communications Interface

The installation cable provided will bring the appropriate interface pins from the communications connector to an appropriate adapter for the communications device. Details for specific interfaces are available as application notes from Mentor Engineering, Inc.

Peripherals Interface

Details regarding the cabling interface for external MDC peripheral devices, odometers, and additional I/O are available as application notes specific to these functions. These notes are provided as required by Mentor Engineering, Inc.

MDC Cables

In general, there will be one cable from the MDC connected to power (see Power Connections section) and one cable connected to the communications device (radio, modem, etc.). It is common practice to route the cabling through the vehicle so it is not visible to the driver and is more protected from the environment. Mentor Engineering recommends that this practice be followed in installations.

In some installations that use GPS, there will also be a GPS antenna that will have to be mounted on the roof of the vehicle and connected to the MDC via the GPS connector (usually located at the bottom of the MDC).

Power Connections

The MDC receives power via the vehicle connector. The installation cable that is provided for the vehicle connector will have pigtails for connection to power and ground.

The MDC power leads should be crimped onto the power leads at the power input to the communications device. Installing the power leads in this way will avoid the possibility of the ground potential at the MDC differing from the ground potential of the communications device (due to current draw during a transmit cycle).

If the MDC is connected to switched ignition power the units manifest will be lost every time the engine is turned off. In some systems, the terminal will be connected to ignition power and will be powered on and off automatically. If the ignition is off the terminal can be powered using the power switch.

The MDC has a 2-amp fuse on its power input. The fuse is easily accessible via the back of the unit if it needs to be replaced (port 2A in Figure 2). Note, however, that a blown fuse will often indicate that there is either a problem with a connection to the MDC or with the MDC itself. Check all connections before replacing the fuse.

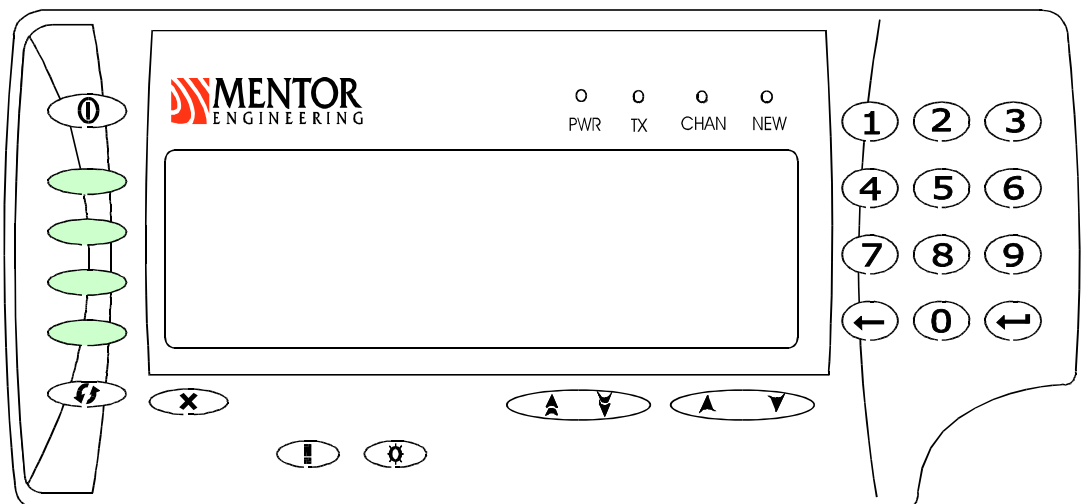
Please refer to the Technical Data section of this manual for details on the voltage and current requirements of the MDC.

Communications Device

There will also be a communications device that will have to be installed in the vehicle. In radio systems, this will be a mobile radio with its accompanying antenna. If a data system such as Mobitex or CDPD is being used, then the communications device will be a modem. The size and location of the communications device should be taken into account during the installation process to ensure that there is enough space to mount and install all components of the system in the vehicle.

Basic Operation and Configuration

The following figure should be used as reference while following the instructions in this section.



- | | | | |
|--|------------------------|--|---------------|
| | ON/OFF KEY | | BACKSPACE KEY |
| | FUNCTION KEY | | ENTER KEY |
| | MORE KEY | | NUMBER KEY |
| | EXIT KEY | | POWER LED |
| | EMERGENCY KEY | | CHANNEL LED |
| | BACKLIGHT KEY | | NEW INFO LED |
| | PAGE UP/ PAGE DOWN KEY | | TRANSMIT LED |
| | UP/DOWN KEY | | |

Figure 3 MDC Front View with Key Definitions

Turning the MDC On

The MDC is powered on and off with the ON/Off Key. In some systems, the MDC is powered on and off with the vehicle ignition.

The MDC will display the Mentor logo along with software revision information. The first screen of the customer's application file should appear after approximately 2 seconds.

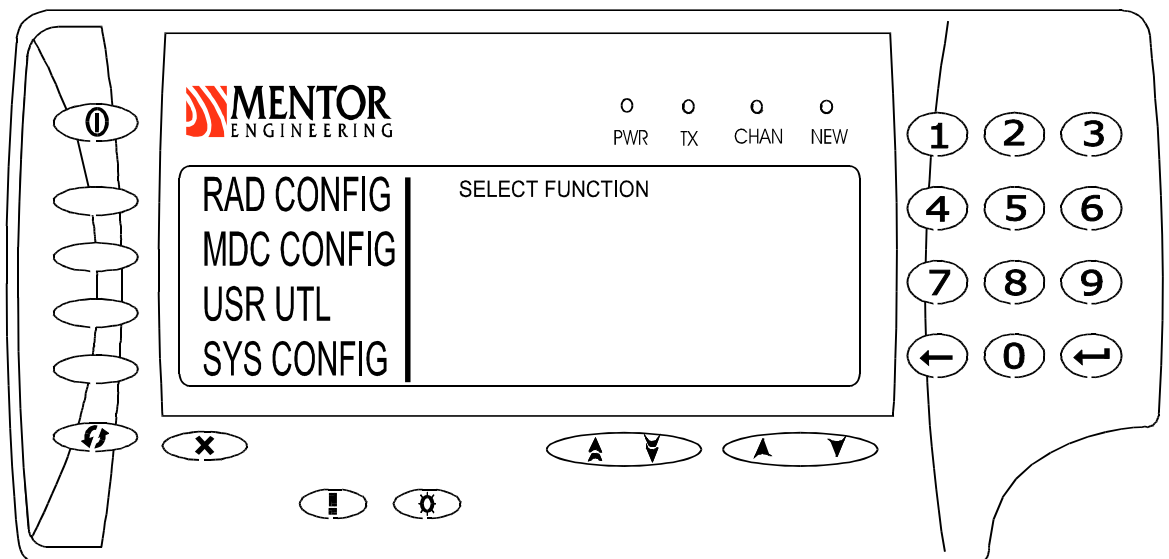
Adjusting the Backlight

The backlight for the keypad and LCD display is adjusted by pressing the BACKLIGHT key. Each time the key is pressed, the backlighting will switch to the next of eight different levels of intensity.

Accessing the MDC Maintenance Menus

Many MDC parameters (unit ID, communications parameters, time/date) may be modified through the MDC maintenance menus. These menus are only intended for use by qualified technicians and, therefore, they are protected by a special access sequence.

To access the menus, press the keys *CONFIDENTIAL* in order within a 2 second time frame. The screen display that should appear is shown in the figure below. (If you are having problems entering the maintenance menus, it is likely that you are not pressing the coded keypad sequence fast enough).



Setting the MDC Time and Date

From the MDC maintenance menu, select the user utilities function by pressing the function key next to the USR UTL text. In the subsequent screen, press the function key next to the CHANGE TIME text, enter the current time at the prompt and press ENTER. Next, press the function key next to the CHANGE DATE text, enter the current date and press ENTER.

Press EXIT once to leave the USR UTL menu.

Adjusting the LCD Contrast

From the MDC maintenance menu, select the user utilities function by pressing the function key next to the USR UTL text. From the user utilities menu, press the function key next to the LCD CONTRAST text. Use the PAGE UP / PAGE DOWN keys to adjust the contrast up or down as required.

Press EXIT once to leave the USR UTL menu.

Setting the MDC ID

In most systems, it is necessary to set a unique ID for each MDC that is installed. (NOTE: In an EDACS Data Network the MDC ID has to be the same as the LID of the mobile radio it is connected to. When the MDC is being installed for use on a data network such as CDPD or Mobitex, the external modem has a unique ID and the MDC ID does not need to be configured. For these systems, please refer to the appropriate applications note for the necessary set-up parameters.)

From the MDC maintenance menu, select the MDC configuration screens by pressing the function key next to the MDC CONFIG text. From the MDC configuration screen, press the MDC ID function key, enter the MDC ID at the prompt and press ENTER. Press EXIT to leave the MDC configuration screen

Important:

Before exiting from the MDC Maintenance screen, the newly entered value must be saved. To save modified parameters, select the SYS CONFIG function key. The next screen will not display any function keys; however, there is a save function associated with the bottom function key. Press this key and you will be prompted to save the changed values. Press ENTER and the values will be saved.

Finally, press EXIT to leave the SYS CONFIG menu and EXIT again to leave the maintenance menus.

Setting Communications Parameters

The communications parameters for the various communications systems are set via the MDC maintenance menus. Usually Mentor personnel will pre-configure these values. Please refer to the applicable application notes from Mentor Engineering to configure these values if required.

Configuring and Testing in the Vehicle

When the MDC has been installed in the vehicle, there are some configuration and testing procedures that Mentor Engineering recommends following. These procedures can verify that the unit is ready for fleet operation when it leaves the installation site.

Setting the MDC Modem Level

Note: Setting the modem level is not required on any data network (EDACS, CDPD, Mobitex, etc.).

If the MDC is being used in a radio system, then the MDC Modem Level should be set while installing. The MDC can be set to transmit modem tones at a certain audio level but the radio limits excessive levels causing signal distortion. Therefore, if the transmit level is too high the data will over-deviate the channel and will not be successfully decoded by the receiving device. If the transmit level is too low, then the transmission will be under-deviated and not be received either.

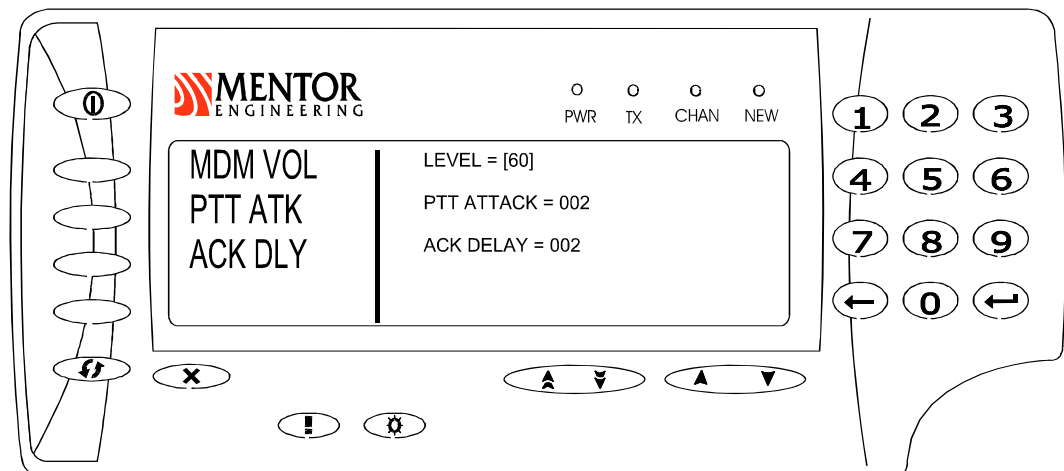
Follow this procedure to correctly set the MDC Modem Level. A radio service monitor will be required.

1. Press *CONFIDENTIAL* to get back into the MDC maintenance menus.
2. Press the function key next to the RAD CONFIG text to go into the radio configuration menus.
3. Press MORE and you will see the label MDM VOL next to the top function key.
4. Set up your service monitor to monitor the frequency that the mobile radio will be transmitting on.

5. Press the function key that corresponds to the MDM VOL text. On the main MDC screen, you will see square brackets appear around the LEVEL numbers. These square brackets indicate that the MDC is transmitting mark tone.
6. Key the microphone of the mobile radio.
7. Using the service monitor, determine the amount of deviation in kHz of the channel. We want 2.5 kHz deviation.

Note: Since the MDC does not control the PL Inhibit leads during this test, any deviation due to PL (private line) Tones on your system must be added to the 2.5 kHz. For example, if PL Tone deviation is 0.5 kHz, then you must have a total of 3.0 kHz of deviation on the channel.

8. If the channel deviation on the service monitor is not 2.5 kHz, then use the up and down arrow keys on the MDC to change the value of the number in square brackets (see below).



9. Increasing the number in the brackets (up arrow) will increase the deviation measured on your service monitor. Decreasing the number (down arrow) will decrease the deviation.
10. Once the deviation is approximately 2.5 kHz on the service monitor, hit ENTER on the MDC.
11. The new transmit level is now set in the MDC. Write down the new number for future reference, along with the MDC serial number.
12. Press EXIT to get back to the main menu.

- 13.** Before exiting from the MDC Maintenance screen, the newly entered value must be saved. To save modified parameters, select the SYS CONFIG function key. The next screen will not display any function keys, however, there is a save function associated with the bottom function key. Press this key and you will be prompted to save the changed values. Press ENTER and the values will be saved.
- 14.** Finally, press EXIT to leave the SYS CONFIG menu and EXIT again to leave the maintenance menus.

Setting the MDC ID

As previously mentioned, in most systems, it is necessary to set a unique ID for each MDC that is installed. (NOTE: For an EDACS Data Network the MDC ID must be the same as the LID ID of the mobile radio it is connected to. When the MDC is being installed for use on a data network such as CDPD or Mobitex, the external modem has a unique ID and the MDC ID may require a different type of configuration. For these systems, please refer to the appropriate applications note for the necessary set-up parameters.)

From the MDC maintenance menu, select the MDC configuration screens by pressing the function key next to the MDC CONFIG text. From the MDC configuration screen, press the MDC ID function key, enter the MDC ID at the prompt and press ENTER. Press EXIT to leave the MDC configuration screen

Before exiting from the MDC Maintenance screen, the newly entered value must be saved. To save modified parameters, select the SYS CONFIG function key. The next screen will not display any function keys; however, there is a save function associated with the bottom function key. Press this key and you will be prompted to save the changed values. Press ENTER and the values will be saved.

Finally, press EXIT to leave the SYS CONFIG menu and EXIT again to leave the maintenance menus.

Testing the Communications

As a final test, a message can be sent by the MDC to the receiving device, if one is available. If an acknowledgement is received by the MDC, then it can be assumed that the message made it to the receiving device, and the MDC is operating properly.

When the MDC is powered on, it usually defaults to some sort of sign-on screen. This screen will usually have a function key labeled SIGNON. This key can be used to test communications.

First make sure that the communications device (ie:- radio, external modem) is on and set to the correct data channel. Also verify the cabling and antenna connections. If you are using mobile radios on a conventional radio system, then the channel LED on the MDC should be illuminated.

Press the function key next to the SIGNON text. Enter any information prompted for using the numeric keypad or keyboard and press ENTER. There may be several fields that need to be entered.

After the last field has been entered and ENTER is pressed, the MDC will display the message "SENDING..."

After a few seconds the message "Job Transmission Complete" will appear on the MDC screen. If this happens, then the test was successful and installation is complete.

If the message "Could Not Deliver Message. Try Again?" appears then the test failed. Check the connections and equipment again to try to isolate the problem. It might be necessary to re-check the MDC Modem Level again.

Technical Data

Supply voltage:	9 - 18 volts
Current consumption	
Typical (LCD heater off, medium backlight):	0.22 A
Maximum (LCD heater on, full backlight):	1.29 A
Temperature range	
Operating:	-30 to +65°C -22 to +149°F
Storage:	-30 to +80°C -22 to +176°F
Approximate Size (W x D x H):	8.5 x 2 x 3.5 in. 216 x 51 x 89 mm.
Weight	1 lb. / 0.6 kgs