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PIM
POWER ISOLATED MODEM
USER MANUAL

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PIM
Power Isolated Modem
User Manual

Commercially available modems are not suitable for use in railroad wayside applications. The PIM, however, is designed to be powered by a typical battery source and will operate over a temperature range extending from –40°C to +72°C.

Introduction

This document provides a detailed description of the use and operation of the MICRO-AIDE Power Isolated Modem (PIM). It also provides a detailed description of the installation and use of MICRO-AIDE's Modem-Config Application. The latter is used to create and save the profile used by the PIM.

Description

The PIM is specifically designed for use in railroad applications. It features a fully isolated, internal power supply. External DTE signals and telephone line voltages are not reflected back to its power source. The PIM can be safely powered by any battery source in the range from 8 to 36 Vdc.

Baud rates up to 33,600 are supported by the PIM. Industry standard error correction and data compression algorithms are also supported.

The PIM is housed in a rugged aluminum case. It will operate over temperature ranges associated with wayside equipment. Front panel LEDs indicate the status of the modem at all times.

A standard DB-25 connector allows the PIM to be connected to a wide array of railroad signal and communications equipment. Typical applications include remote access of hotbox detectors, alarm devices, data loggers, event recorders and PLCs.

Figure 1 on page 4 provides a three-sided, dimensioned view of the PIM. More detailed information is included in the section entitled "Specifications" on page 5.

New PIM

MICRO-AIDE designed the original PIM in 1999. In 2012 the PIM was re-designed. The new design includes all of the capabilities of the earlier modem, but housed in a substantially smaller package.

The new PIM design uses a Silicon Labs chip. The new chip introduces a slightly different set of AT commands.

Installation

The PIM is housed in a case that includes mounting ears at either side. The diameter of each hole is .219". The mounting holes are 6.134" apart. The modem can be secured to any flat surface including a backboard.

A standard 25-pin, RS-232 cable can be used to connect the PIM to the DTE device. The PIM is equipped with a female connector configured for DCE operation. The specifications page lists each of the RS-232 signals provided by the PIM.

The telephone line is attached to the PIM via a standard RJ-11 connector.

The PIM draws its internal power from the terminal leads labeled "B" and "N". A detachable, tension clamp connector is used for this purpose. The connector is located at the rear of the modem. Wire gauges in the range from 12 to 22 AWG can be used.

The PIM is designed with an internal, fully isolated power supply. The battery power source will be isolated from all PIM circuitry, DTE signals and telephone tip and ring leads.

Setup

The PIM includes support for a single operating profile. In some applications the factory-installed profile may need to be modified. Modem profiles are largely determined by the operational aspects of the

DTE attached to the PIM and the call originating system. The PIM supports many industry standard AT and Hayes commands. However, several modem characteristics are not uniformly coded by modem manufacturers.

MICRO-AIDE's ModemConfig App must be used to create a new PIM profile. The latter half of this User Manual provides a complete description of the ModemConfig App.

Unless otherwise requested, each PIM is programmed prior to shipment by the following initialization string. A separate command, rather complex and therefore not listed, is used to save the profile.

ATE0Q1\Q3\N5\T10S0=2

The six AT commands listed above allow the PIM to operate as follows:

E0: disable echoing of commands to DTE port
Q1: disable result codes to DTE port
\Q3: enable RTS/CTS flow control at DTE port
\N5: only calls with error correction are supported
\T10: DTE Baud rate is set to 38,400
S0=2: modem answers in two rings

A complete list of AT commands used by the PIM is available from MICRO-AIDE.

The PIM operation controlled by the preceding commands may be appropriate for the user's intended application. If not, the profile will need to be changed. The modem is ready for use after the correct profile is programmed and saved into the non-volatile memory of the PIM.

Operation

To operate the PIM simply make the necessary power, phone line and DTE cable connections. The LEDs will illuminate in accordance with the following descriptions.

Pwr: power is applied
RI: flashes when ringing voltage is present
RD: data received from the phone line
SD: data from the DTE and sent by the modem
OH: modem is off hook
CD: carrier from the far end modem has been detected

The current profile used by the PIM can be reviewed at any time. To do so, connect the communications port of a PC directly to the DB-25 connector of the PIM. A communications program (e.g., HyperTerminal® or Procomm®) can be used to access the PIM. Use the following AT command sequence to report the profile settings.

ATS&$%$\$

The results will be grouped into five categories.

Additionally, the ModemConfig App can be used to review the current profile. Refer to the section entitled "View Profile" on page 8 for additional details.

Maintenance and Trouble-Shooting

The PIM is designed to be completely maintenance free. It contains no consumable materials or serviceable components. If the unit fails to power-up (as indicated by the power LED not being illuminated) the unit should be returned to MICRO-AIDE for repair.

The operation of the PIM can be easily tested. Any PC equipped with a modem and a communications program can be used to access the PIM. A check of the modem's ability to answer, connect and communicate can be performed very effectively. Remote tests of the PIM can be made by MICRO-AIDE technicians at the request of the user.

All rail signal products manufactured by MICRO-AIDE are protected by a five-year warranty. Contact information is listed below.

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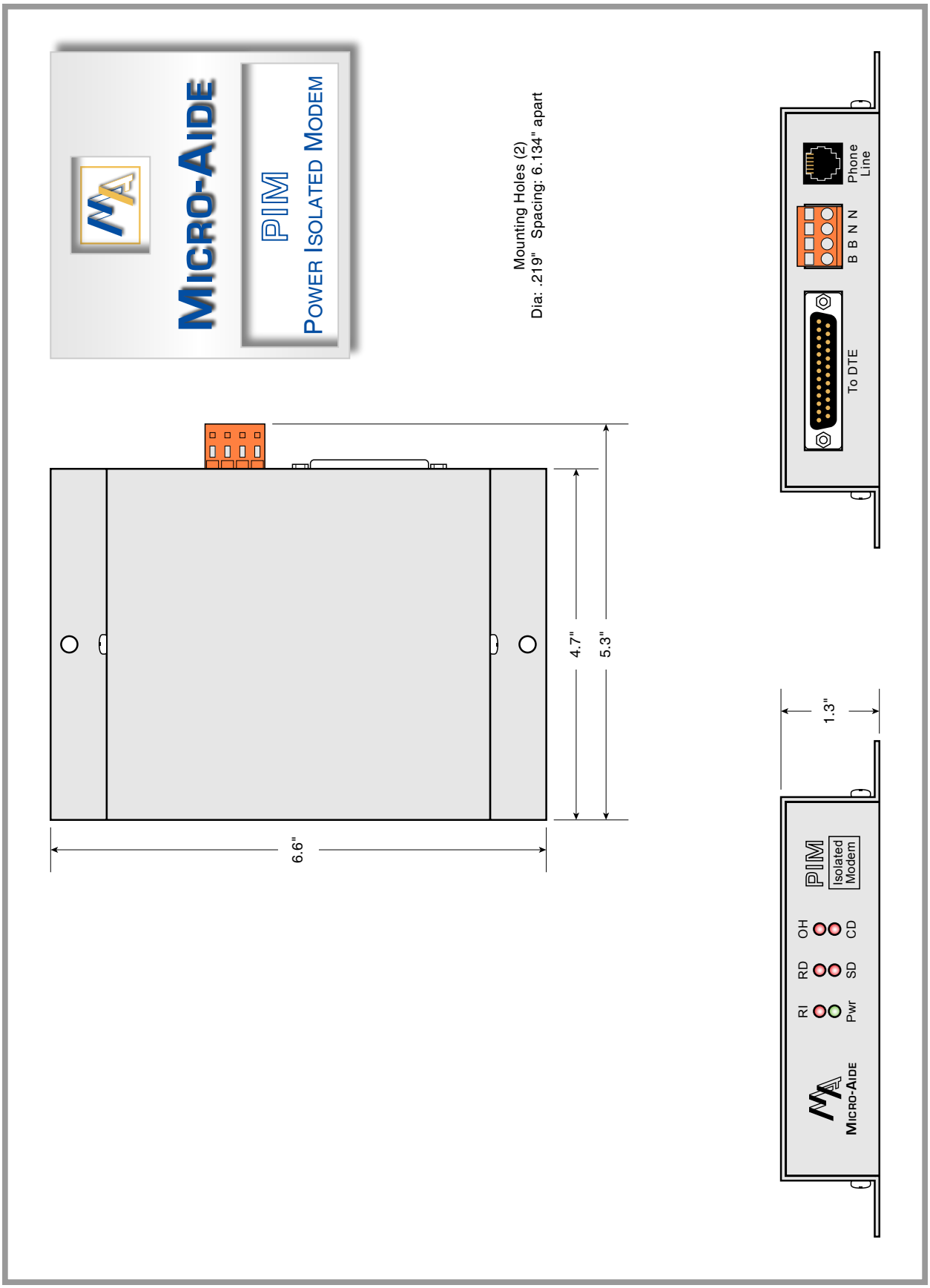


Figure 1: Three-Sided Dimensional View

PIM
Power Isolated Modem
Specifications

Physical
Size

Length: 6.6"

Width: 5.3"

Height: 1.3"

Weight: 10 oz.

Environmental
Storage

Temperature: -50°C to +85°C

Humidity: 0% to 95%, non-condensing

Operating

Temperature: -40°C to +72°C

Humidity: 0% to 95%, non-condensing

Mounting
Shelf or desktop

Construction
Chassis

Fully enclosed, anodized aluminum, externally accessible connectors and LEDs

Electrical

Single PCB with conformal coating, mounted inside chassis

Power
Voltage

Input: 8 to 36 Vdc

Consumption

Maximum 60 mA at 12 Vdc

Isolation and Protection
Minimum 4000 Vdc to ground or any input connection, infinite duration

An external, telco-approved suppressor can be used for added protection

Connectors
Power

Detachable, tension clamp with 4 terminals, 12 to 22 AWG, requires .25" stripped end

Terminals 1 & 2: B, battery positive

Terminals 3 & 4: N, battery negative

DTE

Type: DB-25, female , configured as DCE

Signals: RD, SD, CTS, RTS, DSR, DTR, DCD, RI, Signal Ground

Phone

Single RJ-11

LED Indicators
Green: Power

Red: Qty. 5, Receive Data, Transmit Data, Off Hook, Ring In, Carrier Detect

DTE Interface
Configured as DCE

Auto-Baud detection (fixed Baud rate available)

Line Protection
Internal MOV device used across tip and ring

A telco approved external suppressor should be used for added protection

Regulatory
Designed to meet applicable FCC standards

Modem Standards
Speed: 300 to 33.6K Baud, V.21, V.22, V.29 Fast Connect

Data Compression: V.42bis, V.44

Error Correction: V.42, MNP 2-5

Control Commands
AT command compatibility

Supports most standard Hayes commands

Includes additional AT commands for control of other modem features

Profile
Support for one profile

Defined by the sequence of various AT commands

Active profile is volatile until saved to EEPROM

Use MICRO-AIDE's ModemConfig App to create and save a profile

MICRO-AIDE reserves the right to make changes, at its sole discretion, to any specification listed herein.

ModemConfig Application

Use MICRO-AIDE's ModemConfig Application to create and save a new modem profile.

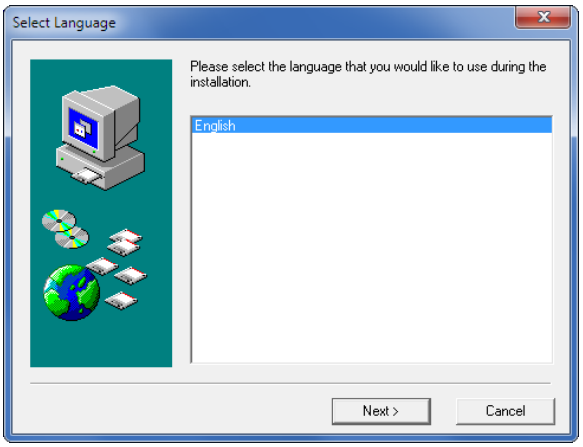
Description

The ModemConfig App is used to create and save a new modem profile. It can be installed and run on any Windows XP®, Windows Vista® or Windows 7® PC. The application requires that specific library files be installed on the PC. Accordingly, a second executable file must also be installed. Both installation procedures are described in the following two sections.

The modemconfig_v100.exe and qt4_runtime_v470.exe files can be downloaded without charge from MICRO-AIDE's website. Visit: www.micro-aide.com/support/downloads.html

QT Runtime Library Installation

Download, unzip and then save to an appropriate location the qt4runtime.exe file. Once saved, double-click the .exe file to initiate the installation process. The following screen will be displayed.

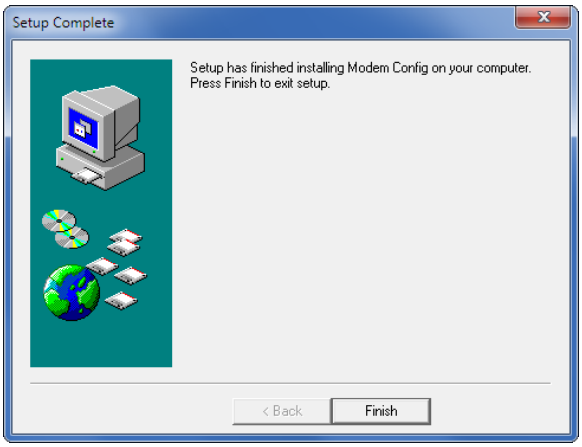


Continue with the standard installation by clicking the button labeled "Next >" in each of five successive dialog boxes. Click the buttons labeled "Finish" and "OK" in the final two dialog boxes to complete the QT4 Runtime library installation. Version 4.7.0 of the library is now available.

ModemConfig App Installation

Download, unzip and then save to an appropriate location the setup_modemconfig_v101.exe file. Once saved, double-click the .exe file to initiate the installation process. Continue with the standard installation by clicking the button labeled "Next >" in each of five successive dialog boxes.

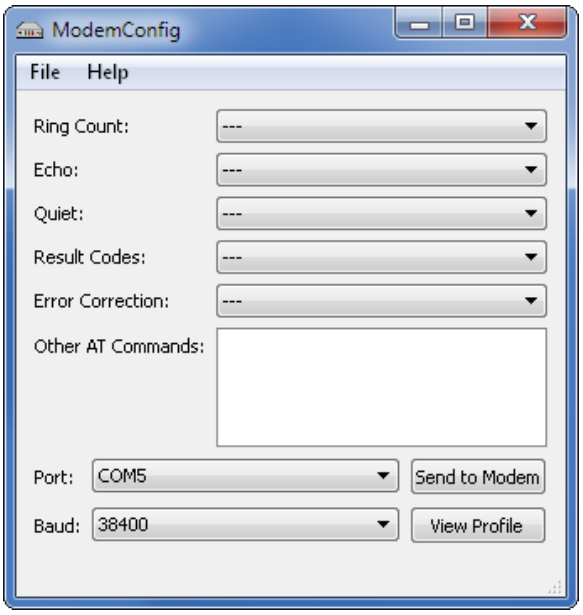
The following screen will be displayed.



Click the button labeled "Finish". Complete the installation by clicking the button labeled "OK" in the final dialog box. Version 1.01 of the ModemConfig App is ready for use. An icon labeled "ModemConfig" will be displayed on the PC's desktop.

Create a New Modem Profile

To create a new profile, start by double-clicking the ModemConfig icon on the PC's desktop. A screen similar to the following will be displayed.



Initially the ModemConfig App displays a single dialog box. The dialog box shown above is used primarily to assign specific profile settings. A second dialog box is used to report the profile settings currently in use. Refer to the section entitled "View Profile" on page 8 for additional details. A description of each component included in the dialog box is provided in the following sections.

Help

The ModemConfig App includes two commands at the top of the dialog box. The Help command can be found there. Click the command to launch the PC's default browser. A Help file in the form of an html page can then be read.

Select a Comm Port

Click the drop-down list box labeled "Port". Select an appropriate port from the list (e.g., "COM5" as shown in the above). ModemConfig will use this port to communicate with the PIM.

Select a Baud Rate

Click the drop-down list box labeled "Baud:". Select the Baud rate that matches the rate presently used by the PIM. For example, if the PIM is currently using a fixed Baud rate of 9600, then the "9600" setting must be selected. The "38400" setting is always the initial setting displayed by ModemConfig. Selecting a Baud rate is not required provided the PIM's DTE port is set to auto-Baud, as established by the \T16 command.

Select Common AT Settings

The most common settings used to create a new profile are listed in the upper section of the dialog box. Five drop-down list boxes allow the user to easily select a variety of important settings. Select the "---" entry to ignore a particular setting. These settings will be sent to the PIM in top-to-bottom order.

Additional AT Settings

To assign additional profile settings, click in the area labeled "Other AT Commands:". This area serves as a large text-edit box. It can be used to create a sequence of additional commands that are user specific. An AT-prefix is not required. The command string that is formed by the individual commands will be sent after the common settings. A space character is not required to delimit each command.

Care should be exercised when assigning additional commands. The ModemConfig App is not able to report an error in any command string. For example, the command %XY will fail, but not be reported as an error.

Additionally, the following fixed Baud rate commands must not be used: \T5, \T7, \T13, \T14 and \T15. These settings will result in fixed Baud rates that are not supported by HyperTerminal and/or the ModemConfig App.

Save the Profile

The command labeled "File" includes the standard Windows "Save" and "Save As" sub-commands. They can be used to save the currently listed settings as a .txt file. The resultant file can be saved at any location. As a .txt file, it can be viewed by a variety of commonly available applications.

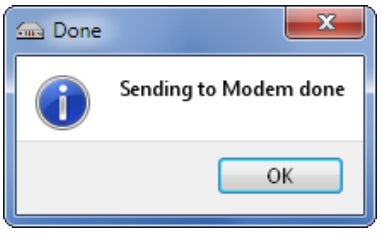
Open a Saved Profile

The "File" command also includes the "Open" sub-command. It can be used to quickly load the ModemConfig dialog box with the contents of a previously saved profile.

Send Profile

The final step is to send the new profile to the PIM. Before doing so, carefully review each setting. Make sure the appropriate PC port and PIM are connected

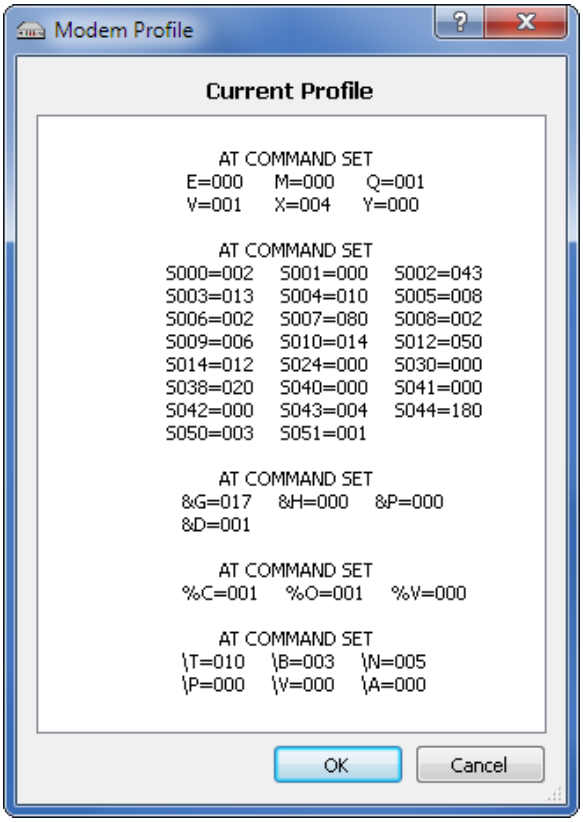
via a suitable cable. Click the button labeled “Send to Modem”. The send and receive data LEDs of the PIM will flash briefly. At the completion of the transmission the following dialog box will be displayed.



Click the button labeled “OK” to return to the Modem-Config dialog box. The PIM will now operate in accordance with the newly established profile.

View Profile

The profile currently saved in the EEPROM of the PIM can be easily inspected. Click the button labeled “View Profile”. A new dialog box will be opened. Its contents will display the values of 42 different profile settings. This feature can be used to verify that the PIM will operate in accordance with the user’s requirements.



The View Profile feature will report data similar to that depicted in the previous sample screen. If required, enlarge the vertical dimension of the dialog box or use the vertical scroll bar to view all of the settings.

Click the button labeled “OK” to close the dialog box and return the focus to the ModemConfig App.

The settings shown in the previous screen reflect the initial profile provided by MICRO-AIDE.

Exit

Click the command labeled “File>Exit” to close the ModemConfig App.