## Overview

This document describes the features of the GUI program used to control Power Line Modem with E-Meter Platform.

Program Startup

The first time the program is run, three menus will be displayed at startup. The first is used to select the com port to which the platform is connected, the second two are related to the power line characteristics. On subsequent runs, the platform remembers these settings and does not display the menu windows. The File menu contains tabs to change any of the settings if needed; additionally, if the previous port cannot be opened, the com port menu will be displayed again.
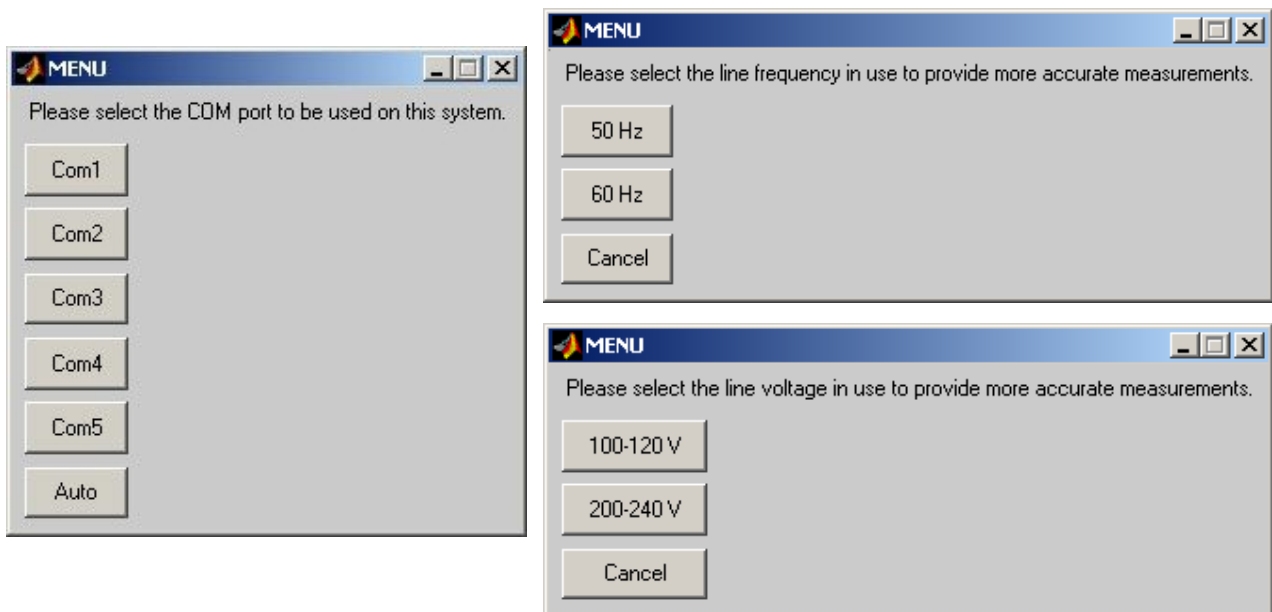
 When a com port is selected the program will attempt to open a communication channel using that port. The results of the operation will be displayed in the status window of the GUI (either that the serial port was opened or it was unable to open a port). If 'Auto' is selected, the program automatically determines which serial port is appropriate for communicating by trying all the ports in turn until a connection with the master is made. It first attempts to use the most recently successful port (if there is one), then proceeds to try 5, 4, 3, 2, and 1. If all the ports fail, then the program displays an error message. After finding and fixing whatever is wrong, the user can attempt to scan the serial ports again by using the pull-down selection.

The platform is designed to run in countries with different power line characteristics, however for accurate E-meter readings, the program must be informed of these setting through the voltage and frequency menus.

Control Panel Overview

Below is a screen image of the GUI software. The graphical controls communicate with the
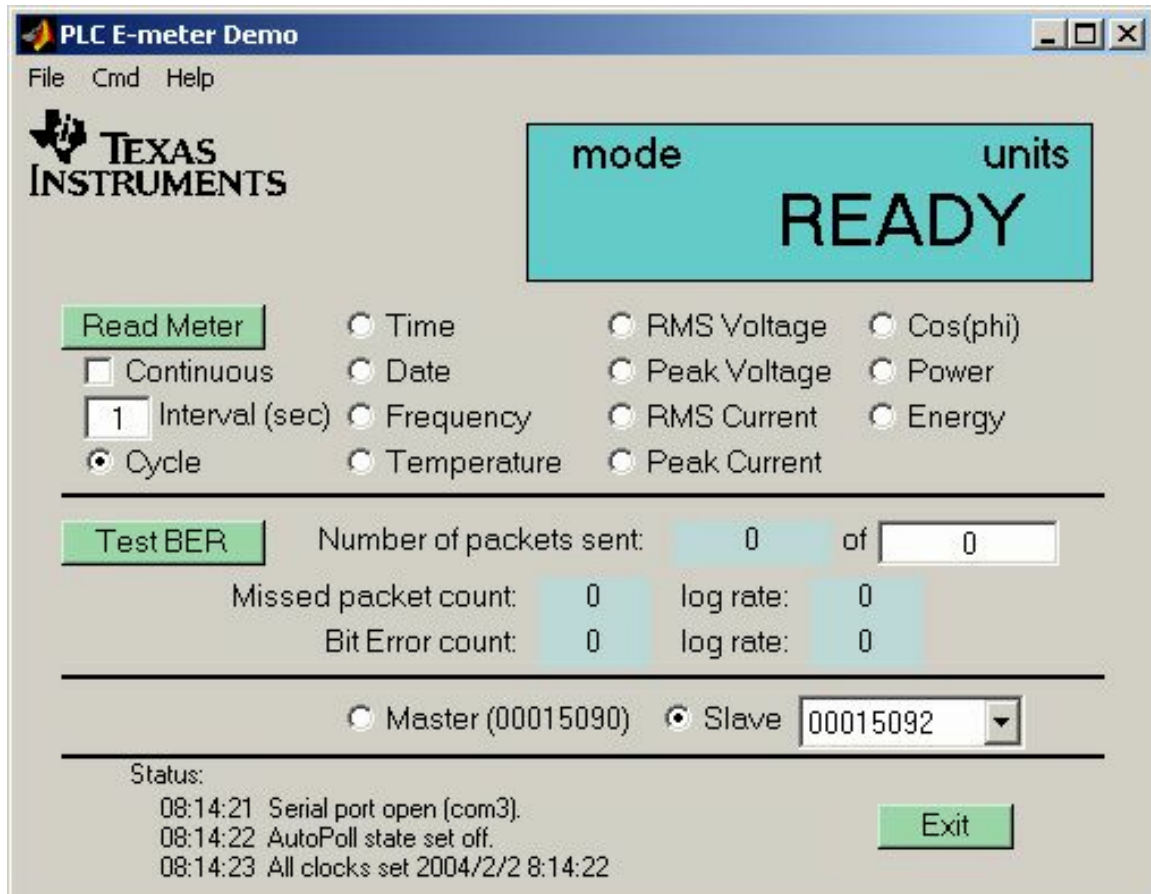TMS320VC5409A on the platform.

Figure 1. Screenshot

Read Meter Button

This button reads either the e-meter on the master node or slave node. The selection of which
node to use is via the "Master" and "Slave" radio buttons.

When the button is pressed, the selected e-meter will be read according to the radio buttons,
"continuous" check box, and "interval" input box. If the "continuous" check box is checked, then
the meter will be read continuously at the interval specified in the "interval" input box. The
reading is stopped by pressing the "Read Meter" button (which will have its label changed to
"Stop Reading"). If the "continuous" checkbox is not checked, then the meter will be read only
once.

The radio buttons determine what is read each reading. If the "cycle" button is pressed, then all
the available values are read from the e-meter and displayed. Otherwise, the single value (e.g.,
RMS voltage) is read and displayed.

Test BER Button

The BER button activates the bit error rate test. In the test, packets are sent continuously from the master unit to the slave unit. Then the statistics are read from the slave unit and displayed.

The number of packets to be sent during the test is entered in the text entry box following the word "of". The test is started by pressing the "Test BER" button. The test can be aborted by pressing this button again (during the test, the label on the button changes to "Abort BER").

The statistics of the bit error rate are displayed in the window. The "missed packet count" shows the number of packets that were sent from the master but not received at the slave. The "bit error count" shows the bit error rate for the packets that were received. The log (base 10) of the rates of errors for both missed and erroneous packets are also displayed.

Master/Slave Selection

The "Master" and "Slave" radio buttons determine which e-meter should send its reading to the PC when the "Read Meter" button is pressed, the destination of a "Set Date" command, and which LCD to write when using the "Set LED" command.

The pull-down to the right of the "Slave" radio button is used to change the address to which the master unit attempts to communicate. When the PLC units are powered on, they automatically start searching for the nearest unit available to them over the power line. When two units find each other, the two units remember the addresses of the partner that they found, and this address is displayed in the pull-down list next to the "Slave" radio button.

It is possible to communicate with other slaves by changing the address manually with the pull-down. In the pull-down list, only the slaves that have been found with the "Find All Slaves" operation are listed.

TEXAS INSTRUMENTS

File Pull-down Selections
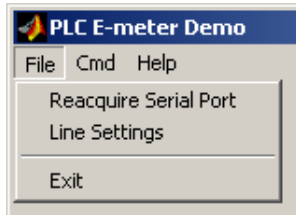
Reacquire Serial Port

When "Reacquire Serial Port" is selected, the same menu used in the startup sequence (shown on page 1) is displayed. This allows the platform port setting to be changed if the host PC configuration changes or if the platform connection is broken and needs to be re-established. The port selected will become the default for the next time the GUI is started.
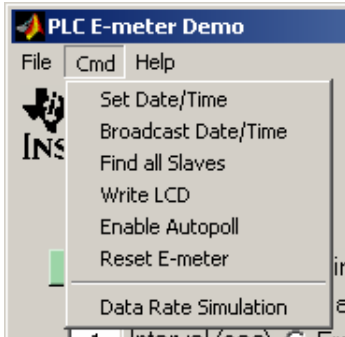
Line Settings

The line setting menus used in the startup sequence are re-displayed allowing a change of the line power environment to be recognized. The selected values will become the defaults for the next time the GUI is started.

Exit

Activating this pull-down terminates the program.
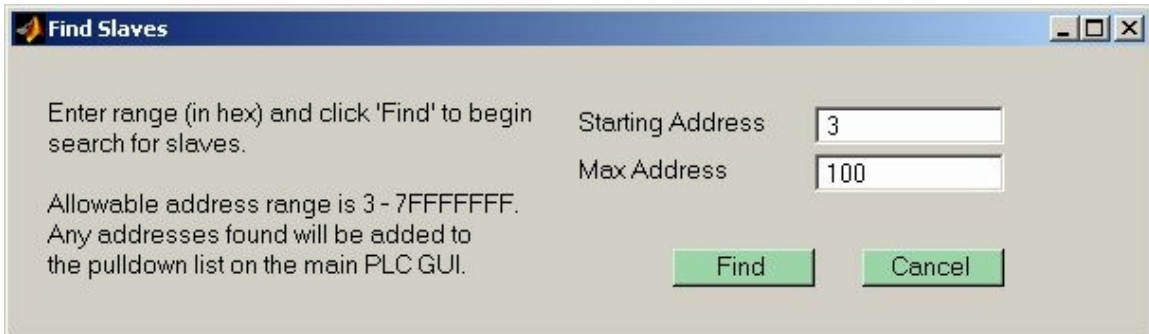
Cmd Pull-down Selections

Set Date/Time

This command sets the date and time of either the master or slave e-meter, depending on which radio button ("Master" or "Slave") is selected.

Broadcast Date/Time

This command sets the date and time of the master and all slave units that hear the message over the power line.

Find All Slaves

This command searches for all slave units within a specified address range that can hear the master. A table of all the slaves is generated and can be seen as highlighted entries in the pull-down selection list to the right of the "Slave" radio button. Before this command is executed, the only entry in the slave list will be the slave with the address closest to the master unit.

Write LCD

This command allows messages to be written on the LCD display of either the master or slave unit, depending on which radio button ("Master" or "Slave") is selected.

Enable AutoPoll

When the program is entered, it automatically disables the "auto-polling" operation. When enabled, auto-polling means that the master unit sends a packet to the slave unit periodically (once per second) to verify that the communication path between the two units still works. Pressing this pull-down item enables the auto-polling operation. When auto-polling is enabled, there will be a check mark next to the "Enable AutoPoll" pull-down. Pressing the "Enable AutoPoll" pull-down again will disable auto-polling.

Reset E-meter
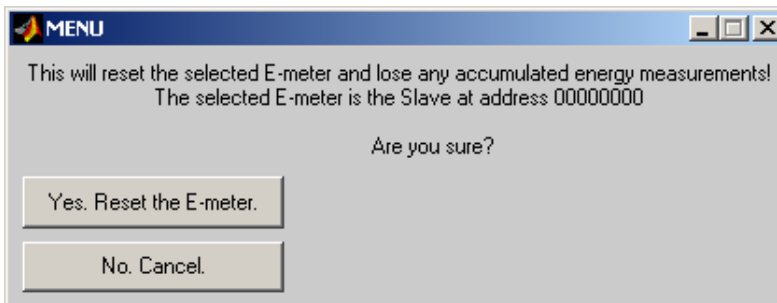
The Reset E-Meter selection will perform a hardware reset of the MSP430 on the E-meter portion of the platform. The displayed menu box will offer a opportunity to abort the operation. If the E-meter is reset, all variables values will be lost including the accumulated power and the clock settings.

Data Rate Simulation
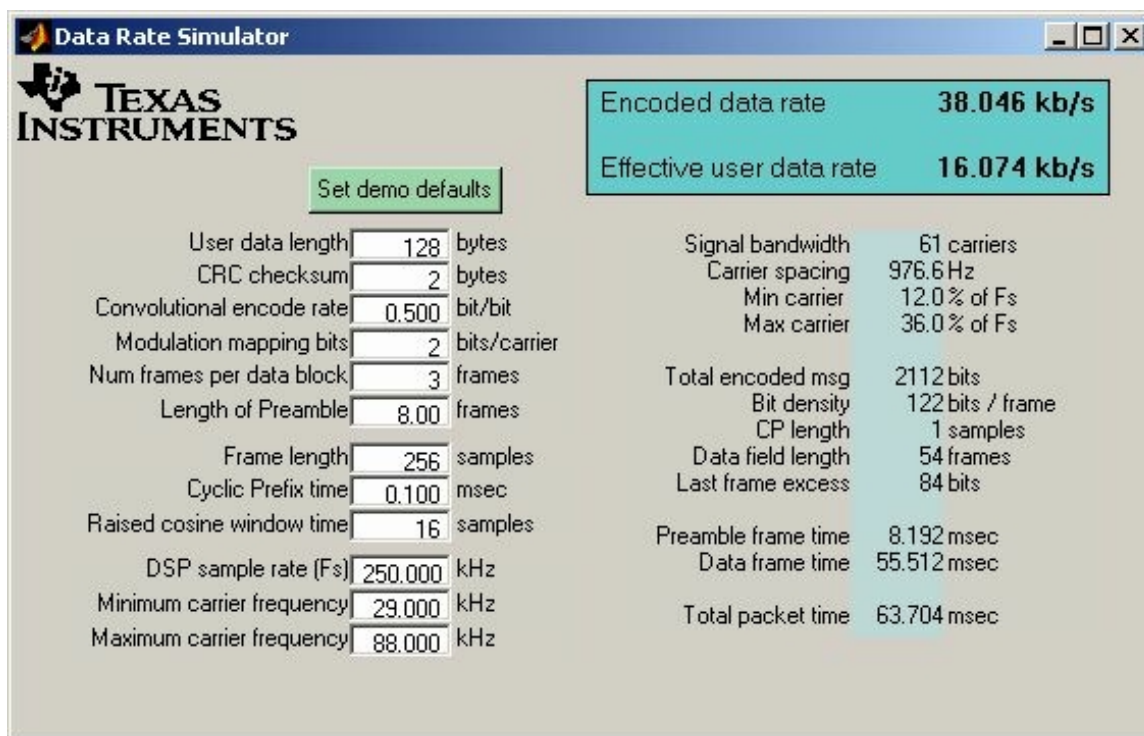
The "Data Rate Simulator" allows estimating modem data rates based on different program assumptions. Note that this has no effect on the platform; it is provided purely for "what if" scenarios. Changes to the DSP program would be required to implement a change.

The "Set demo defaults" button restores the defaults matching the platform code.

Help Pull-down Selections
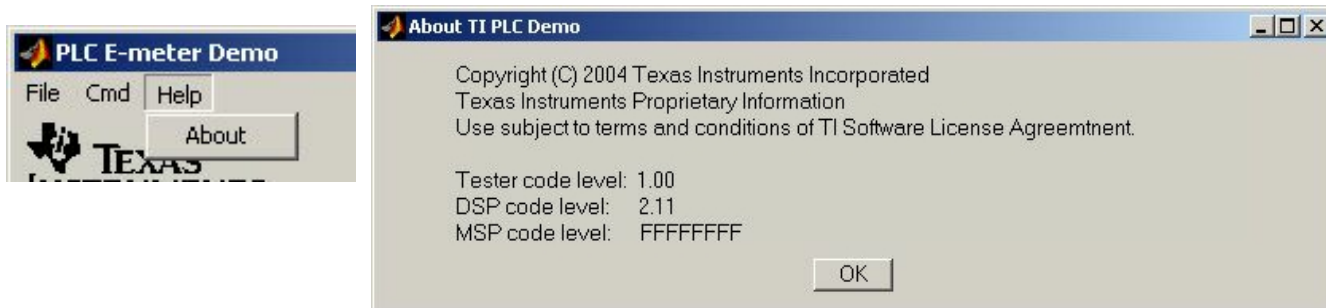
About

Selecting this pull-down displays information about the GUI code and also, if a valid RS232/USB link exists to a master PLC box, will display the software version codes of the DSP and MSP loaded on the box.

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