



Gamatronic Electronic Industries Ltd.

PSM-INV SERIAL

**Power System Monitoring of
a Paralleled Inverter System
Controlled by the SC2012 Controller**

User Guide and Instruction Manual



April 2003, Version 1.0

**Har Hotzvim Industrial Park,
14 Hartum St., P.O.B. 45029, Jerusalem 97774, Israel
Tel: 02-588-8222 Fax: 02-582-8875
Email: info@gamatronic.co.il web: www.gamatronic.com**

WARNING

The management and control program that you purchased makes it possible for you to control an inverter system.

This EMS application enables you to change parameters related to the daily or periodic operation of the system - system faults, etc. - and save them in the inverter system.

It is solely the responsibility of the customer to change these parameters and to save those changes in the system.

Modification of parameters by an unauthorized user can cause problems, faults and/or other damage to the system.

Gamatronic is in no way responsible for changes made by users or for their effect on the inverter system.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	1
1.1 Table of Specifications	1
2. INSTALLATION	2
2.1 Installing the Software	2
2.2 Connecting to a Local Inverter System.....	2
2.3 Connecting to a Remote Inverter System	2
2.4 Activating the Program	2
3. THE GENERAL SCREEN.....	3
3.1 Measurement Gauges	4
3.2 LED Indicators	4
3.3 Communication Data on the Status Bar.....	4
3.4 Alarm Log	4
4. MENUS.....	5
4.1 File Menu	5
4.2 View Menu	5
4.3 Connection Menu	6
4.4 Tools Menu.....	6
4.5 Log Menu.....	8
4.6 Help Menu.....	10
5. THE INVERTER SCREEN	11
5.1 Operating an Inverter	11
5.2 LED Indicators for an Inverter	12
6. THE STATIC SWITCH SCREEN	13
6.1 Operating the Static Switch.....	13
6.2 Measurement Gauges	14
6.3 LED Indicators for the Static Switch	14
7. CONFIGURING THE MODEMS	15
7.1 Example of Modem settings	17

LIST OF FIGURES

Figure 1: Cable Connecting the Inverter system to the Computer	2
Figure 2: The General Screen	3
Figure 3: Dry Out Window	5
Figure 4: Select COM Port Window	6
Figure 5: Connect by Modem Window.....	6
Figure 6: Change Password Window	6
Figure 7: Settings Window	7
Figure 8: Alarm Log Window	8
Figure 9: Calendar.....	9
Figure 10: Alarms Definition Window	9
Figure 11: Legends Window	10
Figure 12: The Inverter Screen	11
Figure 13: The Static Switch Screen.....	13

LIST OF TABLES

Table 1: Description of Settings Parameters	7
Table 2: Description of an Inverter's LED Indicators	12
Table 3: Description of Alarm Messages.....	14
Table 4: Description of Operation Status LEDs.....	14

1. GENERAL INFORMATION

The PSM-INV Serial monitor program enables an inverter system to be monitored and controlled by a computer connected to the inverter system via a serial cable or a modem.

This program is password-protected. Every time you log onto the program a password is requested the first time you try to change one of the settings or perform an action. You are not allowed to make changes or perform actions if you do not respond with the correct password.

1.1 Table of Specifications

FEATURE	DESCRIPTION
Program	PSM-INV SERIAL
Devices	Gamatronic's IP2001 Bezeq Parallel AC/DC Inverter System
Communication	RS232, Modem
Operating System	WINTEL
Hardware Required	PEN II, 32MB MEM, 10 MB HD, SERIAL PORT, Serial cable\Modem\phone line
General Features	One program supports one system Real-time alarm and status information Installation possible in all Microsoft environments Multi-language support Customization to meet client requirements Modem traps
Communication Features	Access from any location in the world via modem
User Interface Features	User-friendly Graphic User Interface LED indicators Analogical and Digital Display Pushbutton controls Fault history logs Alarms Settings Communication Setting

2. INSTALLATION

2.1 Installing the Software

To install the software:

1. Close all open Windows programs on your computer.
2. Place the PSM-INV SERIAL CD in your computer; the *Welcome* window of the Setup program appears on the screen.
3. Click the *Next* button.
4. Follow the instructions written on the window that appears.
5. Click the *Next* button.
6. Repeat Steps 4-5 until the *Software Successfully Installed* window appears.
7. Click the *Finish* button to complete the installation.

2.2 Connecting to a Local Inverter System

Attach a serial cross cable cable to the selected Com port on the computer and to the communication socket on the front of the inverter system.

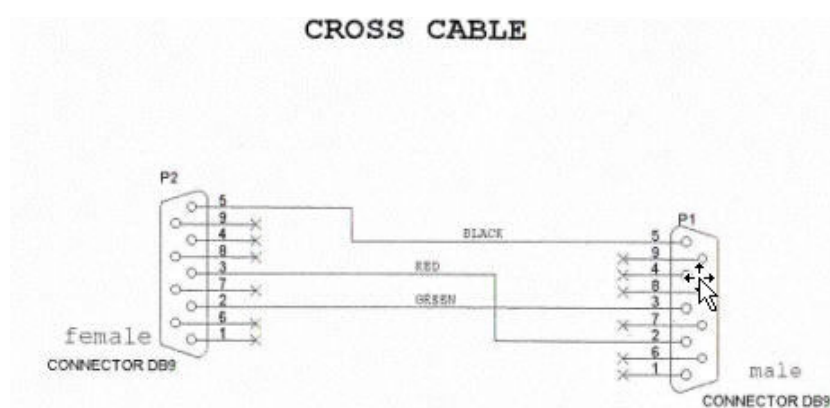


Figure 1: Cable Connecting the Inverter system to the Computer

2.3 Connecting to a Remote Inverter System

Two modems are required to connect to a remote inverter system.

To connect the modems:

1. Connect one modem to a phone line and to the computer's Com port.
2. Connect the other modem to a phone line and to the controller's communication socket.
3. Configure both modems (*see Configuring the Modems, page 15*).

2.4 Activating the Program

To activate PSM-INV Serial: Click its icon on the Desktop.

To deactivate the software: Click the button in the PSM-INV Serial window.

3. THE GENERAL SCREEN

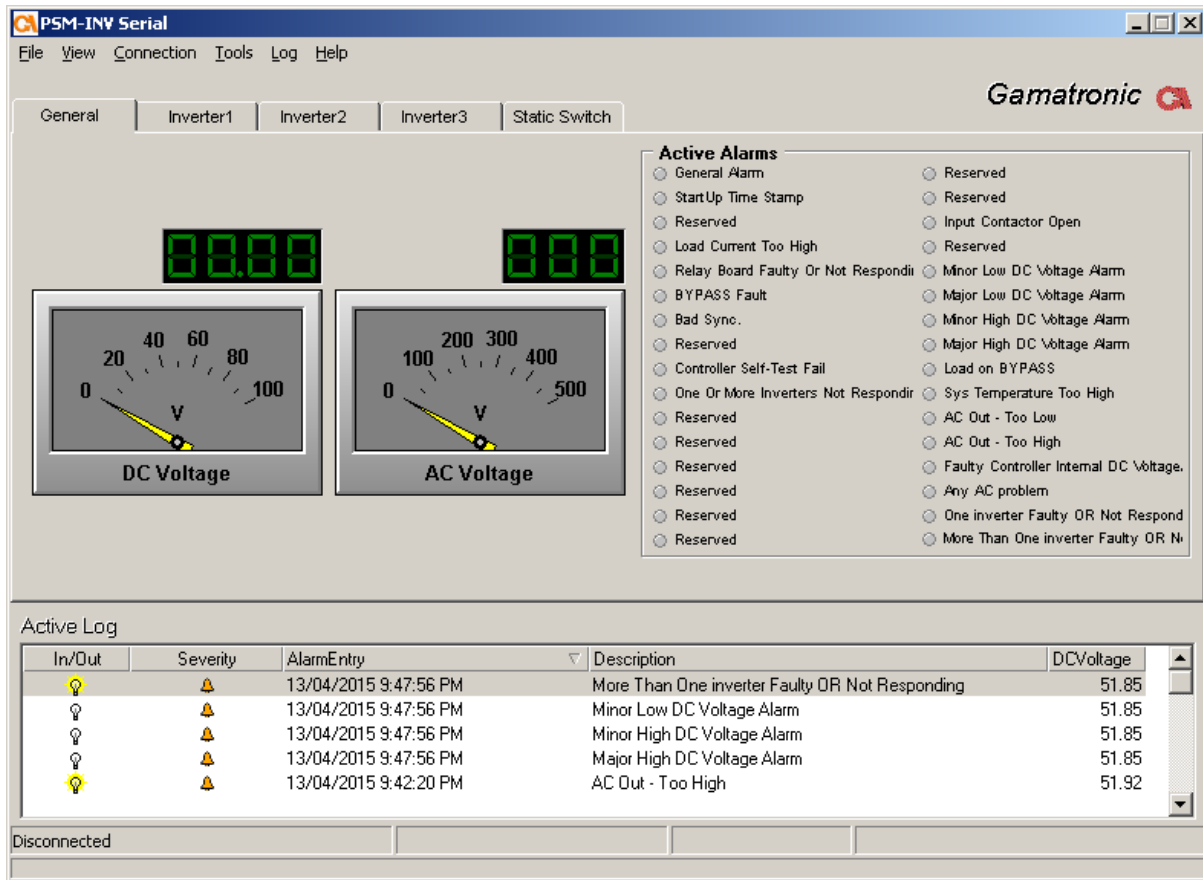


Figure 2: The General Screen

The General Screen appears when PSM-INV Serial is activated. It displays updated, real-time information on the status of the whole inverter system via:

- Digital and analogical measurement gauges
- Active alarms LED indicators
- Communication Data on the status bar
- Alarm Log

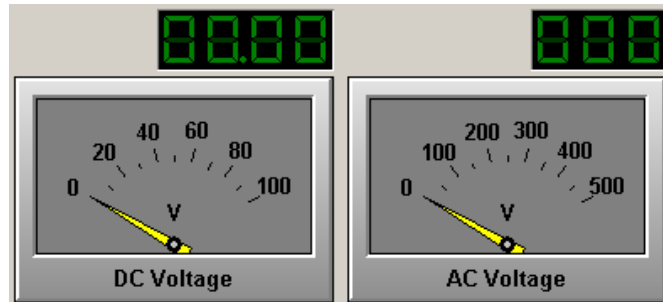
The inverter system is controlled via the options in the menus (see Menus, page 5)

There are also screens that enable you to monitor and control individual inverters and the static switch (see *The Inverter Screen, page 11* and *The Static Switch Screen, page 13*). Click the appropriate tab to open one of these screens.

3.1 Measurement Gauges

The measurement gauges on the *General* screen display digitally and analogically the real-time status of the system's input and output voltage:

- **DC Voltage** - Input voltage
- **AC Voltage** - Output voltage



3.2 LED Indicators

Possible system faults are listed in the main window under *Active Alarms*. The LED next to the alarm message is lit when the alarm is active. The alarms are activated according to the parameters defined in the *Settings* window (see *Settings*, page 7). If you change the message for any of the alarms (see *Alarms Definition*, page 9) the new message appears in the *Active Alarms* list and in the *Alarm Log*.

3.3 Communication Data on the Status Bar

General information regarding the status of communication between PSM-INV Serial and the IP2001 Bezeq system is displayed in the status bar at the bottom of the screen.

A sample display of this communication data is: `System is connected to COM1 | 18.02.2001 16:46:07`

The meaning of this is:

- **Inverter system is connected to COM1** - The inverter system is connected to the COM1 port of the computer. The message **DISCONNECTED** appears here when the system is disconnected from the computer, indicating a communication failure. It is not possible to control or monitor the system when it is disconnected.
- **18.02.2001 16:46:07** - Current date and time

3.4 Alarm Log

The *Alarm Log* is a table detailing every fault that every occurred in the inverter system. It contains the following information about each fault:

- **In/Out** - A lit icon in this column indicates that the fault is active.
- **Severity** - The degree of severity of the fault is indicated by the color of the icon in this column:
 - = Critical Fault
 - = Major Fault
 - = Minor Fault
 - = Warning
- **Alarm Entry** - Date and time the program learned about the fault
- **Description** - Alarm message for the fault
- **DC Voltage** - Input voltage for the faulty system

4. MENUS

The options in the following menu enable you to view additional information about the inverter system's status and to manage the system by changing its default or current parameters.

- File Menu
- View Menu
- Connection Menu
- Tools Menu
- Log Menu
- Help Menu

4.1 File Menu

Choose the *Exit* option to close PSM-INV Serial.

4.2 View Menu

Choose the *View* menu>*Dry Out...* option to open the *Dry Out* window. The inverter system has 5 output dry contacts and 32 possible faults. This includes 11 faults that are reserved for future definition (see *Alarms Definition, page 9*). This read-only window shows which fault is linked to each dry contact. The green squares indicate a linked fault.

Alarm	DryOut1	DryOut2	DryOut3	DryOut4	DryOut5
Reserved					
Reserved					
Reserved					
Input Contactor Open		■			
Reserved					
Minor Low DC Voltage Alarm				■	
Major Low DC Voltage Alarm		■			
Minor High DC Voltage Alarm				■	
Major High DC Voltage Alarm	■				
Load on BYPASS					■
System Temperature MUCH Too High			■		
AC Out - Too Low					■
AC Out - Too High			■		
Faulty Controller Internal DC Voltage/s				■	
Any AC problem	■				
One inverter Faulty OR Not Responding			■		
More Than One inverter Faulty OR Not Re		■			
General Alarm			■		

Figure 3: Dry Out Window

4.3 Connection Menu

The *Connection* menu has two options:

- *COM Port*
- *Modem*

4.3.1 COM Port

Choosing the *COM Port* option opens the *Select COM port connected to controller* window in which you can select the port connecting the computer with the system.

Click the com port you want to use to connect to the system or click *AUTO* if you want the computer to select the port.



Figure 4: Select COM Port Window

4.3.2 Modem

Choosing the *Modem* option makes *Connect by Modem* window appear.

Enter the telephone number (including area codes if necessary) of the inverter system.

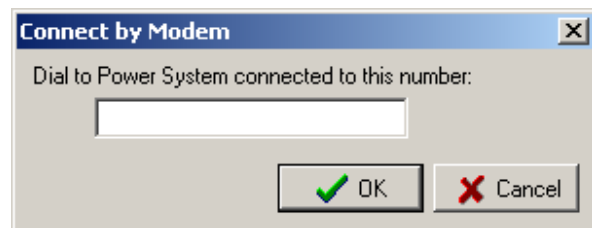


Figure 5: Connect by Modem Window

4.4 Tools Menu

The *Tools* menu contains the following options:

- *Set Password* - Changes the password
- *Settings* - Opens the *Settings* window in which you can change the system's configuration

4.4.1 Set Password

Choosing this option opens the *Change Password* window for changing your password.

To change your password:

1. Enter your password in the *Old password* field.
2. Enter your new password in the *New password* field.
3. Re-enter your new password in the *Re-type password* field.



Figure 6: Change Password Window

Note: When using this program for the first time, enter the password received from the manufacturer into the first field.

4.4.2 Settings

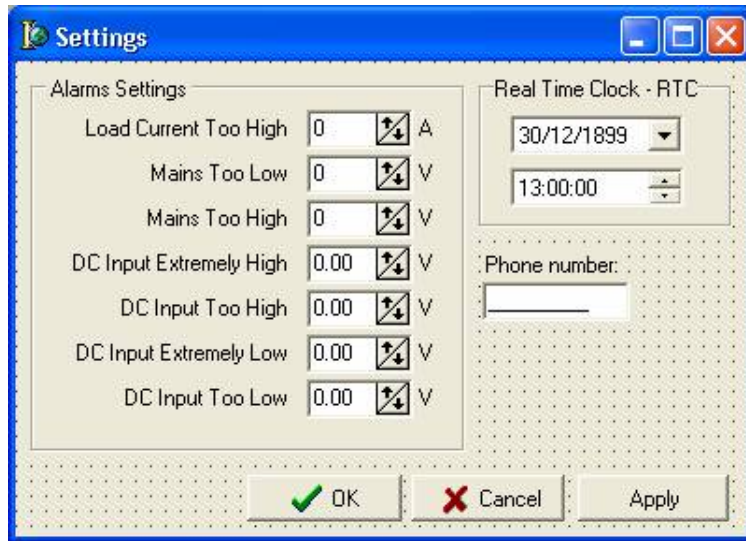


Figure 7: Settings Window

This window allows you to:

- Specify the minimum and maximum limits of the permitted range for the inverter system parameters described below. (An alarm is set off when a inverter system parameter is outside the specified range.)
- Set the date and time of the system's Real Time Clock.
- Set the date and time of the system's Real Time Clock.

Table 1: Description of Settings Parameters

PARAMETER	DESCRIPTION
Load Current Too High	Current drawn by the load \geq this number triggers an overload alarm
Mains too low	Voltage in the mains that is \leq this number triggers an alarm and prevents the system from switching to bypass.
Mains too high	Voltage in the mains that is \geq this number triggers an alarm and prevents the system from switching to bypass.
DC Input Extremely High	DC input voltage \geq this number triggers an alarm
DC Input Too High	DC input voltage \geq this number triggers an alarm
DC Input Too Low	DC input voltage \leq this number triggers an alarm
DC Input Extremely Low	DC input voltage \leq this number triggers an alarm
Real Time Clock - RTC	Sets the date and time of the system's Real Time Clock.
Phone Number	Sets the modem's phone number.

4.5 Log Menu

The *Log* menu contains three options:

- *View Log*
- *Alarm Definition*
- *Legends*

4.5.1 View Log

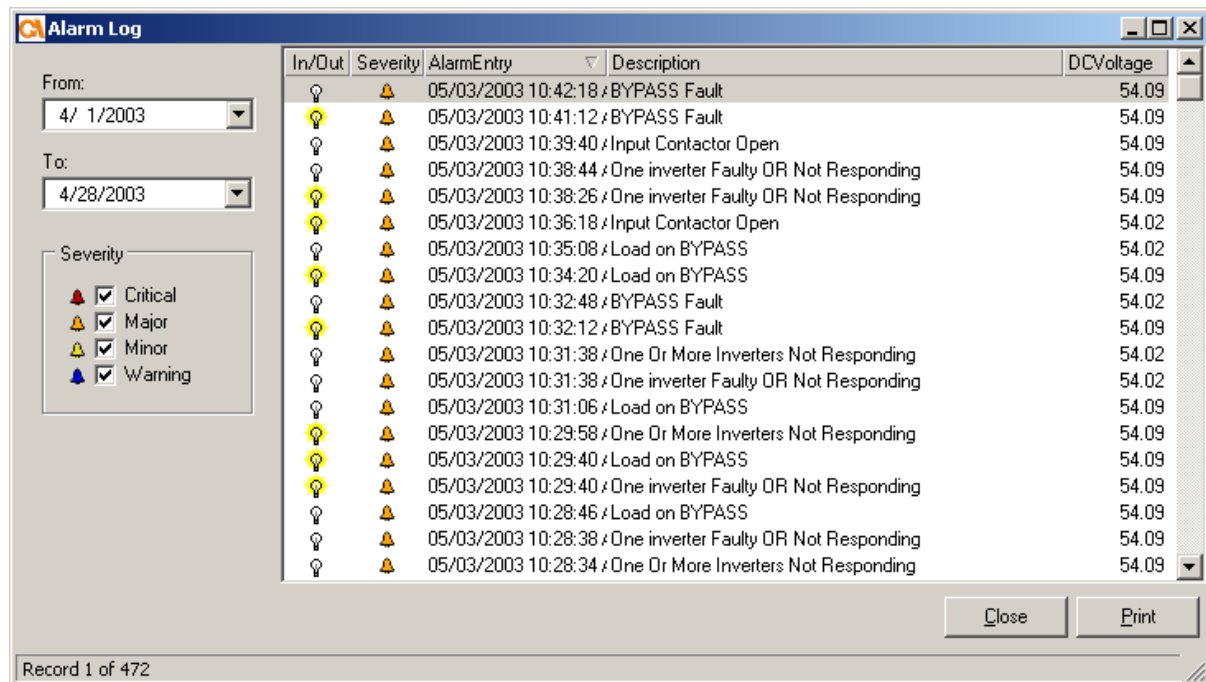


Figure 8: Alarm Log Window

Viewing the system's alarm history in the *Alarm Log* window has the following advantages over viewing it in the *Alarm Log* pane in the PSM-INV Serial window:

- Number of alarms that can be viewed at one time: The *Alarm Log* pane can only display 5 alarms at a time. The *Alarm Log* window can display many more alarms - especially when the window is maximized.
- Filtering the alarms displayed: All alarms that ever occurred in the system are displayed in the *Alarm Log* Pane. You can filter the alarms displayed in the *Alarm Log* window so that only the alarms that occurred between specific dates or with specific severity levels are displayed.
- Printing the *Alarm Log*: You can print a list of the alarms from the *Alarm Log* window but not from the *Alarm Log* Pane.

To set the severity levels by which the alarm log is filtered:

1. Click on a severity level to deselect it.
2. Repeat step 1 until all the severity levels that you don't want displayed are deselected.

Note: Only alarms with selected security levels are displayed in the Alarm Log window.

To set the dates by which the alarm log is filtered:





1. Click the  button next to the *From* date field; a calendar appears.
 - **To display the calendar for a different month:** Click the  or  button next to the name of the month until the month you want appears.
 - **To select a specific date:** Click that date in the calendar.
2. Click a date; the calendar disappears and the new date is displayed in the date field.
3. Repeat steps 1 and 2 for the *To* date field.



Figure 9: Calendar



To print the alarms listed in the Alarm Log window:

1. Click the *Print* button; the *Print Preview* window appears.
2. Click the ; the *Alarm Log* prints out.
3. Click the *Close* button to return to the *Alarm Log* window.

4.5.2 Alarms Definition

This option allows you to change the message and severity level for each alarm. Once the changes are made, they appear in the *Alarm Log*, *Active Alarms* list and *Dry Out* window.

To change alarms' description and severity:

1. Choose the *Log* menu>*Alarms Definition* option.
2. Double-click on the description of an alarm that you want to change.
3. Modify the alarm description.
4. Double-click on the severity of an alarm; a  button appears.
5. Click the  button.
6. Select a severity level from the list that appears.
7. Repeat steps 2-6 until you finish modifying the alarm definitions.
8. Click the *Close* button.

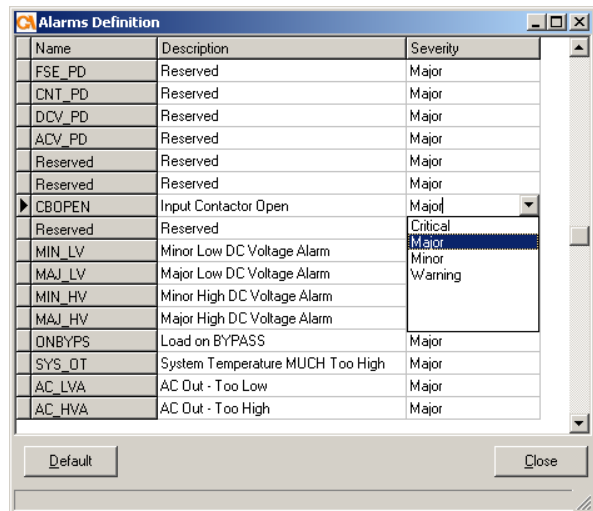


Figure 10: Alarms Definition Window

4.5.3 Legends

The Legends window explains the meaning of PSM-INV Serial's icons.



Figure 11: Legends Window

4.6 Help Menu

The *About* option in this menu provides precise information about the program's name and version number.

5. THE INVERTER SCREEN

Each inverter in the system has its own inverter screen that monitors and controls it.

To open an inverter screen: Click on its tab in the PSM-INV Serial window.

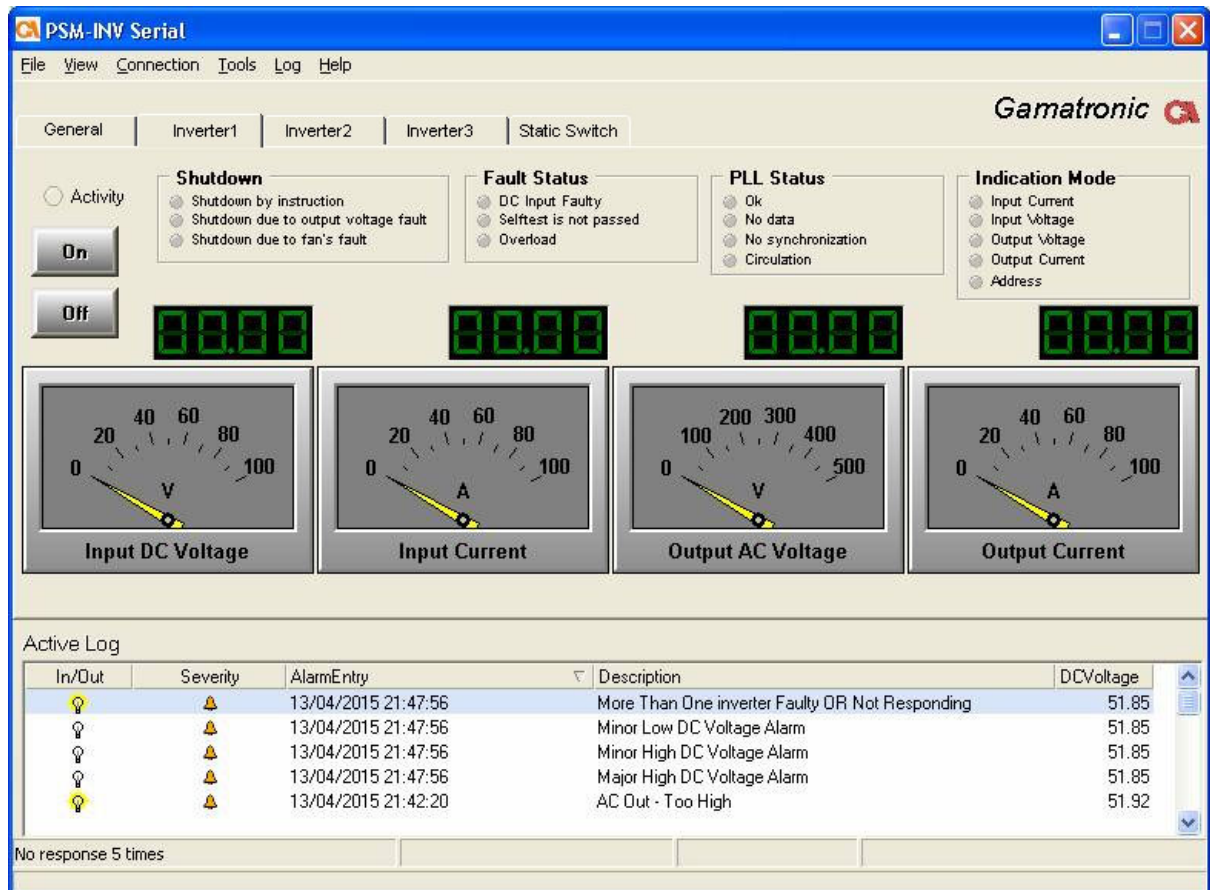


Figure 12: The Inverter Screen

The inverter screen contains the following features:

- Control buttons for turning the inverter on or off
- LED indicators (*see LED Indicators for an Inverter, page 12*)
- Analogical and digital measurement gauges for monitoring the inverter
- Menus, Tabs, and Alarm Log for the entire inverter system - not just that particular inverter

5.1 Operating an Inverter

To turn on an inverter: Click the *On* button.

To turn off an inverter: Click the *Off* button.

5.2 LED Indicators for an Inverter

The LED indicators for individual inverters provide the following at-a-glance information about the real-time status of that inverter. These LEDs are described in Table 2:

Table 2: Description of an Inverter's LED Indicators

LED	DESCRIPTION
Activity	This LED is lit when the inverter is activated.
Shutdown	Reasons for shutting down the system
Shutdown by instruction	System shuts down when Inverter On button is clicked
Shutdown due to output voltage fault	System shuts down when output voltage is out of specified range
Shutdown due to fan's fault	System shuts down when fan is faulty
Fault Status	Status of the inverter's faults
DC Input Faulty	DC input voltage is out of specified range
Selftest is not passed	Not relevant
Overload	Load is greater than the system was designed to handle
PLL Status	(Phase Lock Loop) Synchronization status of system components
OK	Inverters are synchronized
No Data	Data wire is disconnected from inverter
No Synchronization	Synchronization wire is disconnected from inverter
Circulation	Inverters current direction is negative
Indication Mode	Information displayed by the LED on the front of an inverter
Input Current	Input current to inverter
Input Voltage	DC input voltage to inverter
Output Voltage	AC output voltage from inverter
Output Current	Output current from inverter
Address	Address of the inverter within the inverter system

6. THE STATIC SWITCH SCREEN

The system's static switch is monitored and controlled by its own screen.

To open the static switch screen: Click on the *Static Switch* tab in the *PSM-INV Serial* window.

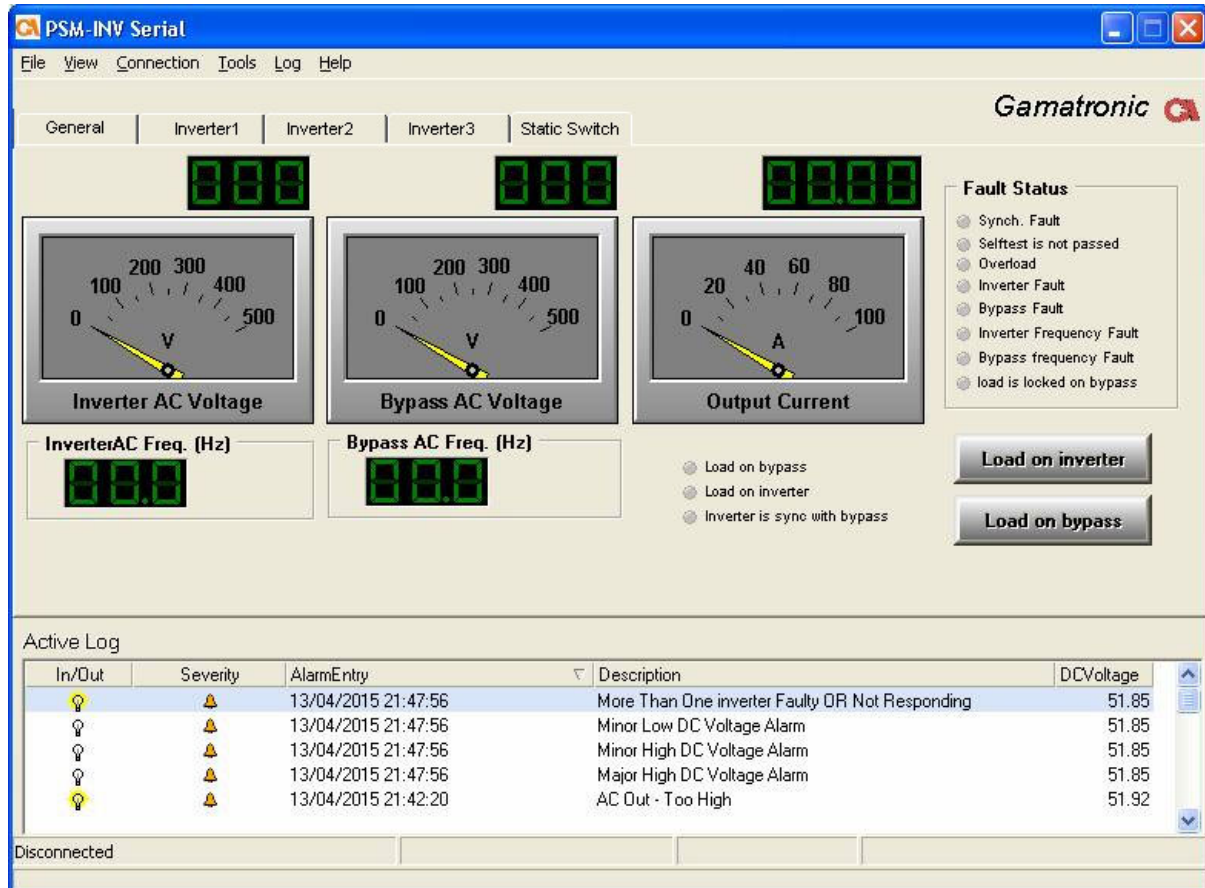


Figure 13: The Static Switch Screen

The static switch screen contains the following features:

- Control buttons for turning the static switch on or off
- LED indicators (see *LED Indicators for the Static Switch*, page 14)
- Analogical and digital measurement gauges for monitoring the static switch
- Menus, Tabs, and Alarm Log for the entire inverter system - not just for the static switch.

6.1 Operating the Static Switch

To manually transfer the load from the bypass to the inverter: Click the *Load on Inverter* button.

To manually transfer the load from the inverter to the bypass: Click the *Load on Bypass* button.

6.2 Measurement Gauges

The measurement gauges display digitally and analogically the real-time status of the system's output:

- **Inverter AC Voltage** - Output voltage of all the inverters
- **Bypass AC Voltage** - Output voltage of the bypass
- **Output Current** - Output current of the system

There are also two 7-Segment Displays showing digitally the real time status of:

- **Inverter AC Freq.** - Inverter output frequency
- **Bypass AC Freq.** - Bypass output frequency

6.3 LED Indicators for the Static Switch

There are 16 LED indicators displaying the fault status of the static switch and three LED indicators providing at-a-glance information about the current operation of the static switch. The LED next to the alarm message in the **Fault Status** list is lit when the alarm is active.

A lit operation status LED indicates the current operating mode of the static switch. An unlit LED indicates an inactive operation mode.

These LEDs are described in Table 3 and Table 4.

Table 3: Description of Alarm Messages

ALARM MESSAGE	DESCRIPTION OF FAULT
Synch. Fault	Inverter is not synchronized with mains.
Failed Self test	The static switch failed its self-test
Overload	Overload
Inverter Fault	Fault in voltage of the inverters connected to the static switch (load is transferred to bypass)
Bypass Fault	Fault in the voltage of the mains (load cannot be transferred to bypass)
Inverter Frequency Fault	Frequency of the inverters connected to the static switch is too high or too low (load is transferred to bypass)
Bypass frequency fault	Frequency of the mains is too high or too low (load cannot be transferred to bypass)
Load is locked on bypass	After the inverter has failed 7 times in a set period of time to supply the load, the load is locked on bypass and can't be transferred back to the inverter.

Table 4: Description of Operation Status LEDs

OPERATION STATUS	DESCRIPTION
Load on inverter	The load is fed from the inverter
Load on bypass	The load is fed from the bypass
Inverter is sync. with bypass	The inverter is synchronized with the bypass

7. CONFIGURING THE MODEMS

There are a number of available programs that enable you to configure modems, such as Window's *Hyper Terminal* Program.

To use Hyper Terminal to configure the modems connected to the inverter system and the computer:

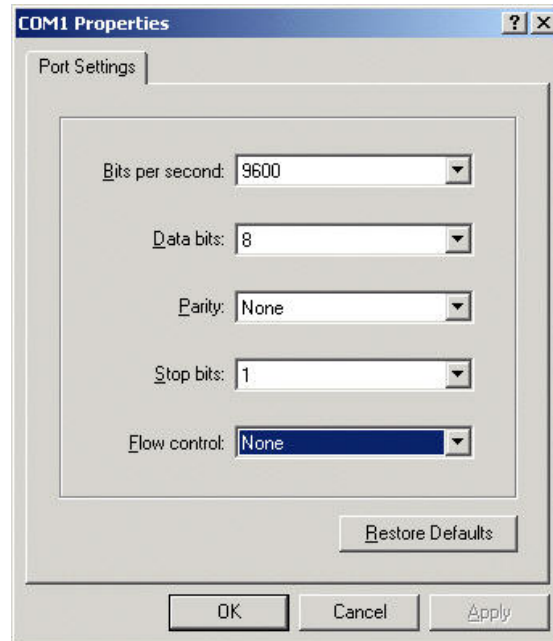
1. Choose the option *Start>Programs>Accessories>Communications>Hyper Terminal*. (If *Hyper Terminal* isn't in the *Start* menu, install it from the Windows setup disk.)
2. Enter a name into the *Name* field of the *Connection Description* window.
3. Press *OK*.



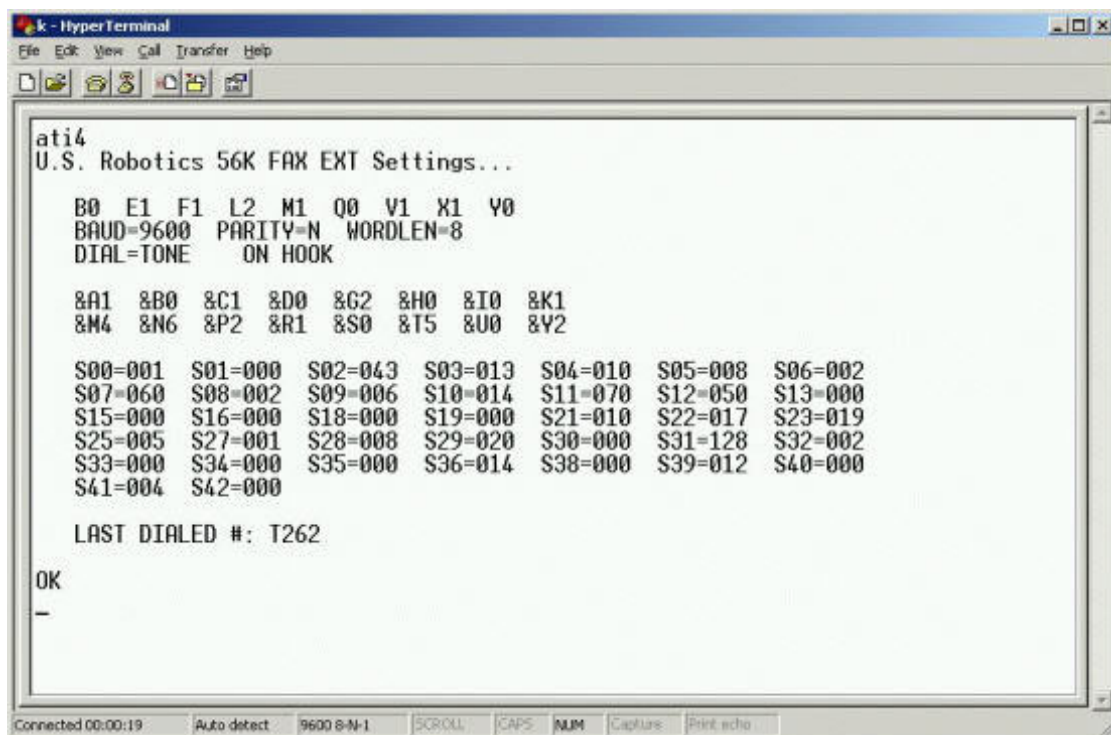
4. In the *Connect Using:* field, choose the Com Port connected to the modem
5. Click *OK*.



6. Enter the following values into the fields in the Com Properties window:
 - **Bits per second:** 9600
 - **Data bits:** 8
 - **Parity:** None
 - **Stop bits:** 1
 - **Flow Control:** None
7. Click **OK**.



8. Type the ATi4 into the *Hyper Terminal* window to display the settings for the modems.



9. The settings should be the same as those in the following table. **To change a setting:**
 - a. Type in the code from the table.
 - b. Press Enter; OK appears on the screen.
10. Type AT&Y1 and then AT&WO to save the new settings.
11. Activate PSM-INV Serial and select the Port and telephone number for the modem.
12. Choose **Tools menu>Settings>General Configuration** and select **Modem Dial on Alarm**.

7.1 Example of Modem settings

(for U.S Robotics Ext. Fax/Modem)

DESCRIPTION	SETTINGS OF THE MODEM CONNECTED TO THE CONTROLLER	SETTINGS OF THE MODEM CONNECTED TO THE COMPUTER	DESCRIPTION
	=	ATB0	ITU-T answer sequence
	=	ATE1	Modem displays keyboard commands
	=	ATF1	Local echo off; receiving system may send a remote echo of data it receives
	=	ATL2	Medium speaker volume
	=	ATM1	Speaker on until connect
	=	ATQ0	Displays result codes
	=	ATV1	Verbal codes
	=	ATX1	Sets result code displayed
	=	ATY0	Use profile 0 setting in NVRAM
ARQ result codes disabled	AT&A1	AT&A3	Protocol indicators added-LAPM/MNP/ONE(error control) and V.42 bis/MNP5 (data compression)
Variable, follows connection rate	AT&B0	AT&B1	Fixed serial port rate
	=	AT&C1	Normal CD operation
DTR override	AT&D0	AT&D2	Normal DTR operation
	=	AT&G2	1800Hz guard tone, U.K requires B0 setting
Flow control disabled	AT&H0	AT&H1	Hardware flow control, clear to send(CTS)
	=	AT&I0	Software flow control: disabled
	=	AT&K1	data compression: Auto disable/enable
	=	AT&M4	Sets error control (ARQ) for connections at 1200 bps and higher: normal/ARQ
Connection speed 9600bps	AT&N6	AT&N0	Connection speed is determined by remote modem
	=	AT&P2	
Modem ignores RTS	AT&R1	AT&R2	Received data to computer only on RTS
	=	AT&S0	DSR override; always ON
	=	AT&T5	Prohibits remote digital loopback
	=	AT&U0	No restrictions on the minimum speed for the connection
	=	ATS0=1	Number of rings before modem answers = 1