

PowerCommand iWatch™ Installation Manual

Remote Network Monitoring



The Power of One™

Printed in U.S.A.

900-0538

8-2005



Redistribution or publication of this document
by any means, is strictly prohibited.

Notices

The information in this document is subject to change without notice. Cummins Power Generation makes no warranty of any kind with regard to this manual including, but not limited to, the implied warranties of merchantability and fitness for particular purpose. Cummins Power Generation shall not be liable for errors contained herein or incidental consequential damages in conjunction with furnishing, performance, or use of this manual.

This document contains proprietary information which is protected by copyright. All rights are reserved. No part of this document may be photocopied or otherwise reproduced without consent of Cummins Power Generation.

Copyright © 2005 by Cummins Power Generation. Published in a limited copyright sense, and all rights, including trade secrets, are reserved.

Document Edition:

First 6/2005

The following are products of Cummins Power Generation:

PowerCommand Pulse
PowerCommand iWatch

The following are products of Advantech:

Advantech Studio
Advantech WebLink 2059
Advantech TPC-1260

PowerCommand iWatch is a trademark of Cummins Inc.
Cummins and PowerCommand are registered trademarks of Cummins Inc.
The Power of One is a trademark of Cummins Inc.
Microsoft and Windows are registered trademarks of Microsoft Corporation.
WebLink is a registered trademark of Advantech Inc.
LonMaker is a registered trademark of Echelon Corporation.

Table of Contents

SECTION	TITLE	PAGE
SAFETY PRECAUTIONS		v
1.	INTRODUCTION	1-1
	Welcome	1-1
	Who Should Use This Manual?	1-2
	Writing Conventions	1-2
2.	CONFIGURATION TOOL	2-1
	Introduction	2-1
	Installation	2-2
	Application Overview	2-8
	Site Configuration	2-9
	RAS Entry Configuration	2-12
	ModLon Gateway Configuration	2-14
	Device Configuration	2-16
	Deleting Sites/ModLon Gateways/Devices	2-19
	Downloading WebLink Applications	2-19
	Modifying WebLink Login Security	2-25
3.	OPC MULTIPLEXOR	3-1
	Introduction	3-1
	Installation	3-1
	User Interface	3-1
	OPC Server	3-6
	Historical Data/Alarm Storage and Forwarding	3-7
APPENDIX A.	MODLON GATEWAY REGISTER MAPS	A-1

List of Figures

FIGURE	TITLE	PAGE
Figure 1-1	The Remote Network Monitoring System	1-1
Figure 1-2	Open Dialog	1-2
Figure 2-1	Initial Installation Dialog	2-2
Figure 2-2	Second Installation Dialog	2-2
Figure 2-3	Main Installation Dialog	2-3
Figure 2-4	License Agreement	2-3
Figure 2-5	Installation Information	2-4
Figure 2-6	Installation Customization Option	2-4
Figure 2-7	Installation Customization	2-5
Figure 2-8	Final Installation Checkpoint	2-5
Figure 2-9	Installation Progress	2-6
Figure 2-10	Installation Complete!	2-6
Figure 2-11	Reboot System Dialog	2-7
Figure 2-12	Launching RNMConfig	2-7
Figure 2-13	Configuration Tool User Interface	2-8
Figure 2-14	Adding a Site	2-8
Figure 2-15	Site Information Dialog	2-9
Figure 2-16	Save Changes	2-11
Figure 2-17	Right Mouse Click on Site	2-11
Figure 2-18	RAS Configuration – Type of Connection	2-12
Figure 2-19	RAS Configuration – Phone Number	2-12
Figure 2-20	RAS Configuration – Phone Number	2-13
Figure 2-21	RAS Configuration – RAS Entry Properties	2-13
Figure 2-22	ModLon Gateway Configuration	2-14
Figure 2-23	ModLon Gateway – Configuration Options	2-14
Figure 2-24	ModLon Details	2-15
Figure 2-25	ModLon Entry Right Mouse Click	2-15
Figure 2-26	Device Selection	2-16
Figure 2-27	Device Selection Default Values	2-16
Figure 2-28	Device Details	2-17
Figure 2-29	Tag Details	2-17
Figure 2-30	Tag Detail – Relay/Input Descriptions	2-18
Figure 2-31	Delete Confirmation	2-19
Figure 2-32	Advantech Web Studio 6.0 Icon	2-19
Figure 2-33	Advantech Studio 6.0 Start Menu	2-19
Figure 2-34	Advantech Studio – Open Project	2-20
Figure 2-35	Advantech Studio – Execution Environment	2-20
Figure 2-36	Execution Environment Dialog	2-20
Figure 2-37	Execution Environment Dialog – Connected	2-21
Figure 2-38	Execution Environment Dialog – Application Tab	2-21
Figure 2-39	Execution Environment Dialog – Stopped Application	2-21

List of Figures (Continued)

FIGURE	TITLE	PAGE
Figure 2-40	Send to Target Dialog	2-22
Figure 2-41	Sending Files to Target Dialog	2-22
Figure 2-42	Sending Files to Target	2-22
Figure 2-43	Run Application	2-23
Figure 2-44	Target Status	2-23
Figure 2-45	Security Login	2-23
Figure 2-46	Main Navigation Screen in Web Browser	2-24
Figure 2-47	Exiting Advantech Studio	2-24
Figure 2-48	Configuring Advantech Studio Security	2-25
Figure 2-49	Security – Group Account Dialog	2-25
Figure 2-50	Security – Enter Group Name	2-26
Figure 2-51	Security – Group Account Selection	2-26
Figure 2-52	Security – User Account Dialog	2-26
Figure 2-53	Security – New User Account	2-27
Figure 2-54	Security – User Password	2-27
Figure 3-1	OPC Multiplexor Main Dialog	3-2
Figure 3-2	Connected Site Information	3-2
Figure 3-3	OPC Multiplexor – Site Connected	3-3
Figure 3-4	OPC Multiplexor – OPC Client Component	3-3
Figure 3-5	OPC Multiplexor – Disconnected Client	3-4
Figure 3-6	OPC Multiplexor – Reconnected Client	3-5
Figure 3-7	OPC Server General Folder	3-6
Figure 3-8	OPC Server Device Folders	3-6
Figure 3-9	Site Configuration Dialog	3-7

List of Tables

TABLE	TITLE	PAGE
Table 2-1	Site Configuration Field Definitions	2-10
Table 3-1	OPC Server General Tags	3-6
Table 3-2	Configuration Database Tables	3-7
Table A-1	ModLon Register Mapping Information – Option 1 Single PowerCommand Genset	A-2
Table A-2	ModLon Register Mapping Information – Option 1 Automatic Transfer Switch – Detailed	A-5
Table A-3	ModLon Register Mapping Information – Option 1 Digital I/O Module (DIM)	A-8
Table A-4	ModLon Register Mapping Information – Option 2 Paralleling PowerCommand Genset	A-9
Table A-5	ModLon Register Mapping Information – Option 2 Automatic Transfer Switch – Simple	A-13
Table A-6	ModLon Register Mapping Information – Option 2 Digital I/O Module (DIM)	A-15
Table A-7	ModLon Register Mapping Information – Option 3 Paralleling PowerCommand Genset	A-16
Table A-8	ModLon Register Mapping Information – Option 3 Automatic Transfer Switch – Detailed	A-20

Safety Precautions

The PowerCommand Network can be used to remotely operate power transfer equipment (e.g., transfer switches, paralleling systems) and start and stop generator sets. All of the safety precautions for that equipment must be observed. Refer to the Operator's Manual for the equipment that is being monitored and controlled by the network for important safety precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER *This symbol warns of immediate hazards which will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.*

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Keep your hands, clothing, and jewelry away from moving parts.
- Before starting work on the generator set, disconnect battery charger from its AC source, then disconnect starting batteries, negative (-) cable first. This will prevent accidental starting.

- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing or jewelry in the vicinity of moving parts, or while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surface to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death. DO NOT tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag and lock open switches to avoid accidental closure.
- Jewelry is a good conductor of electricity and should be removed before working on electrical equipment.

MEDIUM VOLTAGE GENERATOR SETS

(601V to 15kV)

- Medium voltage acts differently than low voltage. Special equipment and training is required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Due to the nature of medium voltage electrical equipment, induced voltage can remain even after the equipment is disconnected from the power source. Plan the time for maintenance with authorized personnel so that the equipment can be de-energized and safely grounded.

TRANSFER SWITCHES

- AC and DC voltages in the transfer switch components present serious shock hazards that can result in severe personal injury or death. Read and follow these instructions.
- Keep the transfer switch cabinet closed and locked. Make sure only authorized personnel have cabinet and operational keys.
- Due to the serious shock hazard from medium voltages within the cabinet, all service and adjustments to the transfer switch must be performed only by an electrician or authorized service representative.

- If the cabinet must be opened for any reason:
 1. Move the operation selector switch on the generator set to Stop.
 2. Disconnect battery charger from its AC source. Disconnect the starting batteries of the generator set. (Remove the negative [-] lead first to prevent arcing from igniting explosive battery gas.)
 3. Remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

GENERAL SAFETY PRECAUTIONS

- The PowerCommand Network allows remote operation of equipment. PowerCommand Software for Windows can remotely start and stop a genset or exercise a transfer switch. Network modules can independently control other network modules and operate other electrical devices such as fans or pumps etc. Make certain that all appropriate personnel are notified before remotely operating equipment and make them aware of any equipment that can be energized automatically.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.
- Use only the latest physical and logical connection diagrams for installing and maintaining the PowerCommand Network. If changes are made to the physical or logical network connections, make sure the site connection diagrams are updated. Create a new CSV file if the number or type of modules changes or if the bindings change.

1. Introduction

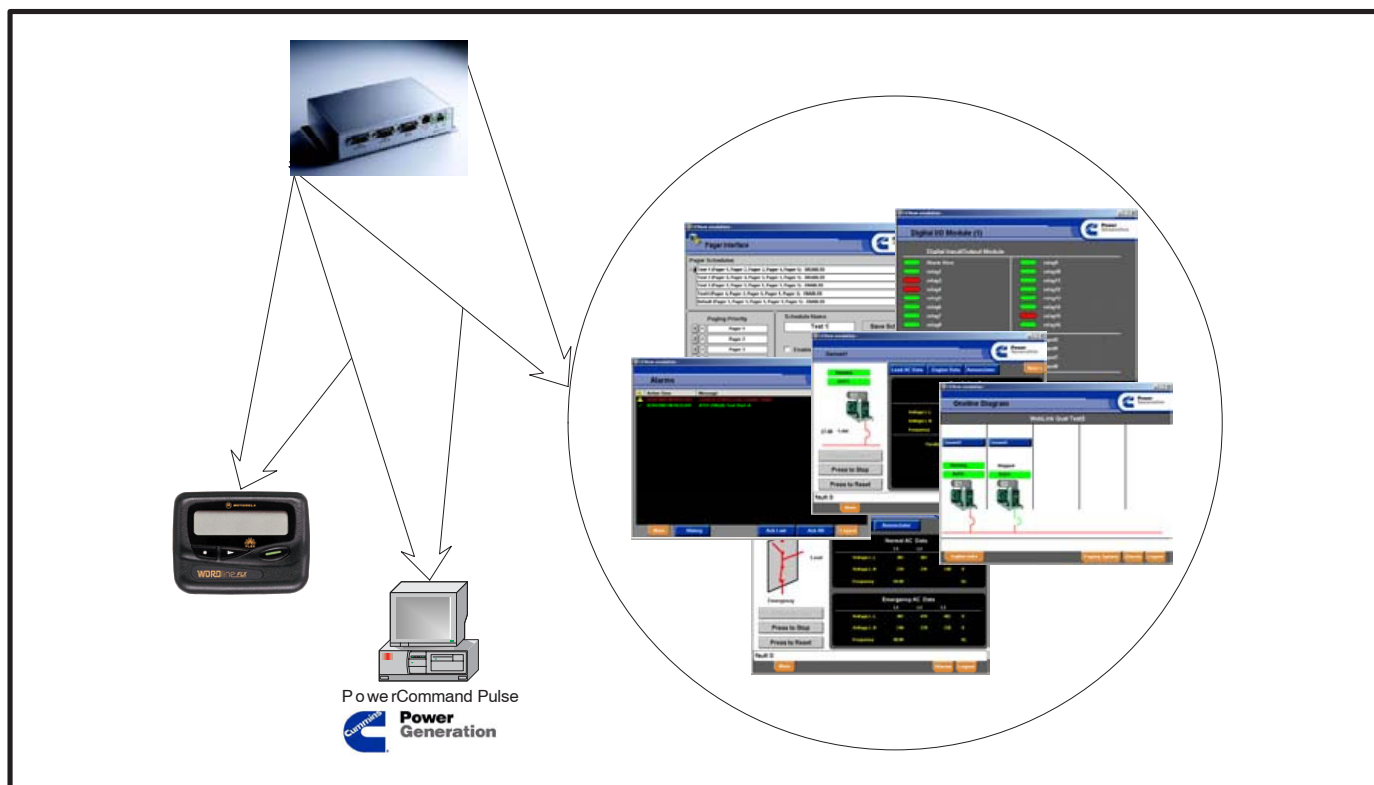


FIGURE 1-1. THE REMOTE NETWORK MONITORING SYSTEM

WELCOME

The PowerCommand iWatch™ is a Windows CE based device that provides monitoring and control of generators and/or transfer switches via the Cummins PowerCommand FT-10 (Echelon LonWorks) network. Access to PowerCommand iWatch can be obtained either over an Ethernet LAN/WAN or by using Internet Explorer version 5.5 or higher.

The Cummins Power Generation Remote Network Monitoring (RNM) software is a suite of components that provide an easy-to-use system for the monitoring of remote generator sites.

The suite is composed of three major components.

- The PowerCommand iWatch Application – Used by the operator to monitor and control Generator, Transfer Switch, and Digital I/O Module (DIM) information and alarms.
- The Configuration Tool

- The OPC Multiplexor

The RNM system works with a Lonworks FT-10 network to communicate with all types of PowerCommand controls (PCC 3100, 3200, 2100, 1301, etc).

The following is included in this manual:

- Section 2 describes the Configuration Tool, which is a point and click mechanism to define PowerCommand iWatch applications for remote sites. If your system has been configured by the factory, this section can be skipped.
- Section 3 describes the OPC Multiplexor, which is an OPC 2.0 DA compliant server for on-demand connected remote PowerCommand iWatch devices. This OPC server has been optimized to integrate with the Cummins Power Generation, PowerCommand Pulse, Genesis Ionics software package.
- Appendix A provides information on register mapping of modules to a ModLon Gateway.

WHO SHOULD USE THIS MANUAL?

This manual is designed to be used by system integrators and distributors.

Before using this manual, a network must be properly set up (see FT-10 Network Installation and Operation Manual 900-0529) and the PowerCommand iWatch control assembly must be installed (see Instruction Sheet C661). To install and configure an PowerCommand iWatch control, personnel must be trained and experienced in setting up FT-10 networks and familiar with LonMaker for Windows software.

WRITING CONVENTIONS

The following conventions are used in writing this manual:

- **Boldface** type indicates an item that requires specific attention. This is used for note blocks as shown in next column.

NOTE: This is an example of a note block. Special attention should be given to the instructions in this form.

- ***Bold Italics*** type indicates an item to select. This is used to direct user interface interaction steps as follows:

Once you have selected a file or entered a File Name, press the ***Open*** button to open the file (see Figure 1-2).

- Monospace type indicates text you will need to type in a data entry field. In the previous example, File Name is a data entry field.

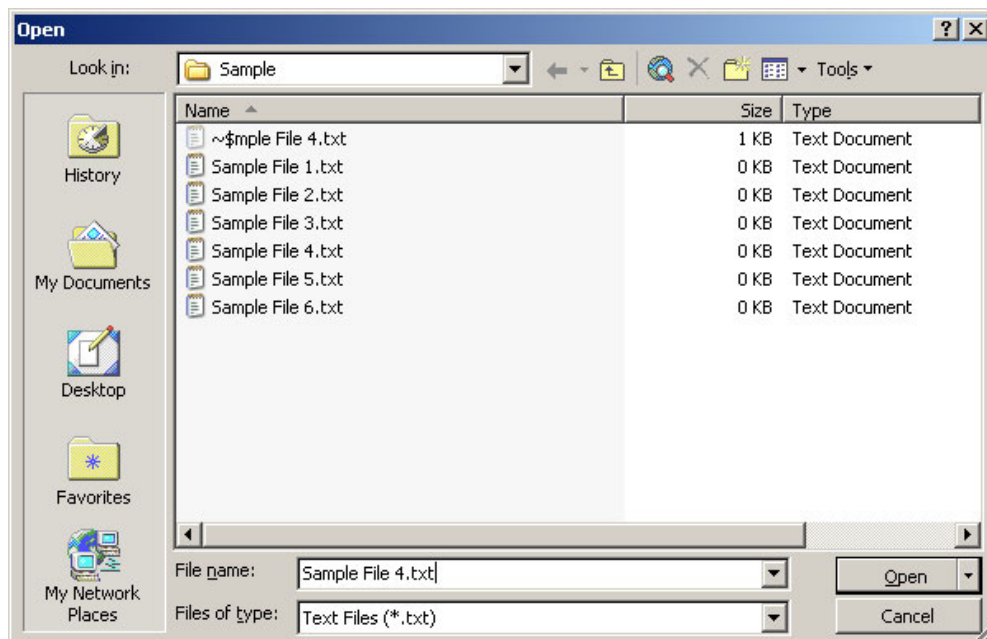


FIGURE 1-2. OPEN DIALOG

2. Configuration Tool

INTRODUCTION

The Configuration Tool is a stand alone application that is used to configure the list of devices and types that are associated with remote generator sites. The site configuration can then be used to generate Advantech Studio WebLink® applications. This greatly reduces the effort by a system integration engineer in creating a unique site configuration to match a specific site's devices.

NOTE: For systems configured by the factory, this section can be skipped.

Individual parameters of the site application and device tags can be customized prior to creating the ap-

plication to download to the device. The site options that are configurable are:

- Name
- IP Address
- Remote Access Server (RAS) Login Security
- Units of Measure
- Paging System Repeat Frequency
- Storing and Forwarding Alarm and Historical Data

The device tag level options available are:

- Digital I/O Module (DIM) input and relay naming
- Historical Logging
- Alarming

INSTALLATION

NOTE: The Advantech Studio 6.0 software package must be installed prior to installing the Configuration Tool. Refer to the Advantech Studio installation guide for more information on performing this step.

The installation of the Configuration tool is performed using the Setup.exe on the distribution CD. This application prompts the user for the option to install the Configuration Tool only or both the configuration tool and the OPC Multiplexor.

The first two dialogs that appear are shown in Figures 2-1 and 2-2.

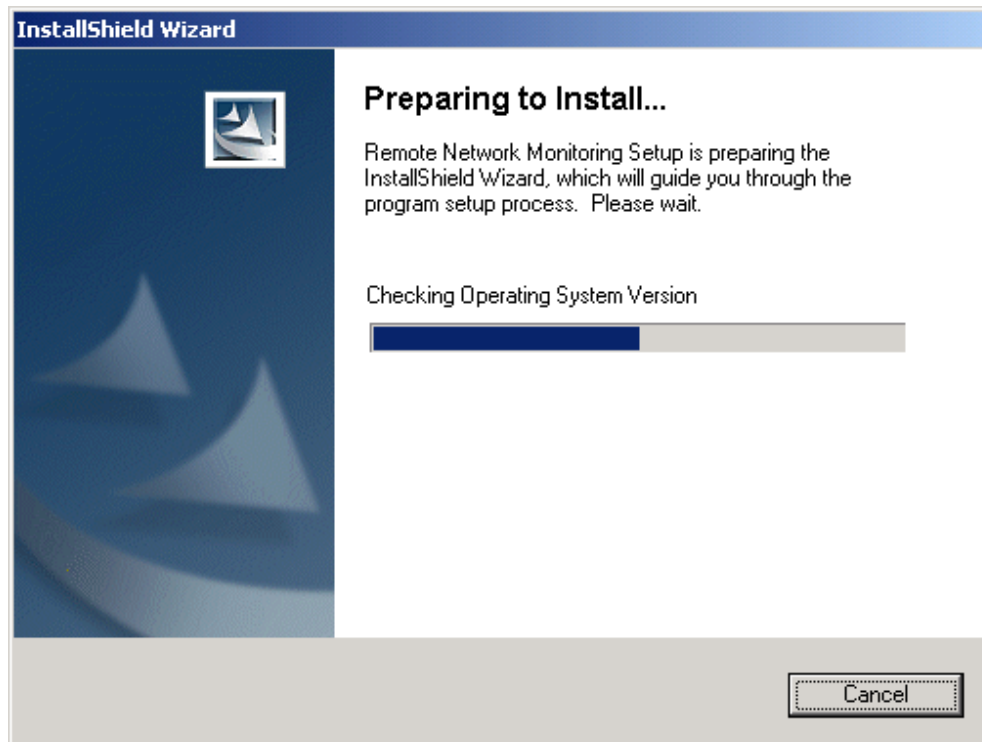


FIGURE 2-1. INITIAL INSTALLATION DIALOG

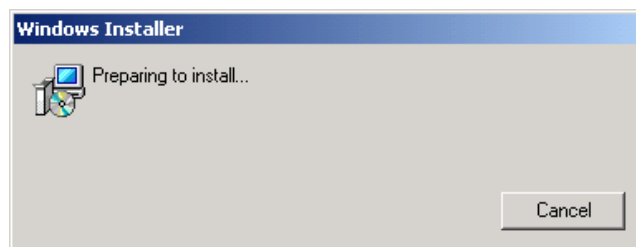


FIGURE 2-2. SECOND INSTALLATION DIALOG

Once the pre-installation process is complete, the main dialog window is displayed (see Figure 2-3). Press the *Next* button to continue or the *Cancel* button to exit the installation.

The next dialog prompts you to review and either accept or reject the license agreement (see Figure

2-4). You should select the radio button for *I accept the terms in the license agreement* to continue. Select the *Next* button to continue the installation process. If you do not accept the license agreement the installation will abort. You may select the *Back* button to return to the previous dialog.

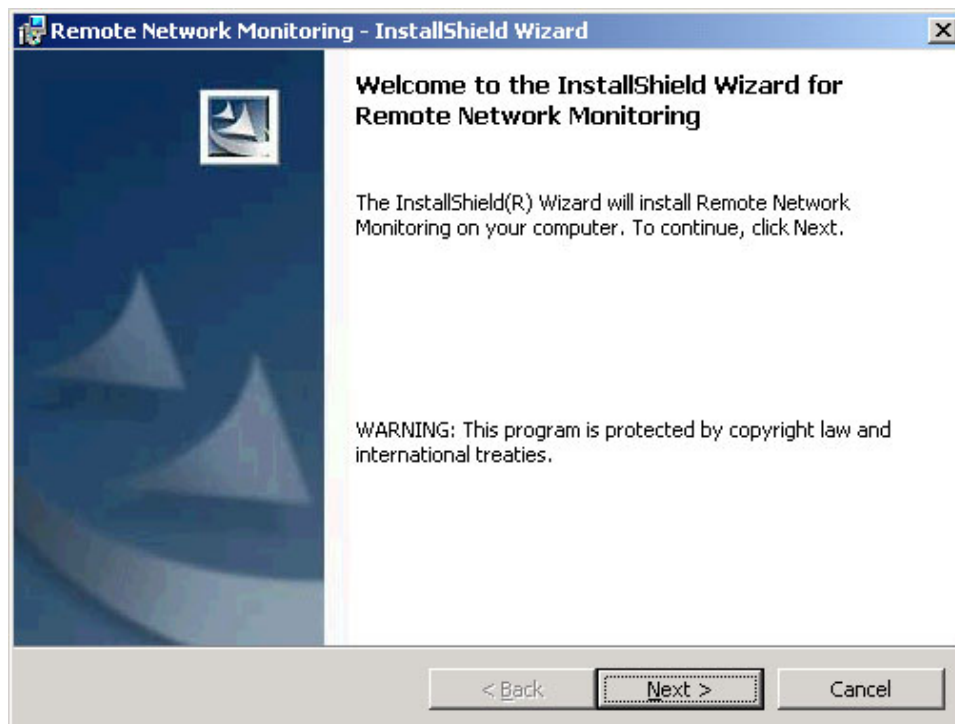


FIGURE 2-3. MAIN INSTALLATION DIALOG

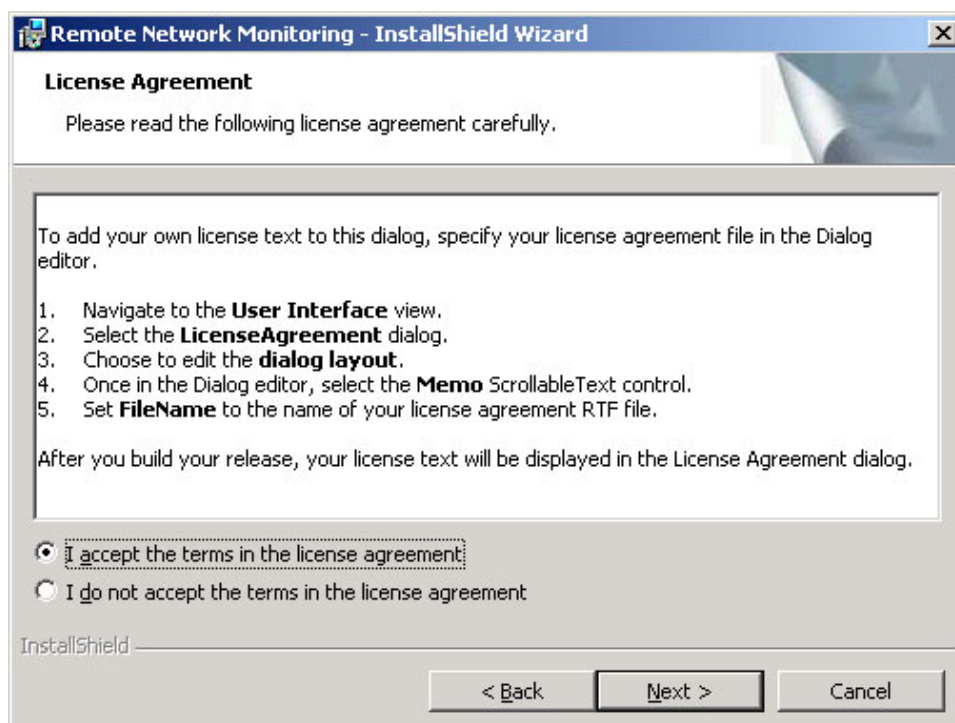
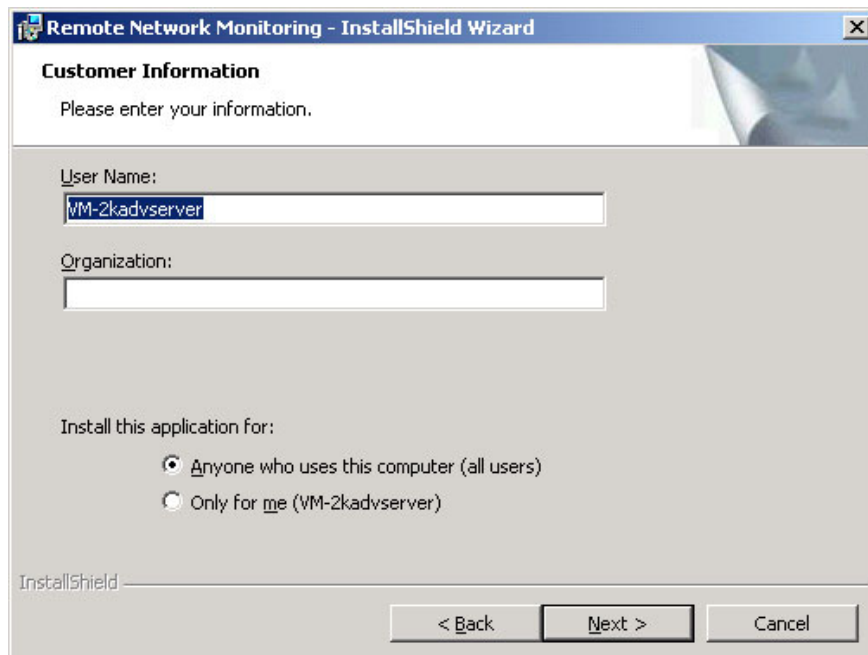


FIGURE 2-4. LICENSE AGREEMENT

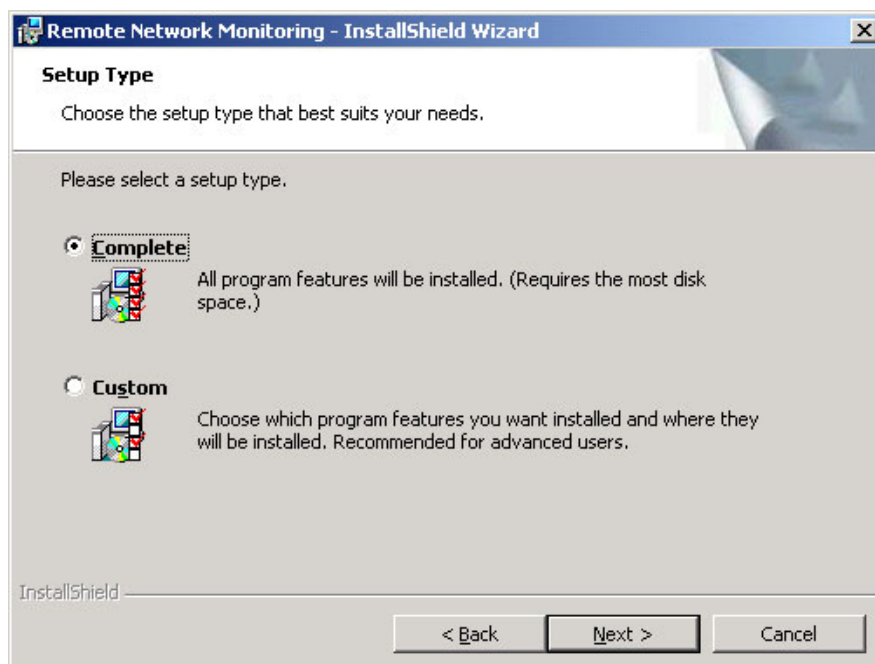
The next dialog prompts you to enter your name and organization information (see Figure 2-5). The option to install this application only for the logged-in user or all users of the computer is available. Press the *Next* button to continue.

The next dialog prompts you for a Complete or Custom installation (see Figure 2-6). Select the *Next* button to continue the installation process.



The dialog box is titled "Remote Network Monitoring - InstallShield Wizard". It has a header bar with a close button (X). Below the header, the title "Customer Information" is displayed. The main area contains the text "Please enter your information." followed by two input fields: "User Name:" with the text "VM-2kadvserver" and "Organization:" which is empty. Below these fields, the text "Install this application for:" is followed by two radio button options: "Anyone who uses this computer (all users)" (selected) and "Only for me (VM-2kadvserver)". At the bottom, there is a progress bar labeled "InstallShield" and three buttons: "< Back", "Next >", and "Cancel".

FIGURE 2-5. INSTALLATION INFORMATION



The dialog box is titled "Remote Network Monitoring - InstallShield Wizard". It has a header bar with a close button (X). Below the header, the title "Setup Type" is displayed. The main area contains the text "Choose the setup type that best suits your needs." followed by "Please select a setup type." and two radio button options: "Complete" (selected) and "Custom". Each option has a small icon and a description: "Complete" has an icon of a computer with a red X and the text "All program features will be installed. (Requires the most disk space.)"; "Custom" has an icon of a computer with a red X and the text "Choose which program features you want installed and where they will be installed. Recommended for advanced users." At the bottom, there is a progress bar labeled "InstallShield" and three buttons: "< Back", "Next >", and "Cancel".

FIGURE 2-6. INSTALLATION CUSTOMIZATION OPTION

If the Custom option is selected, a list of installation options is displayed with all items selected (see Figure 2-7). If you wish to not install an option, click on the option and the choice to not install that option is displayed.

The installation path of the application can be changed by selecting the *Change* button. A file browser dialog is displayed for selecting an alternate location for the install.

Information about the amount of disk space required for installing each component is displayed when the *Space* button is selected.

Select the *Next* button to continue the installation.

Prior to the installation proceeding, a final opportunity to go *Back* and change the options is presented (see Figure 2-8). If no changes are required, select the *Install* button to continue the installation.

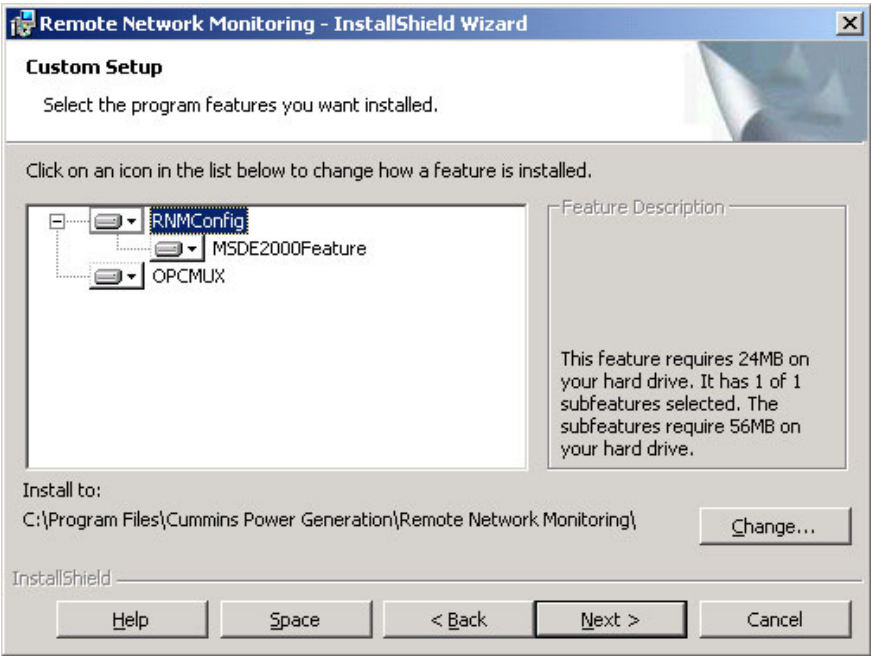


FIGURE 2-7. INSTALLATION CUSTOMIZATION

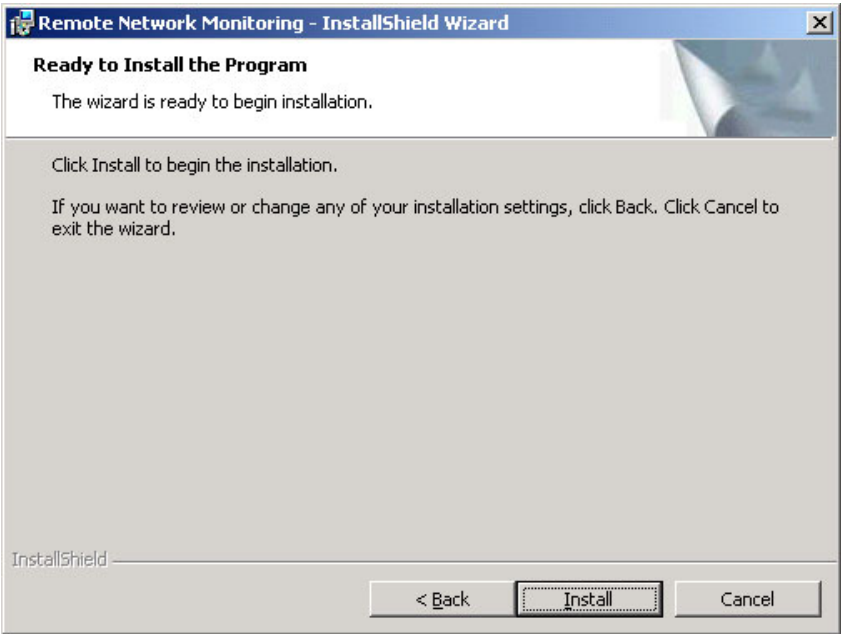


FIGURE 2-8. FINAL INSTALLATION CHECKPOINT

The installation will proceed at this point. The installation takes several minutes and a series of dialogs like the one shown in Figure 2-9 are displayed.

When the installation complete dialog is displayed, the installation is completed. Select the *Finish* button.

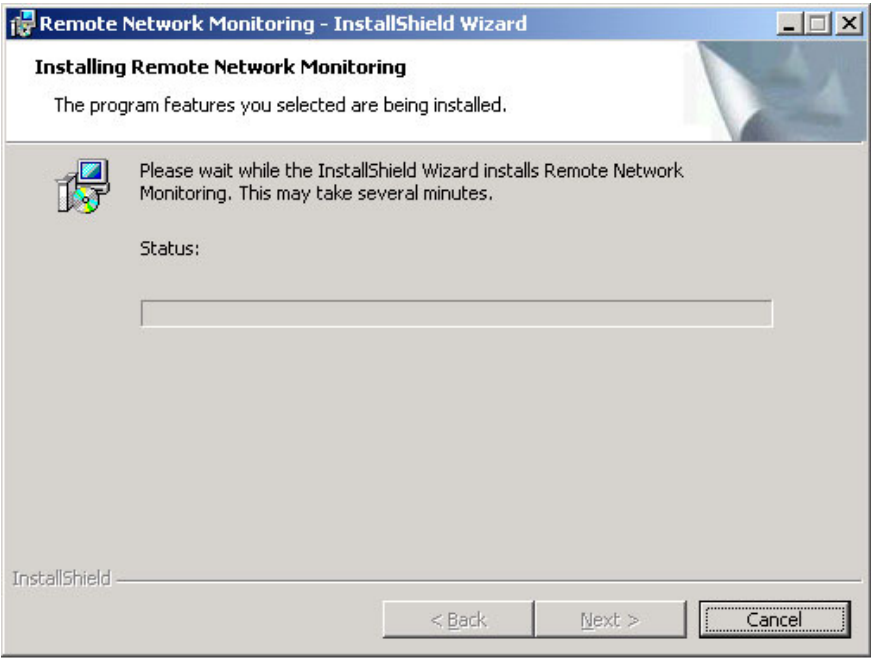


FIGURE 2-9. INSTALLATION PROGRESS

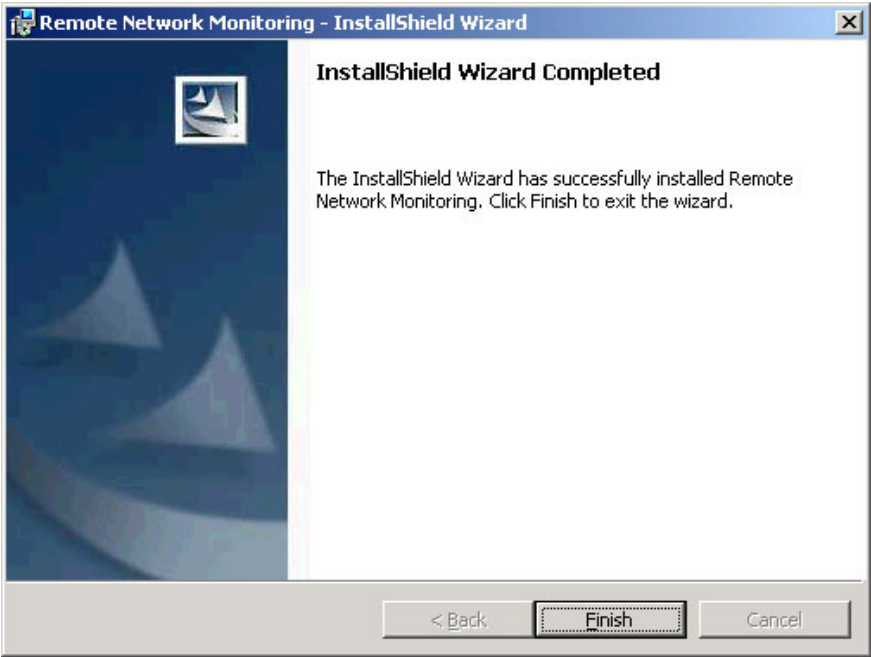


FIGURE 2-10. INSTALLATION COMPLETE!

The system then notifies you that a reboot of the system is required to continue (see Figure 2-11). If you choose not to reboot the system now, the applications will not run properly.

After the reboot is completed, the configuration tool can be run to initialize the configuration database. It is available either through the desktop icon or in the Program Start Menu (see Figure 2-12).

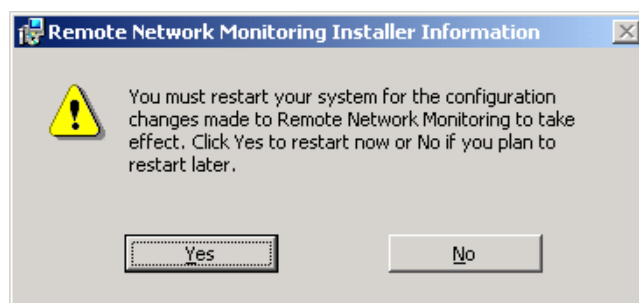


FIGURE 2-11. REBOOT SYSTEM DIALOG

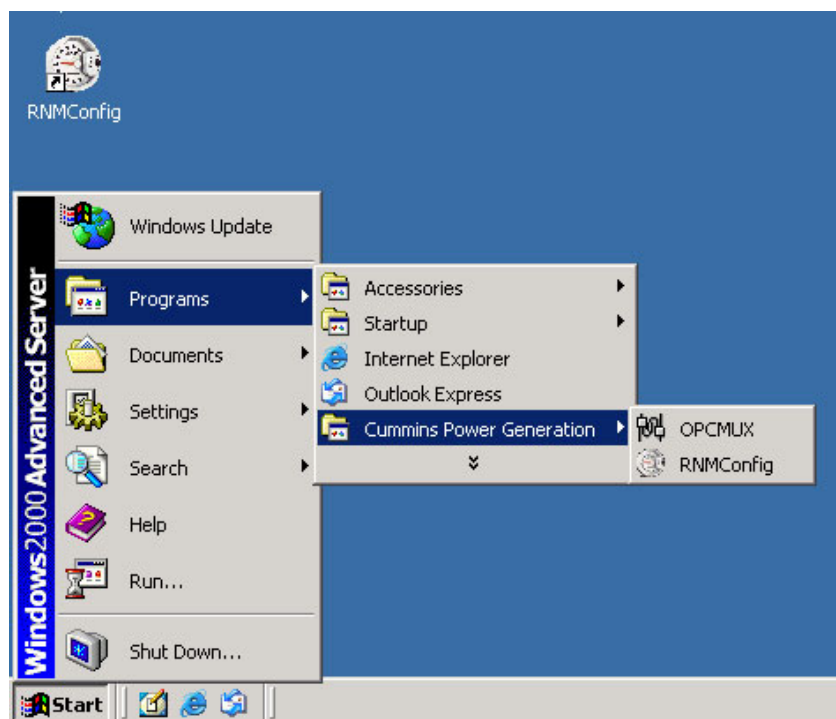


FIGURE 2-12. LAUNCHING RNMCONFIG

APPLICATION OVERVIEW

The configuration tool main screen is displayed upon launching the program (see Figure 2-13). This user interface is the central point for managing the list of sites and their configured ModLon gateways and devices.

The Site Configurations section on the left side of

the screen displays the explorer-like tree view of the configured sites, ModLon gateways, and devices. The Configuration section on the right side of the screen displays the individual set of information for a selected site, ModLon gateway, device, or tag.

A new site can be added by selecting and right clicking on the Site Configurations label (see Figure 2-14).

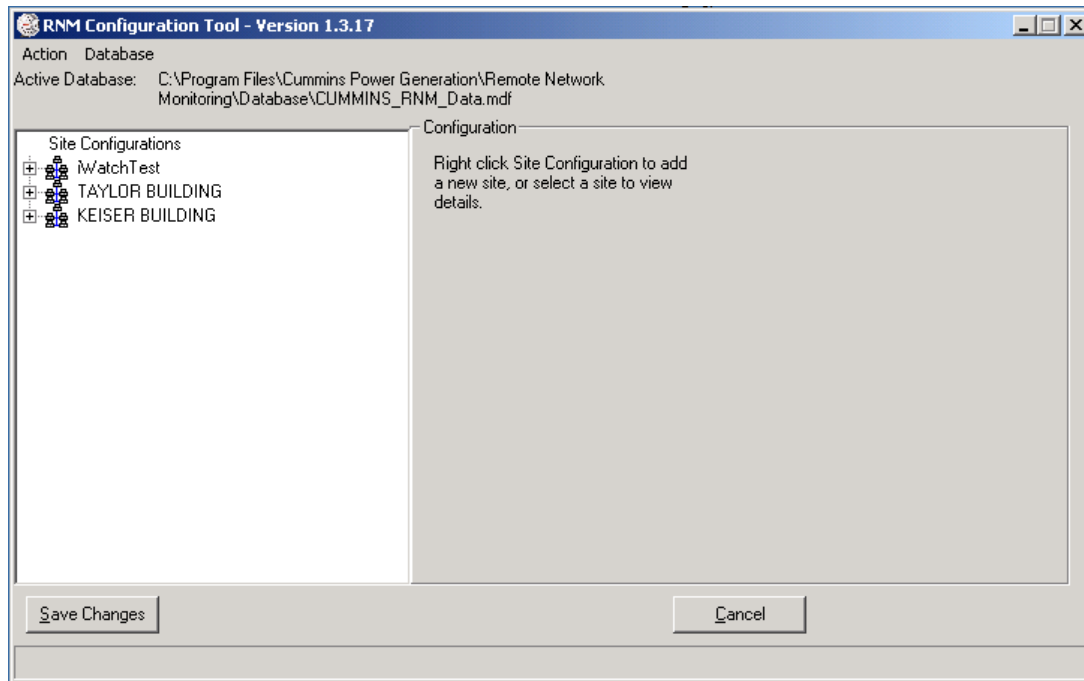


FIGURE 2-13. CONFIGURATION TOOL USER INTERFACE

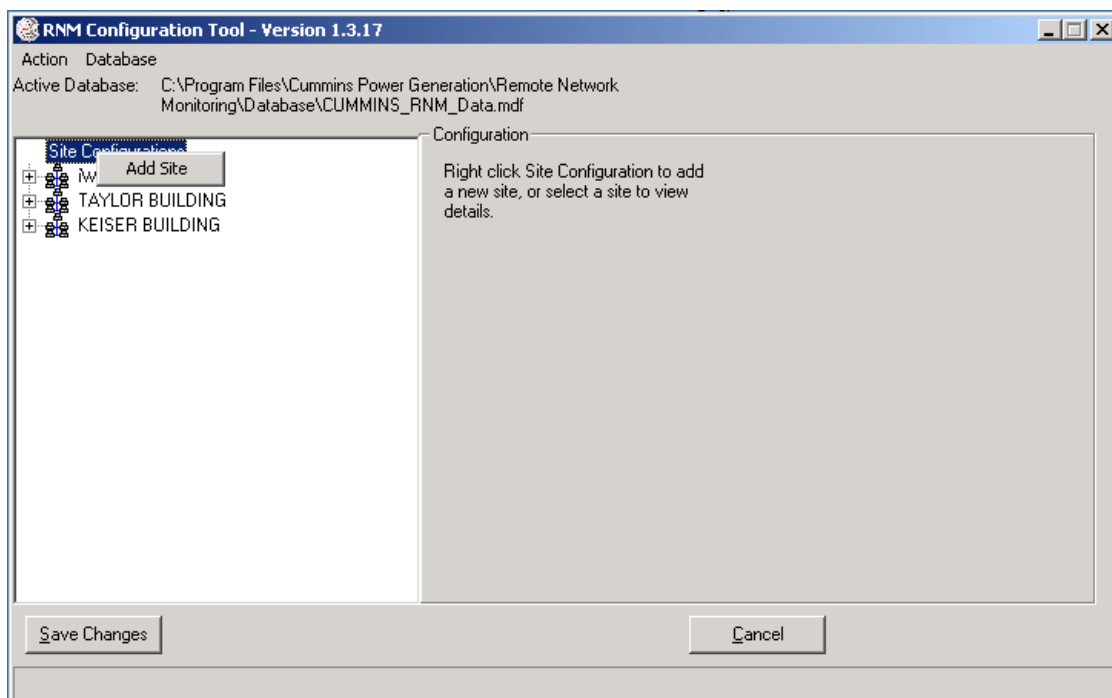


FIGURE 2-14. ADDING A SITE

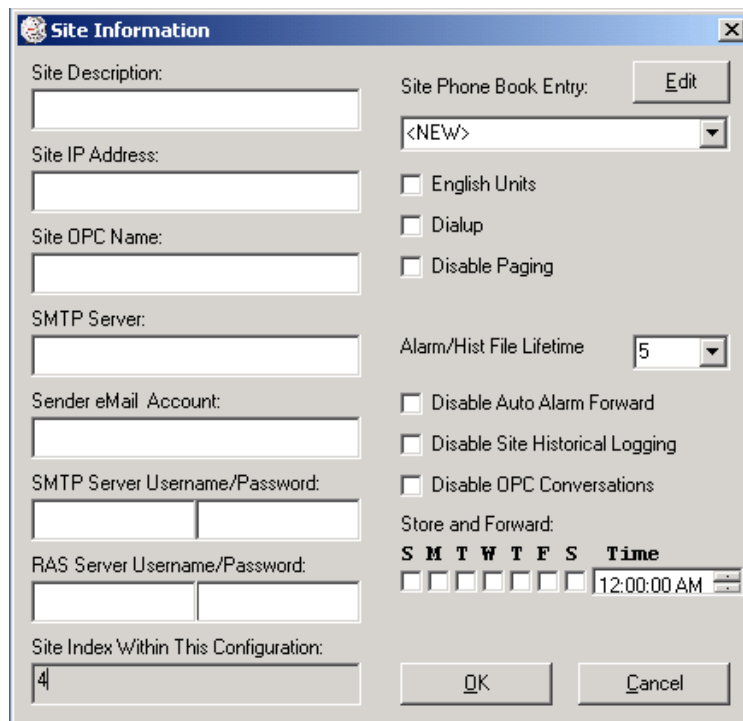
SITE CONFIGURATION

“Add Site” is displayed when you right click on the Site Configurations label. When you click this, the Site Information configuration dialog is displayed (see Figure 2-15). This is the same dialog that is displayed when you edit a site after it has been configured. The only difference is that the current infor-

mation for the configured site is filled into the dialog fields.

Base information for the site to be configured must be entered. If you wish to close this window without entering any site information, press the *Cancel* button.

The field descriptions listed in Table 2-1 describe the data that may be entered into this dialog.



The image shows a Windows-style dialog box titled "Site Information". It contains several input fields and checkboxes. On the left side, there are fields for "Site Description:", "Site IP Address:", "Site OPC Name:", "SMTP Server:", "Sender eMail Account:", "SMTP Server Username/Password:", "RAS Server Username/Password:", and "Site Index Within This Configuration:". On the right side, there is a "Site Phone Book Entry:" field with an "Edit" button, a dropdown menu showing "<NEW>", and several checkboxes: "English Units", "Dialup", "Disable Paging", "Disable Auto Alarm Forward", "Disable Site Historical Logging", and "Disable OPC Conversations". Below these checkboxes is a section for "Store and Forward:" with a row of checkboxes for "S", "M", "T", "W", "T", "F", "S" and a "Time" field set to "12:00:00 AM". At the bottom right are "OK" and "Cancel" buttons.

FIGURE 2-15. SITE INFORMATION DIALOG

TABLE 2-1. SITE CONFIGURATION FIELD DEFINITIONS

Field	Description	Default Value
Site Description	This is the long description of a site name. The Site OPC Name holds the shorter version of the site name.	Blank
Site IP Address	This is the dot notation site IP address in the form ###.###.###.###	Blank
Site OPC Name	This is the short site description used in the first portion of the OPC item name.	Site# – which is incremented for each added site
SMTP Server	This field identifies the SMTP Server	Blank
Sender eMail Account	This field is the name of the eMail Account holder	Blank
SMTP Server Username	This is the user name for the SMTP server	Blank
SMTP Server Password	This is the password for the SMTP server	Blank
RAS Server Username	This is the user name for the RAS security for a dial-up WebLink	Blank
RAS Server Password	This is the password for the RAS security for a dial-up WebLink	Blank
Site Phone Book Entry*	This is the combo selection box for previously configured host RAS entries. The New button allows to create a new host RAS entry	<NEW>
English Units	This field allows for the selection of English units of measure. If unchecked the device will display metric units of measure.	Unchecked – Metric
Dialup	This field allows for the marking of a site as dial-up connectivity. If unchecked the device IP Address will be assumed to be on local Ethernet network.	Unchecked – Ethernet
Disable Paging	This field allows for disabling the alarm based paging system in a configured Advantech Studio application.	Unchecked – Paging Enabled
Alarm/Hist File Lifetime	This field allows the selection of the length of time to keep historical files prior to automatically overwriting.	5 days
Disable Auto Alarm Forward	This field allows for the disabling of site automatic alarm forwarding to the host system	Unchecked – Auto Alarm forwarding Enabled
Disable Site Historical Logging	This field allows for the disabling of site historical data logging.	Unchecked – Historical Logging Enabled
Disable OPC Conversations	This field allows disabling of OPC conversations between the site and the host.	Unchecked – OPC Conversations Enabled
Store and Forward Days of Week	This field allows for the selection of which days of the week that retrieval of remote stored information is performed	All Unchecked – Forward on host demand only
Store and Forward Time	This field allows for the selection of time of day that the retrieval of remote stored information is performed	12:00:00 AM
* If the option for Site Phone Book Entry is set to <NEW> and the Edit button is selected, the operating system dialogs for configuring an RAS entry are displayed. Select the OK button when the site configuration is complete.		

Once a site has been added, selecting the *Save Changes* button saves the site configuration information in the database (see Figure 2-16).

ModLon gateways can now be added to a site.

The *Edit Site* or *Add Modlon* options are displayed when you right mouse click on a site name (see Figure 2-17). The Site Information dialog described above is displayed when *Edit Site* is selected. The ModLon Gateway dialog is displayed if the *Add Modlon* option is selected (see page 2-14).

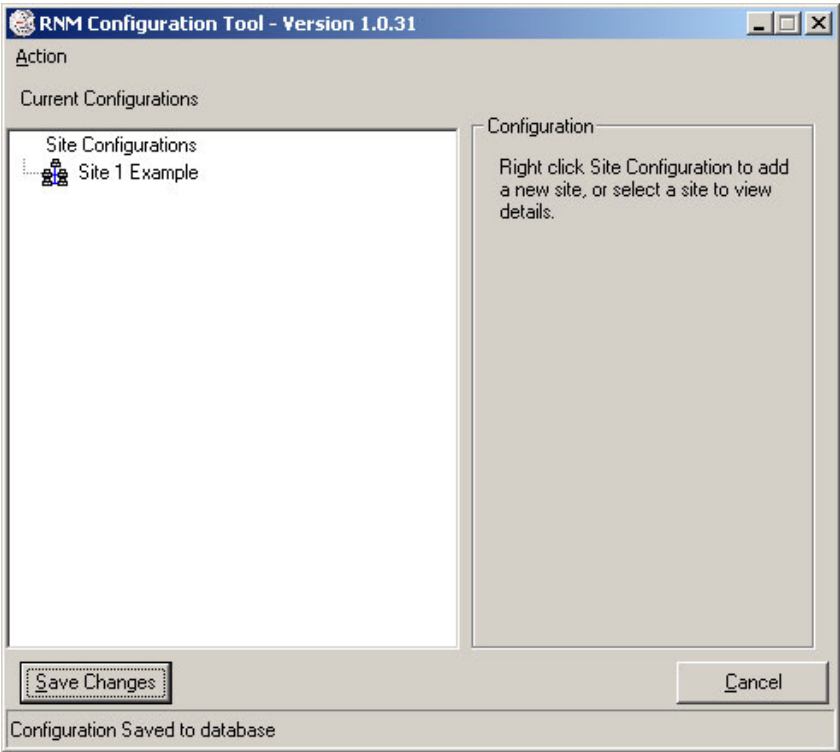


FIGURE 2-16. SAVE CHANGES

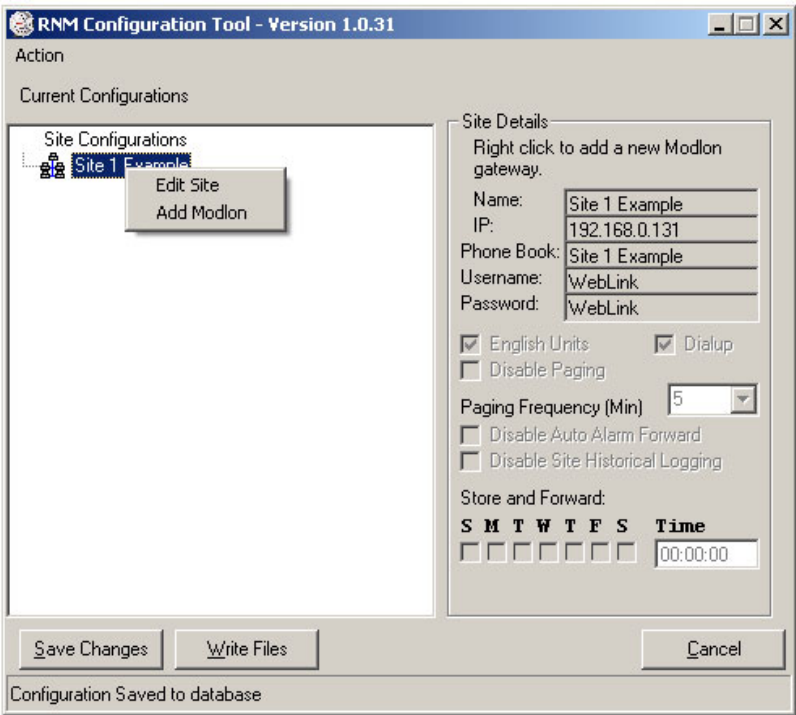


FIGURE 2-17. RIGHT MOUSE CLICK ON SITE

RAS ENTRY CONFIGURATION

The series of dialogs displayed by the operating system to configure an RAS dial-out entry are described below.

The default selection of *Dial-up to private network* is used for dial-up connections (see Figure 2-18). Select the *Next* button to view the next dialog.

NOTE: If you wish to use another type of RAS connection other than dial-up, refer to your operating system user's guide for more information on configuring Virtual Private Network (VPN), direct connect, and broadband connection types.

Enter in the phone number of the site where the remote WebLink is located (see Figure 2-19). Select the *Next* button to continue.

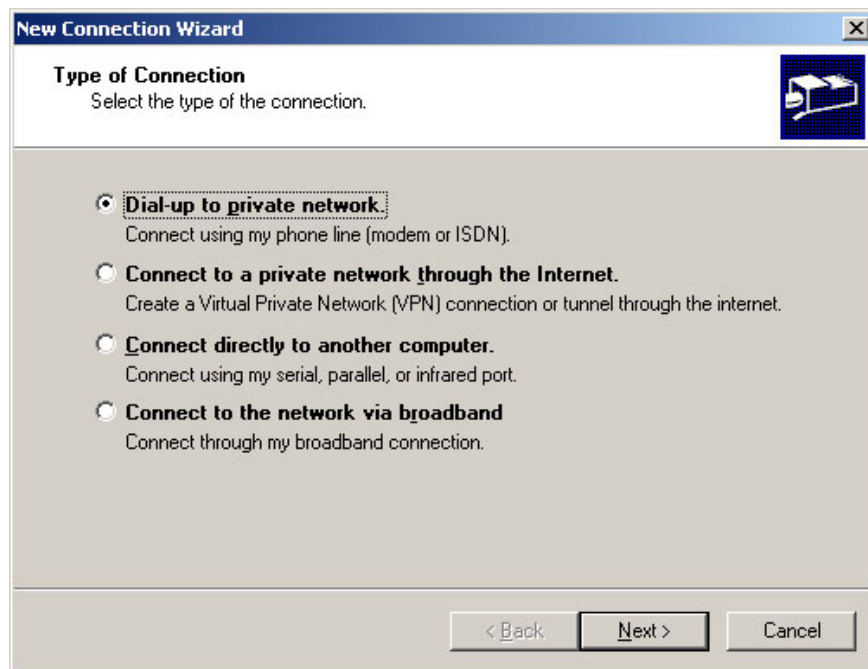


FIGURE 2-18. RAS CONFIGURATION – TYPE OF CONNECTION

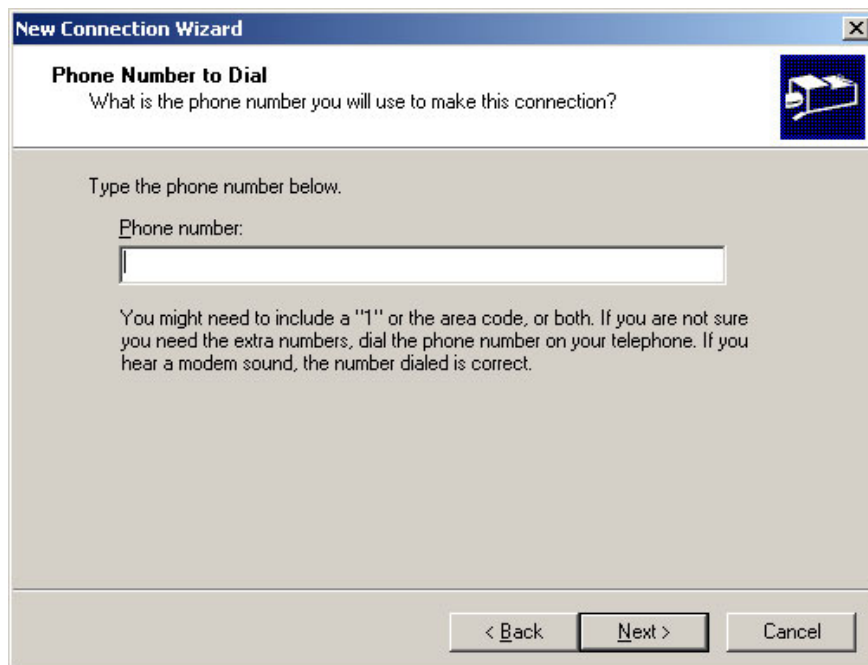


FIGURE 2-19. RAS CONFIGURATION – PHONE NUMBER

Enter in the name of the RAS phone book entry you are creating (see Figure 2-20). Press the *Finish* button to continue.

The dialog shown in Figure 2-21 allows for custo-

mization of the RAS phone book setting for security and networking. No changes are required for a default site configuration; the WebLink provides its own IP address. Press the *OK* button to continue.

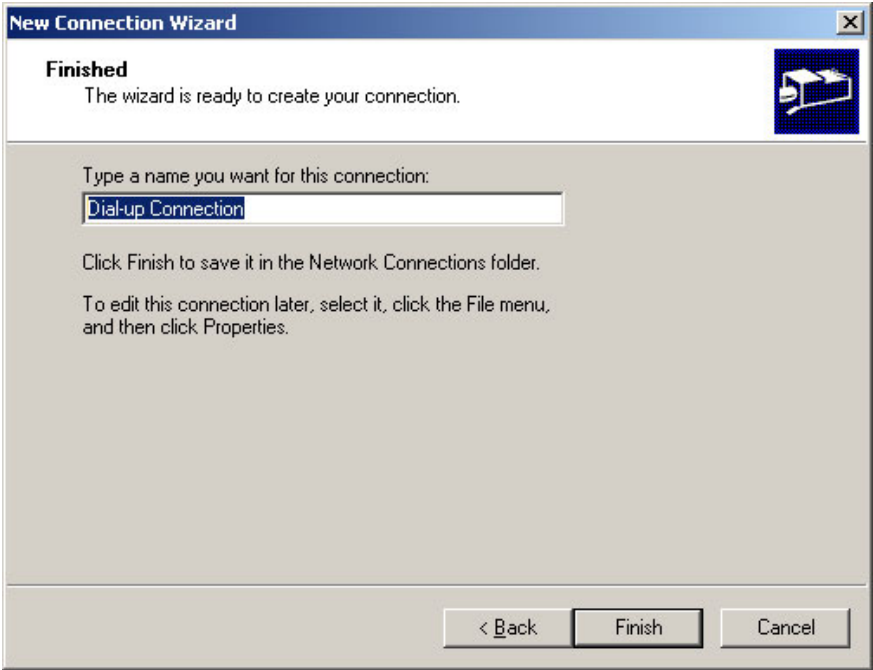


FIGURE 2-20. RAS CONFIGURATION – PHONE NUMBER

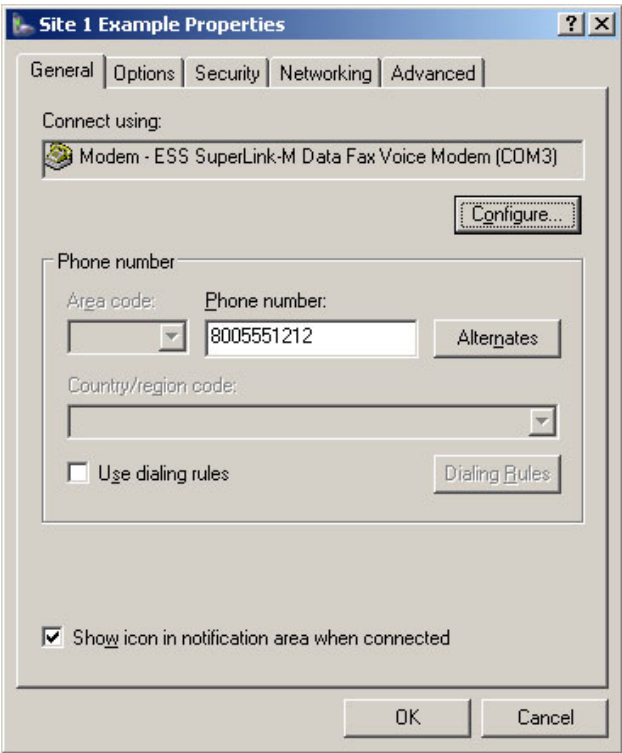


FIGURE 2-21. RAS CONFIGURATION – RAS ENTRY PROPERTIES

MODLON GATEWAY CONFIGURATION

The ModLon Gateway information dialog allows for naming a ModLon gateway and selecting its type (see Figure 2-22).

The *Description* field is the long description of a ModLon gateway and the *OPC Name* is the short

description used in the OPC item name. The default values for the *Description* and *OPC Name* fields are ModLon#, with # incrementing for each ModLon gateway within a selected site.

The available options when the *Modlon Gateway Configuration Option* is pulled down are as shown in Figure 2-23.

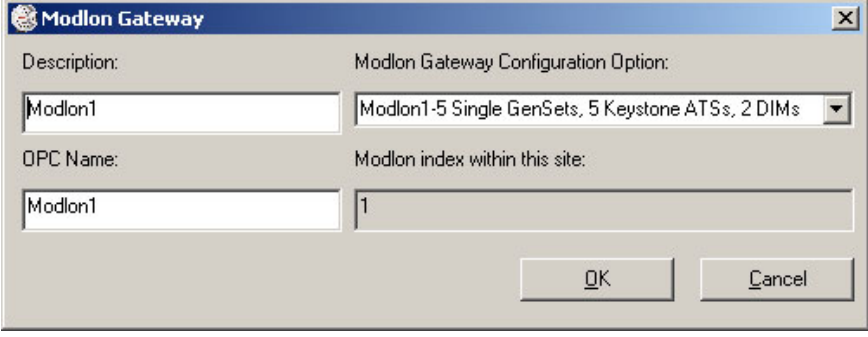
The image shows a Windows-style dialog box titled "Modlon Gateway". It contains two text input fields on the left: "Description:" with the value "Modlon1" and "OPC Name:" with the value "Modlon1". On the right, there is a dropdown menu labeled "Modlon Gateway Configuration Option:" which currently shows "Modlon1-5 Single GenSets, 5 Keystone ATSs, 2 DIMs". Below the dropdown is a text input field labeled "Modlon index within this site:" with the value "1". At the bottom right are "OK" and "Cancel" buttons.

FIGURE 2-22. MODLON GATEWAY CONFIGURATION

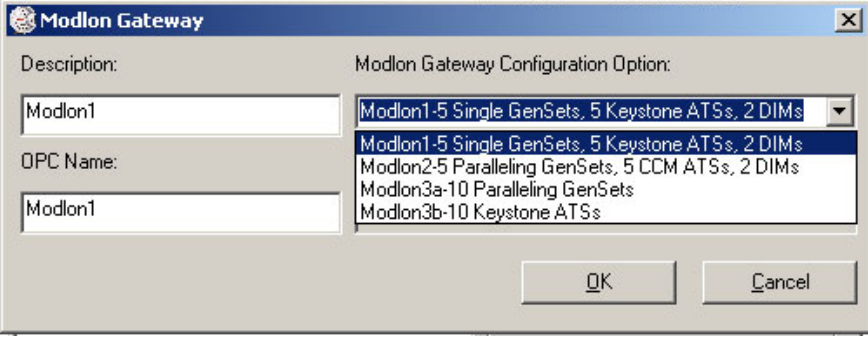
This image shows the same "Modlon Gateway" dialog box as Figure 2-22, but with the dropdown menu open. The dropdown list displays five options: "Modlon1-5 Single GenSets, 5 Keystone ATSs, 2 DIMs" (which is highlighted), "Modlon1-5 Single GenSets, 5 Keystone ATSs, 2 DIMs", "Modlon2-5 Paralleling GenSets, 5 CCM ATSs, 2 DIMs", "Modlon3a-10 Paralleling GenSets", and "Modlon3b-10 Keystone ATSs". The "Description:" and "OPC Name:" fields still contain "Modlon1". The "Modlon index within this site:" field is empty. The "OK" and "Cancel" buttons are at the bottom right.

FIGURE 2-23. MODLON GATEWAY – CONFIGURATION OPTIONS

Press the *OK* button to continue. Figure 2-24 shows the resulting main Configuration Tool screen after a ModLon has been added to a site. ModLon settings are shown on the right side.

When you right mouse click on a ModLon entry, the pop-up dialog shown in Figure 2-25 is displayed.

This allows for adding devices to a ModLon gateway.

NOTE: Once a ModLon gateway has been added to a site and saved, it cannot be edited because the device types available to a ModLon gateway are fixed. This prevents the mismatching of device types to ModLon gateway types.

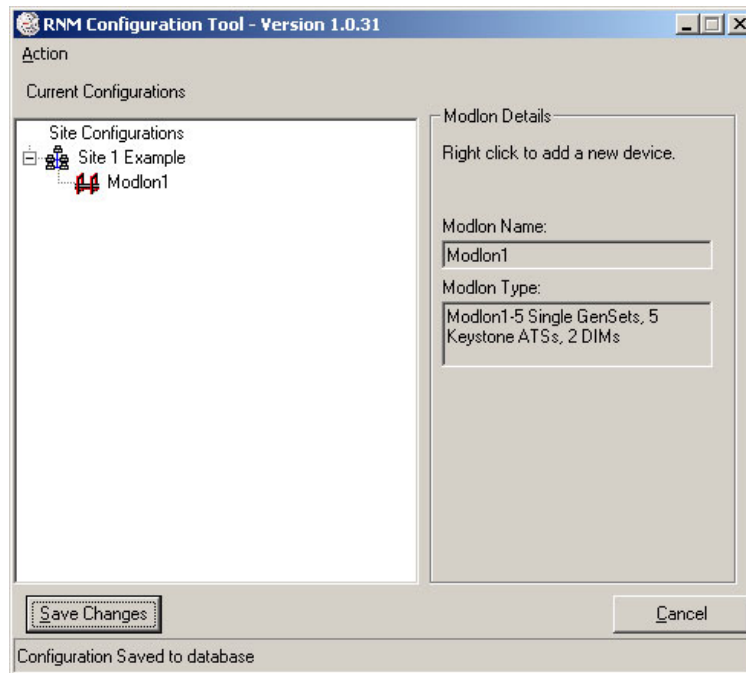


FIGURE 2-24. MODLON DETAILS

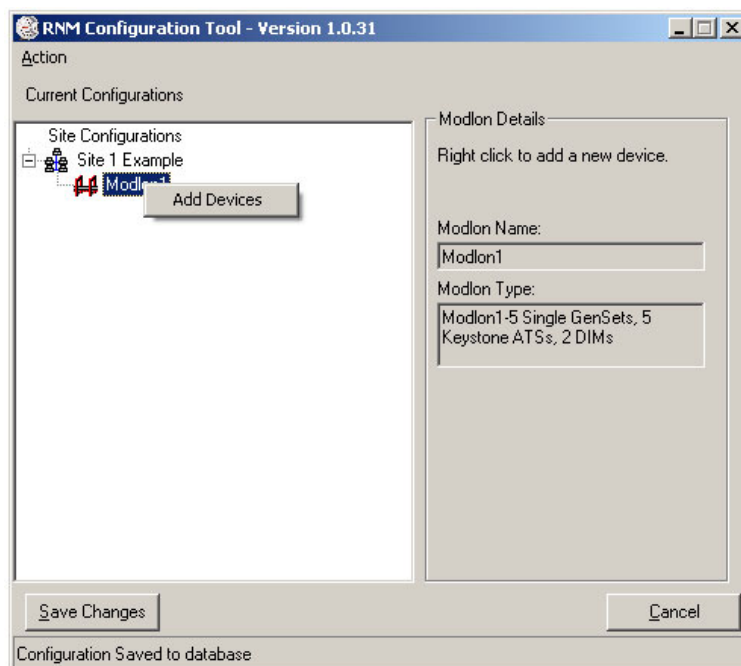


FIGURE 2-25. MODLON ENTRY RIGHT MOUSE CLICK

DEVICE CONFIGURATION

The device configuration dialog presents a list of available devices. The list is dependent upon the type of ModLon gateway that the device is being added to (see Figure 2-26).

Once a device is selected from the *Available Device Types*, the *Device Description* and *Device OPC Name* fields are automatically filled in (see Figure 2-27).

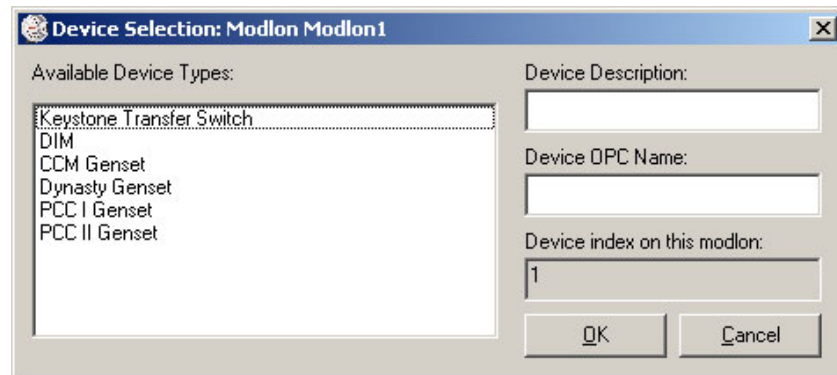


FIGURE 2-26. DEVICE SELECTION

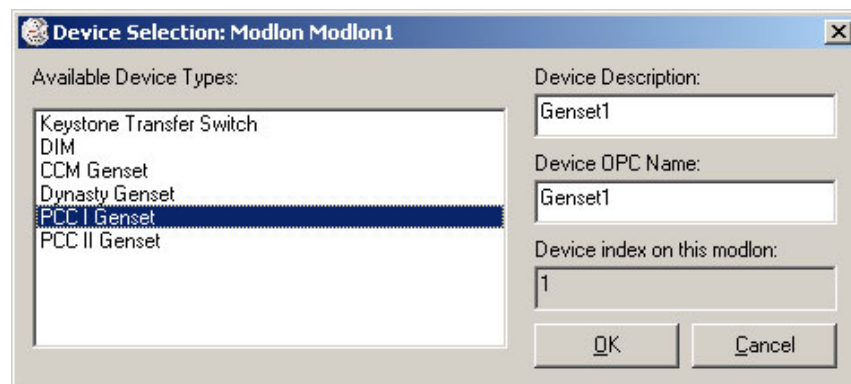


FIGURE 2-27. DEVICE SELECTION DEFAULT VALUES

The default values for the *Device Description* and *Device OPC Name* fields are [DEVICE]#, where [DEVICE] is either Genset, ATS, or DIM and # is incremented for each new device added to a ModLon gateway. Select *OK* to add the device to a ModLon gateway.

Figure 2-28 shows the resulting main Configuration Tool screen after a device has been added to a

ModLon gateway. The right portion of the dialog shows device settings.

The folders beneath the device name are preset, based on device type. Click on the + symbol next to a device folder to view individual tags for the device (see Figure 2-29).

When an individual tag is selected the following dialog is displayed to modify the settings for that tag.

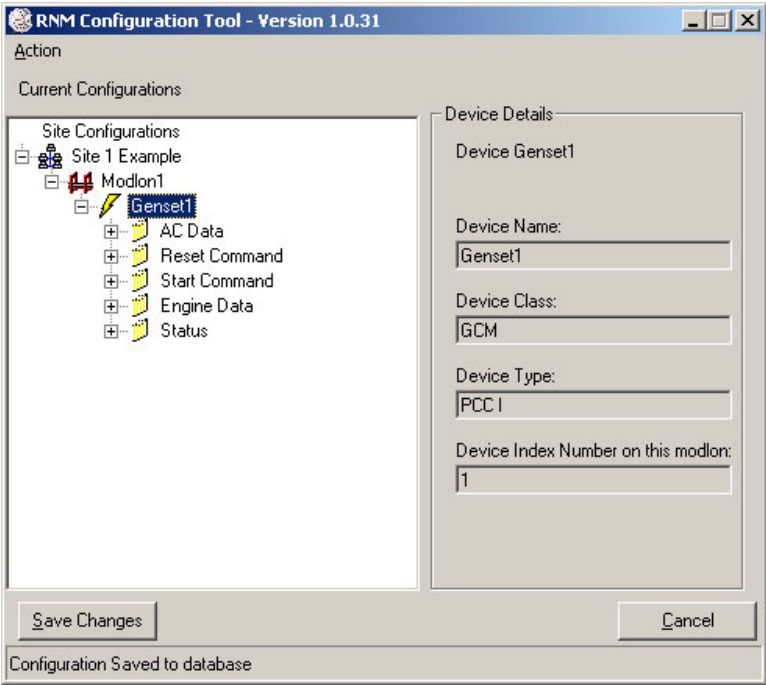


FIGURE 2-28. DEVICE DETAILS

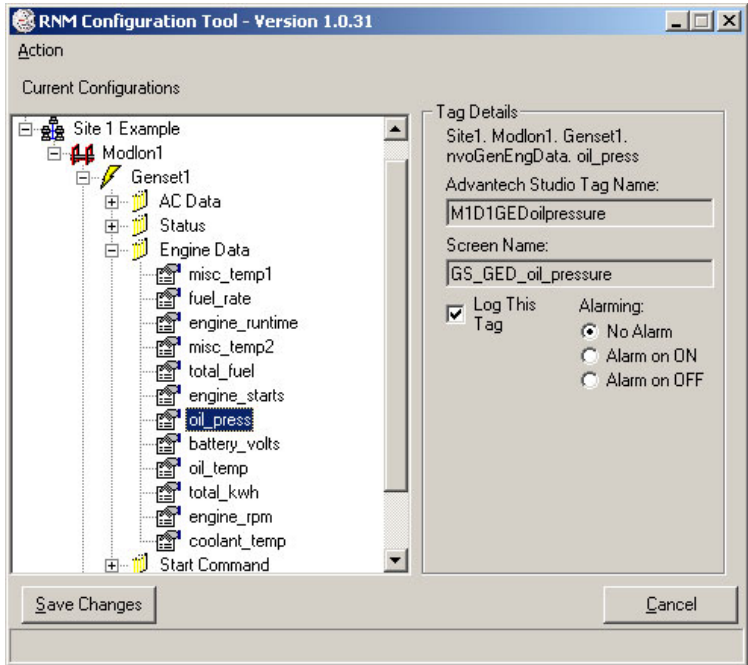


FIGURE 2-29. TAG DETAILS

The options available to edit a tag are *Log This Tag*, *Trend This Tag*, and *Alarming* (see Figure 2-30). Default values are associated with these fields and are editable for each tag within a device.

If the tag selected is an input or relay of a Digital I/O module, the ability to assign custom names to these tags is allowed for both the description display in the Advantech Studio WebLink application and the OPC item name.

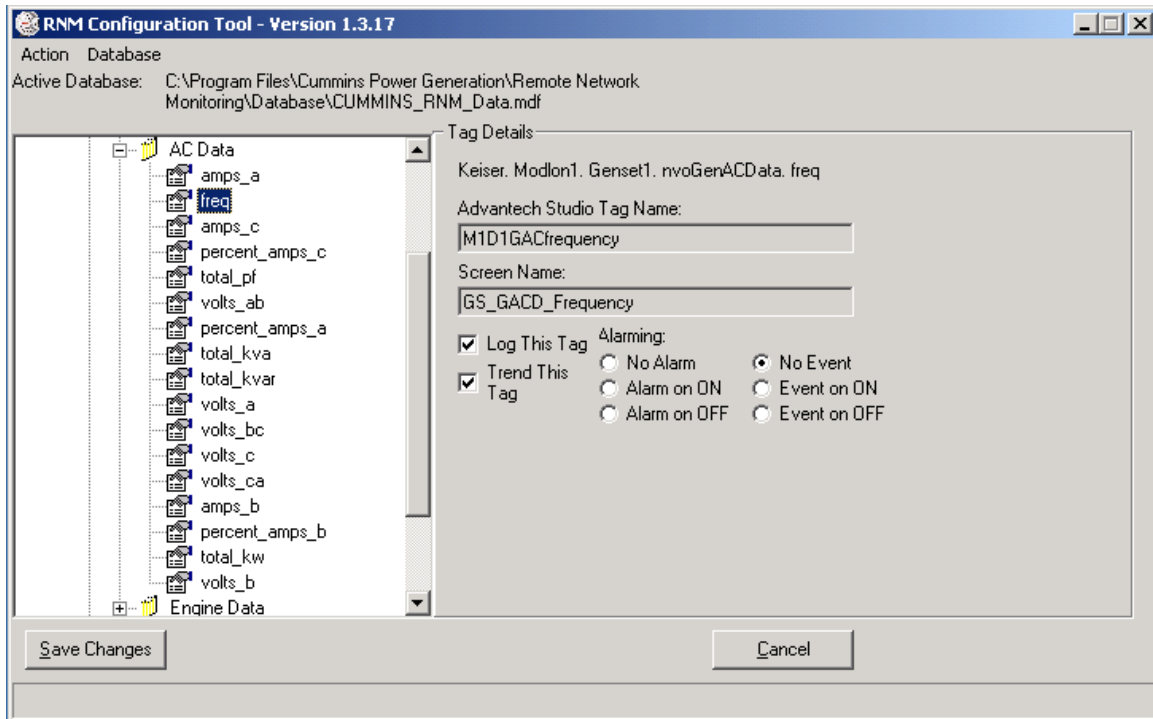


FIGURE 2-30. TAG DETAIL – RELAY/INPUT DESCRIPTIONS

DELETING SITES/MODLON GATEWAYS/DEVICES

If a site, ModLon gateway, or device item needs to be deleted, the *Delete* key on your keyboard can be pressed when the item to delete is selected. The dialog shown in Figure 2-31 is displayed prior to deleting the item selected.

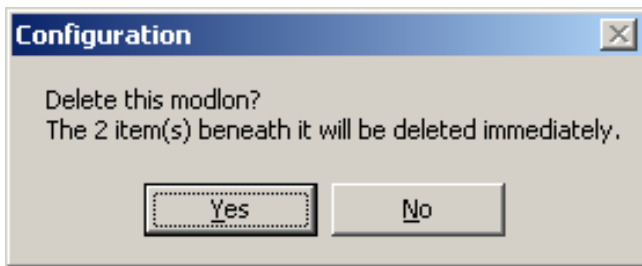


FIGURE 2-31. DELETE CONFIRMATION

Press *Yes* to delete the selected item or *No* to cancel the delete.

NOTE: Deleting an item is immediately reflected in the configuration database and is not “undo-able.”

NOTE: Deleting an item also deletes any items that are children of it. For example, deleting a ModLon gateway will delete all devices associated with it. Deleting a Site not only deletes all ModLon Gateways associated with the site, it also deletes all the devices associated with the deleted ModLon Gateways.

DOWNLOADING WEBLINK APPLICATIONS

To download a configured site application to a Web-Link, you need to execute the Advantech Web Studio 6.0 application from the icon that was placed on your desktop during the install.



FIGURE 2-32. ADVANTECH WEB STUDIO 6.0 ICON

If there is no Advantech Web Studio icon, the application can be launched from the start menu as shown in Figure 2-33.

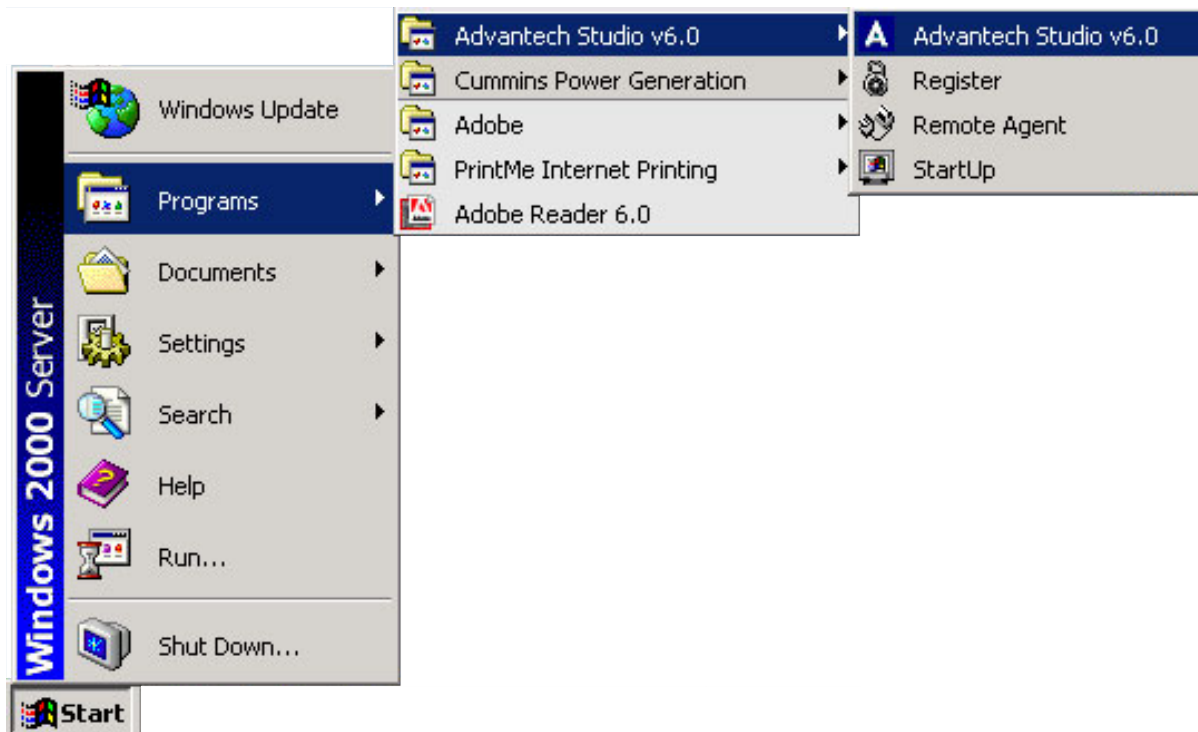


FIGURE 2-33. ADVANTECH STUDIO 6.0 START MENU

Once the Advantech Studio application is running, you can open up your application to deploy using the *File/Open Project* menu option and browsing to the directory created by the configuration tool (see Figure 2-34). The directory is typically located under c:\Program Files\RNConfig.

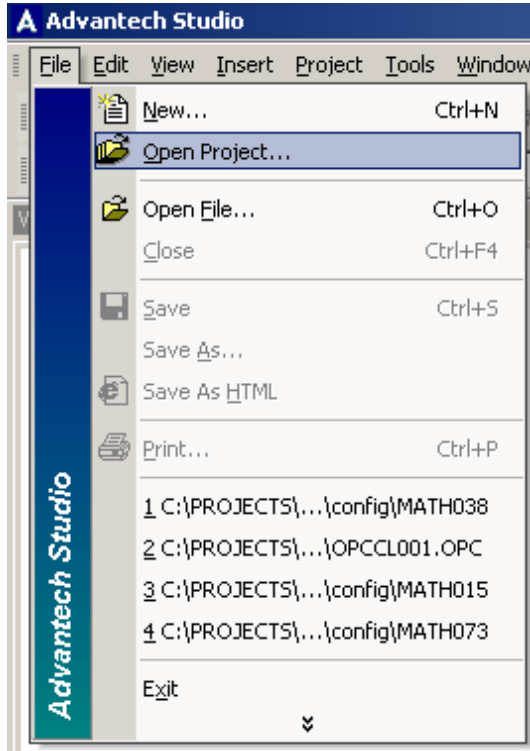


FIGURE 2-34. ADVANTECH STUDIO – OPEN PROJECT

Once the project is opened, it can be downloaded to an Ethernet or dial-up network connected to the WebLink. To do this, select the *Project / Execution Environment* menu option (see Figure 2-35).

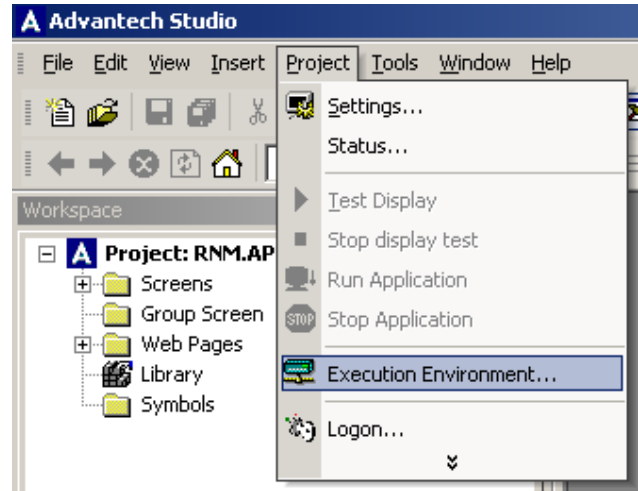


FIGURE 2-35. ADVANTECH STUDIO – EXECUTION ENVIRONMENT

The Execution Environment dialog is displayed (see Figure 2-36). To connect to the WebLink, select the *Network IP* radio button, check the value in the IP Address edit box, and click on the *Connect* button.

This should change the dialog status message to show the connection status (see Figure 2-37).

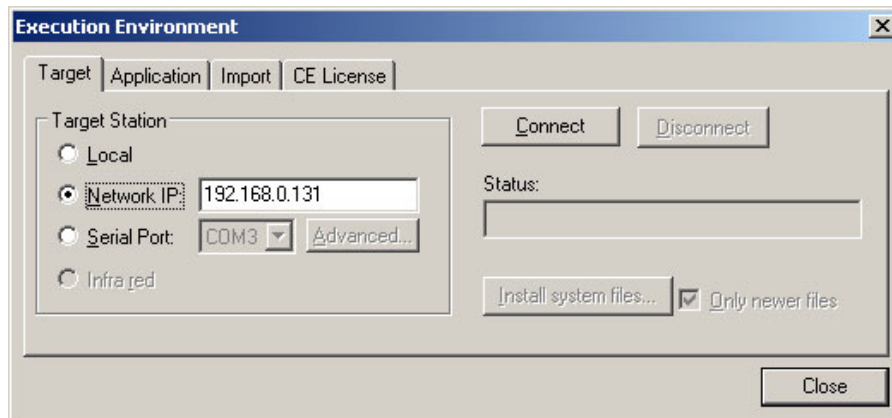


FIGURE 2-36. EXECUTION ENVIRONMENT DIALOG

To download the application to the WebLink, click the *Application* tab. This should change the dialog status message to show the connection status (see Figure 2-38).

The application must be stopped before sending the application to the target. Click on the the *Stop* button (see Figure 2-39).

The *Only newer files* check box can be left checked to speed the download with only updated files being downloaded. If it is unchecked, all files in the application will be downloaded, even if they are current on the WebLink. This could take considerably longer to download the files.

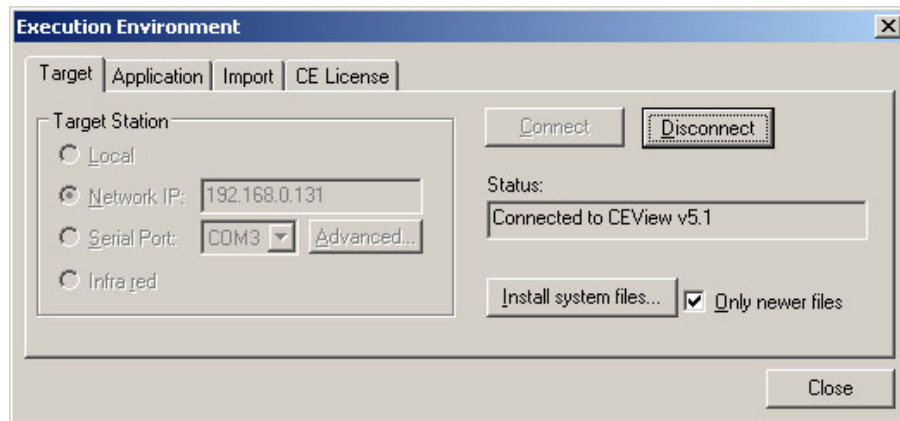


FIGURE 2-37. EXECUTION ENVIRONMENT DIALOG – CONNECTED

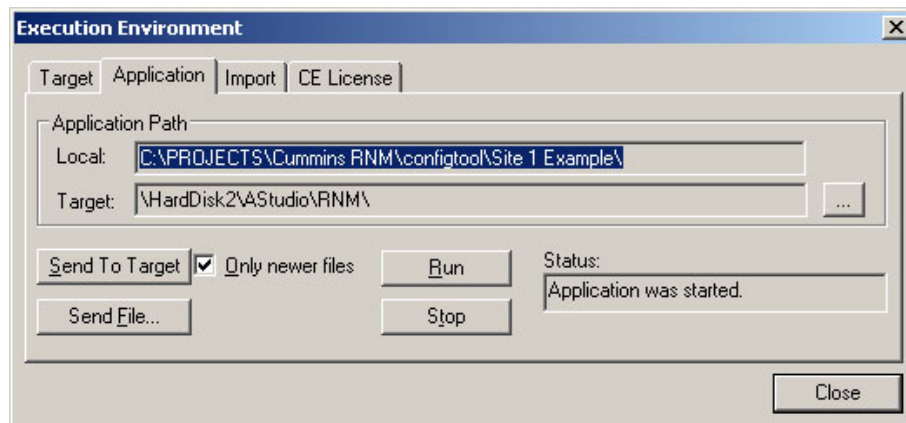


FIGURE 2-38. EXECUTION ENVIRONMENT DIALOG – APPLICATION TAB

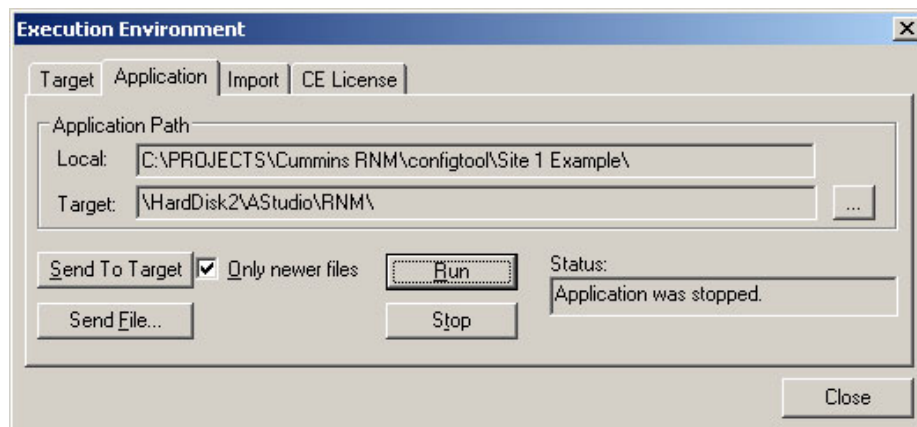


FIGURE 2-39. EXECUTION ENVIRONMENT DIALOG – STOPPED APPLICATION

The application can now be sent to the target Web-Link by selecting the *Send to Target* button. A series of dialogs, labeled *Send to Target* and *Sending Files to Target*, are then displayed showing the progress of the download (see Figures 2-40 and 2-41).

Once the download is complete, the status is updated to reflect that the *Application was updated with success* (see Figure 2-42).

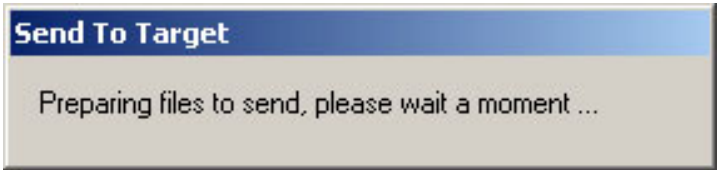


FIGURE 2-40. SEND TO TARGET DIALOG

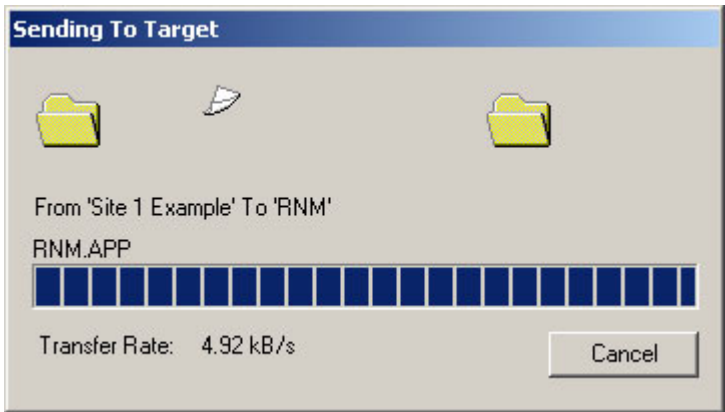


FIGURE 2-41. SENDING FILES TO TARGET DIALOG

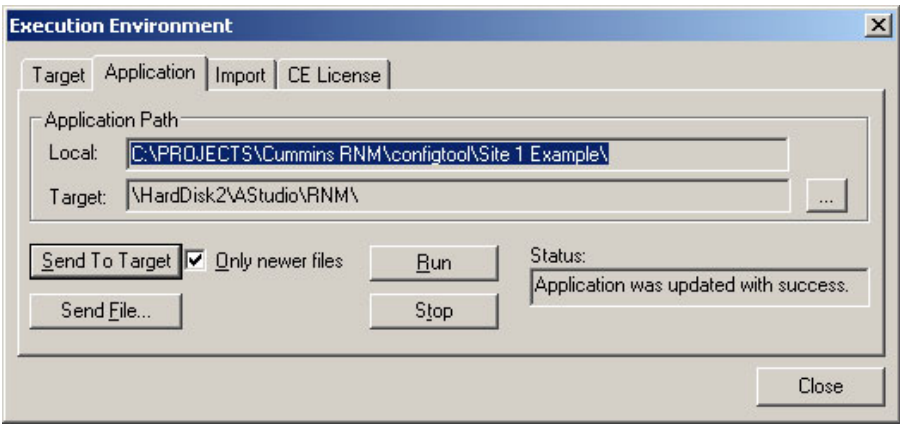


FIGURE 2-42. SENDING FILES TO TARGET

The remote application can now be started by using the *Run* button (see Figure 2-43).

When starting the remote application is successful, the *Status* reflects that the *Application was started* (see Figure 2-44). Click on the *Target* tab to disconnect from the remote WebLink.

Click on the *Disconnect* button to disconnect from the WebLink. Select the *Close* button to finish the download. The application is now downloaded and

running on the remote WebLink. This can be validated by running an Internet Explorer session with the URL address with the appropriate IP Address for the WebLink.

Example:

<http://192.168.0.131/studio/rnm/web/main.html>

The security login dialog is displayed (see Figure 2-45).

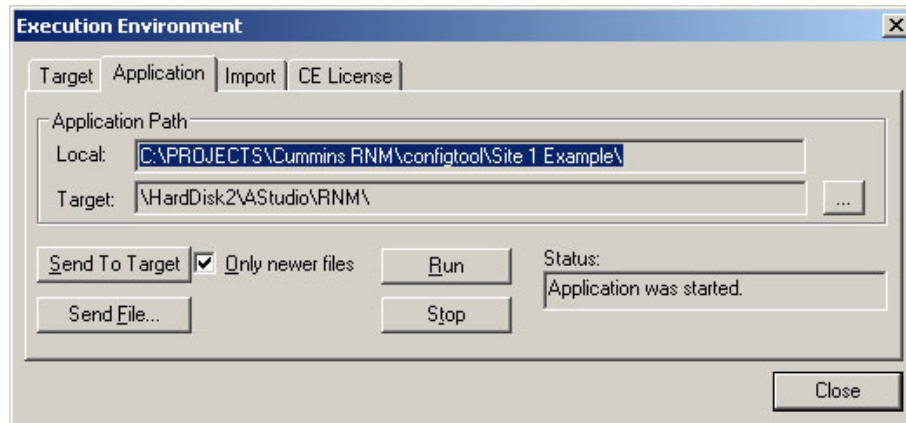


FIGURE 2-43. RUN APPLICATION

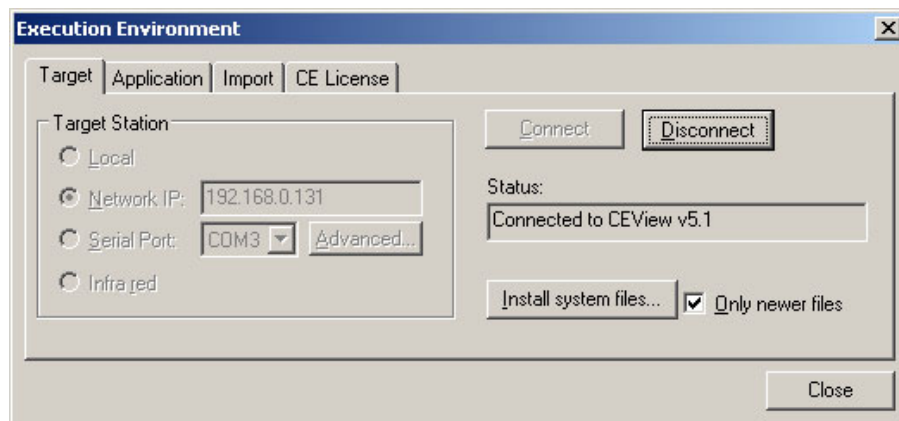


FIGURE 2-44. TARGET STATUS

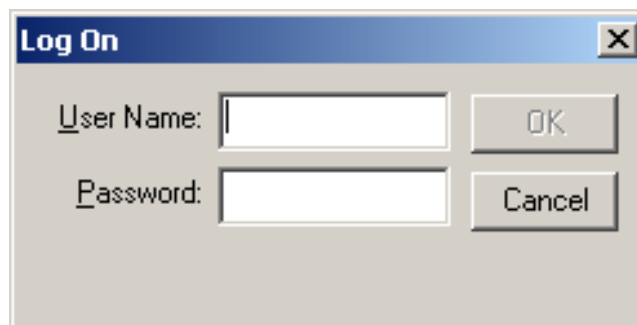


FIGURE 2-45. SECURITY LOGIN

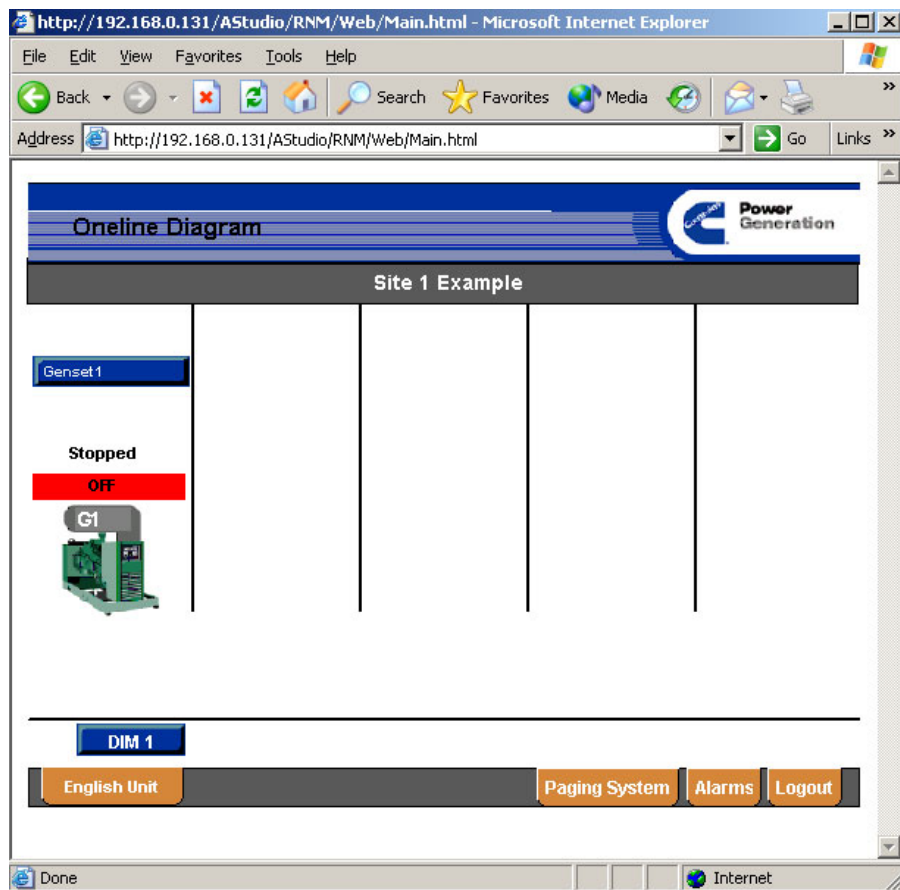


FIGURE 2-46. MAIN NAVIGATION SCREEN IN WEB BROWSER

After entering in a valid user name and password, the main navigation screen is displayed (see Figure 2-46).

NOTE: The valid list of logins can be modified prior to the download under the User and Security Group configuration options in Advantech Studio. For more information, see “Modifying Web-Link Login Security,” starting on page 2-25.

The application now is running properly on the WebLink. You may exit the Advantech Studio application by selecting the *File / Exit* menu option (see Figure 2-47).

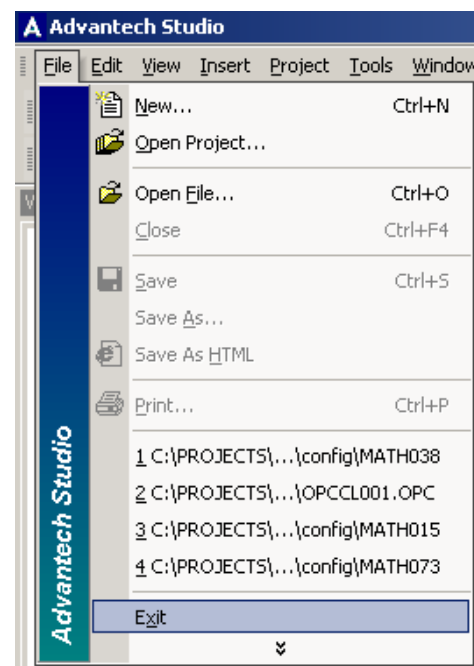


FIGURE 2-47. EXITING ADVANTECH STUDIO

MODIFYING WEBLINK LOGIN SECURITY

NOTE: A security level of at least 10 is required to operate the control functions within the application. This includes Generator Start/Stop/Reset Fault, ATS Test/Stop/Reset Fault, and DIM Relay forcing.

To create a custom set of security logins for the Web based application, Security Groups and Users can be configured in Advantech Studio prior to application download. This can be accomplished under the *Insert / User* or *Insert / Security Group* menu options of Advantech Studio (see Figure 2-48).

To create or modify a group account, select the *Insert / Security Group* menu option. The Group Account dialog is displayed (see Figure 2-49).

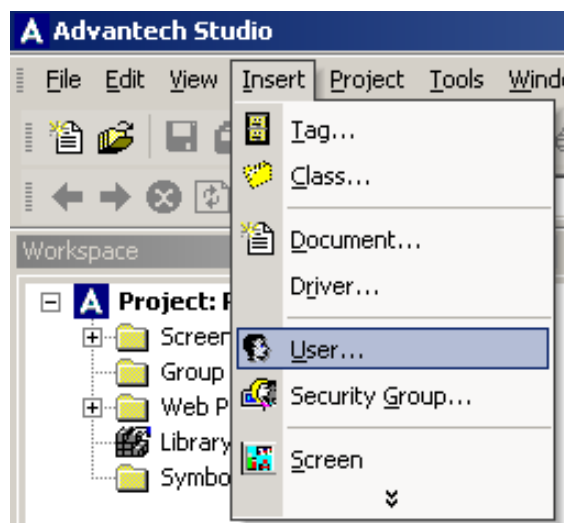


FIGURE 2-48. CONFIGURING ADVANTECH STUDIO SECURITY

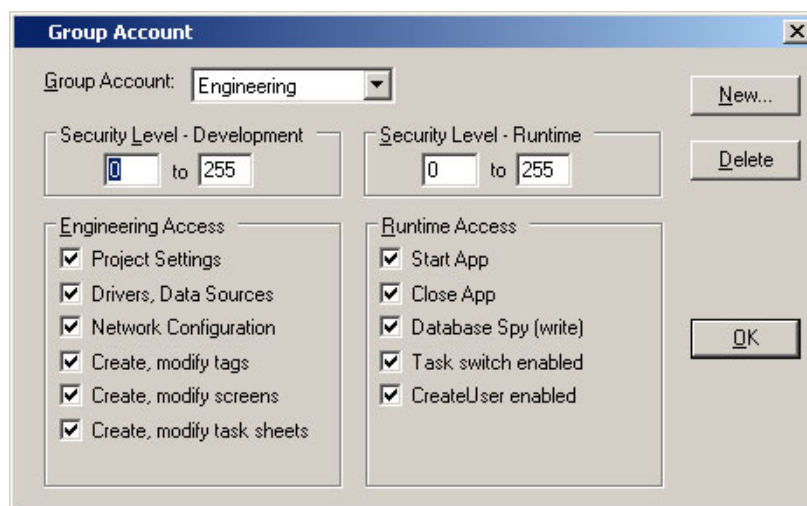


FIGURE 2-49. SECURITY – GROUP ACCOUNT DIALOG

To create a new group account, click on the *New* button and the dialog shown in Figure 2-50 is displayed. Enter a group name and click on *OK*.

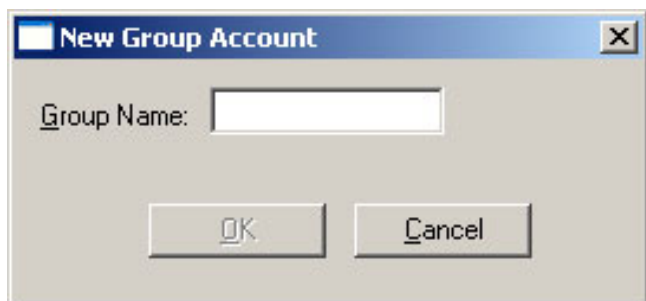


FIGURE 2-50. SECURITY – ENTER GROUP NAME

The new group account is now available in the *Group Account* pull-down list (see Figure 2-51). You

may edit the fields for Engineering and Runtime access as appropriate. Control functions within the application require security level of at least 100. To delete a group account, select it and click on the *Delete* button.

To create a new user account, select the *Insert / User* menu option (see Figure 2-48). The User Account dialog shown in Figure 2-52 is displayed.

Click on the *New* button to create a new user account. The New user Account dialog shown in Figure 2-53 is displayed.

Enter a new user name and click *OK* to continue. The user account is created without a password. To modify the password for a created account, select it in the list and click on the *Password* button of the New Account dialog (see Figure 2-52).

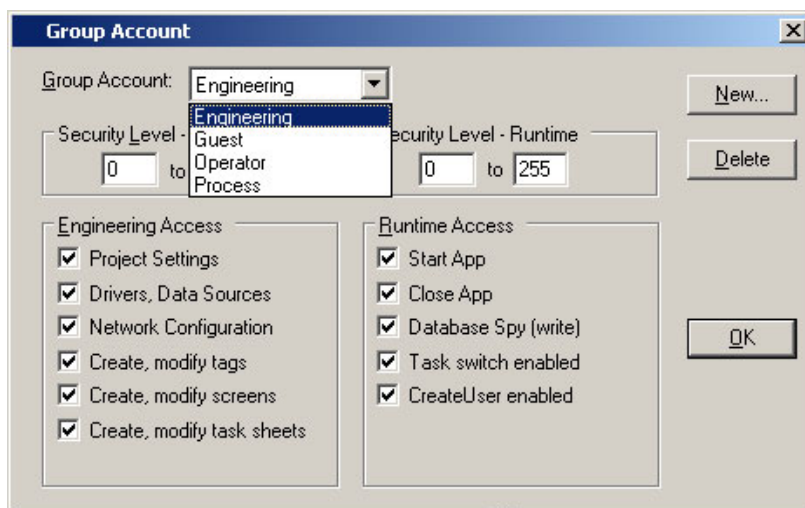


FIGURE 2-51. SECURITY – GROUP ACCOUNT SELECTION

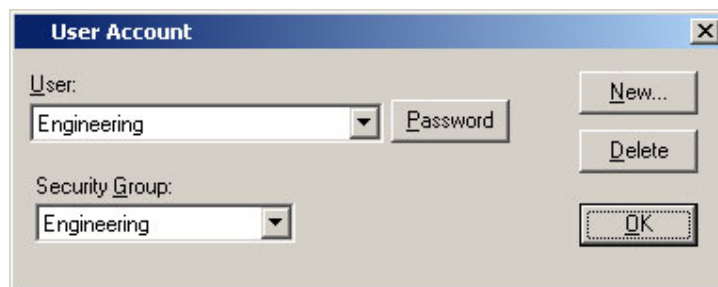


FIGURE 2-52. SECURITY – USER ACCOUNT DIALOG

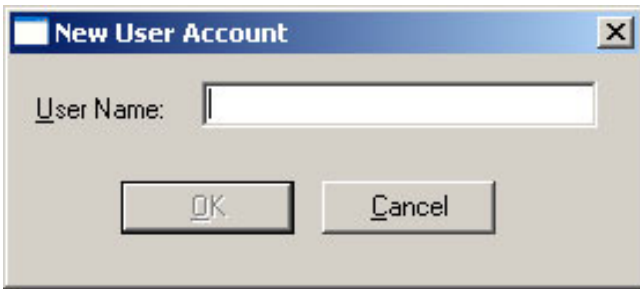


FIGURE 2-53. SECURITY – NEW USER ACCOUNT

Enter a new password, confirm it by re-entering it, and click on *OK* to complete the creation of a new user account (see Figure 2-54).

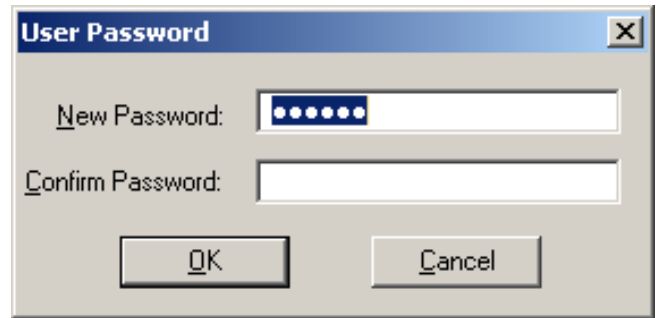


FIGURE 2-54. SECURITY – USER PASSWORD

THIS PAGE INTENTIONALLY BLANK

3. OPC Multiplexor

INTRODUCTION

The OLE for Process Control (OPC) provides a standard mechanism for communicating to smart field devices.

NOTE: Object Linking and Embedding (OLE) is a method for sharing information among Microsoft Windows-based applications.

The OPC Multiplexor is a series of application components that handle the following tasks in a remote networking architecture:

- On-demand OPC Client connectivity to remote WebLink sites
- Remote Access Service (RAS) connection initiation to remote WebLink sites
- OPC 2.0 Data Access (DA) compliant server
- Retrieval mechanism for storing and forwarding historical alarm and data files from remote WebLink sites

INSTALLATION

NOTE: The Configuration Tool must be installed prior to installing the OPC Multiplexor. Please see Section 2 in this manual for more information on installing the Configuration Tool.

The installation of the OPC Multiplexor is performed using the Setup.exe on the distribution CD. This application prompts the user for the option to install the Configuration Tool only or install both the configuration tool and the OPC Multiplexor.

The installation path is required to locate where the Advantech Studio software is installed. The default path is displayed. If you installed the software in a different location, use the **Browse** button to select a different path.

USER INTERFACE

The OPC Multiplexor dialog (see Figure 3-1) has three main user interface components:

- Upper Left – Tree view of sites/ModLon gateways/devices/tags
- Upper Right – Detail information on sites or individual tags
- Lower – Status log of connection/conversation events handled by the OPC Multiplexor

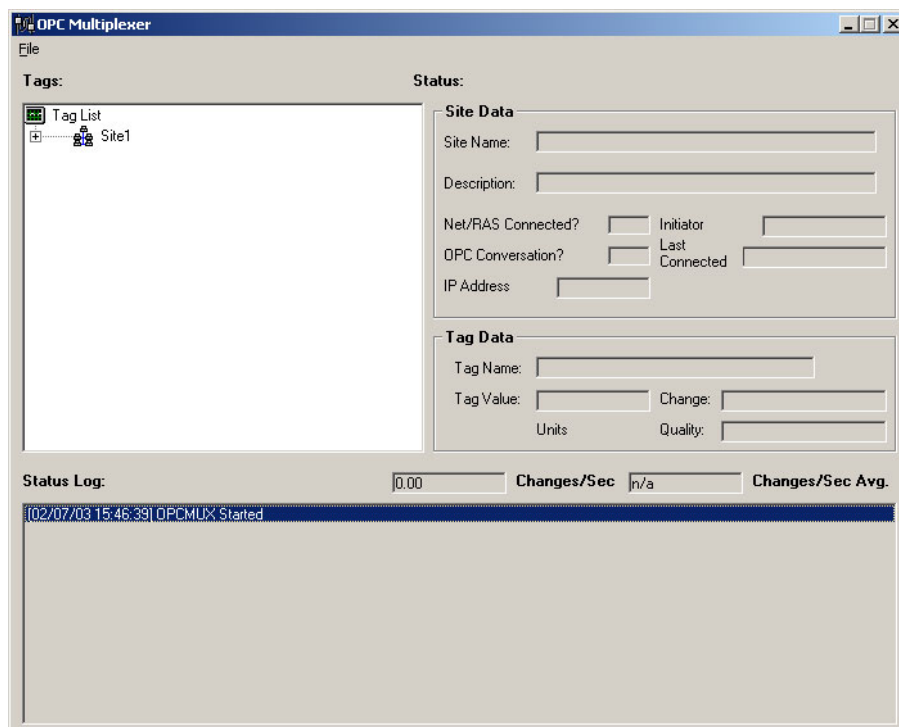


FIGURE 3-1. OPC MULTIPLEXOR MAIN DIALOG

When a site is selected, the details for the connection state of that site are displayed in the upper right pane (see Figure 3-2).

Detailed information about the tags associated to devices within a site can be browsed in the tree view to the upper left by clicking on the + and – icons to expand and collapse the branches (see Figure 3-3).

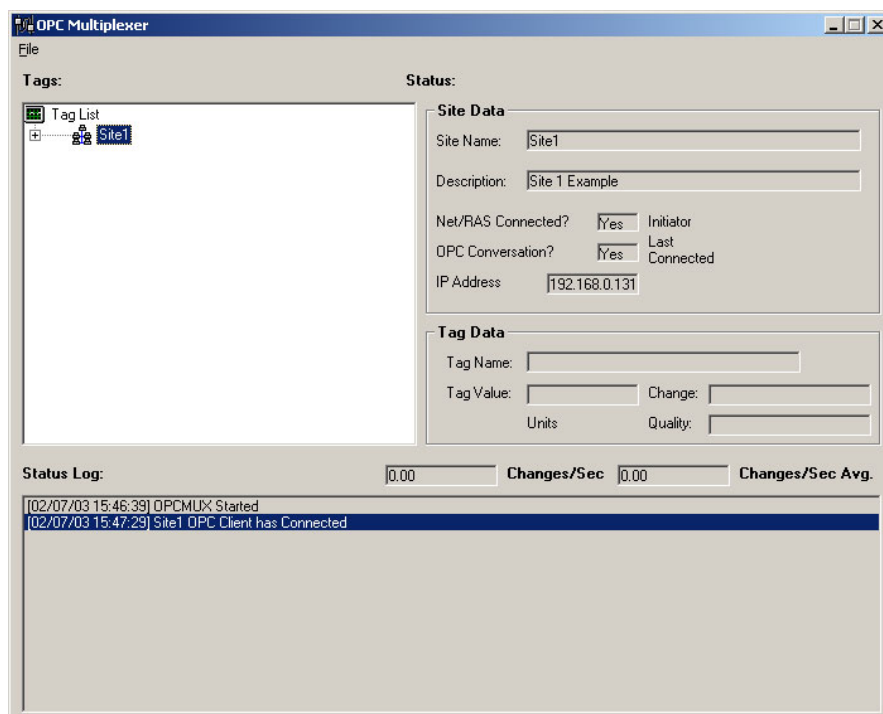


FIGURE 3-2. CONNECTED SITE INFORMATION

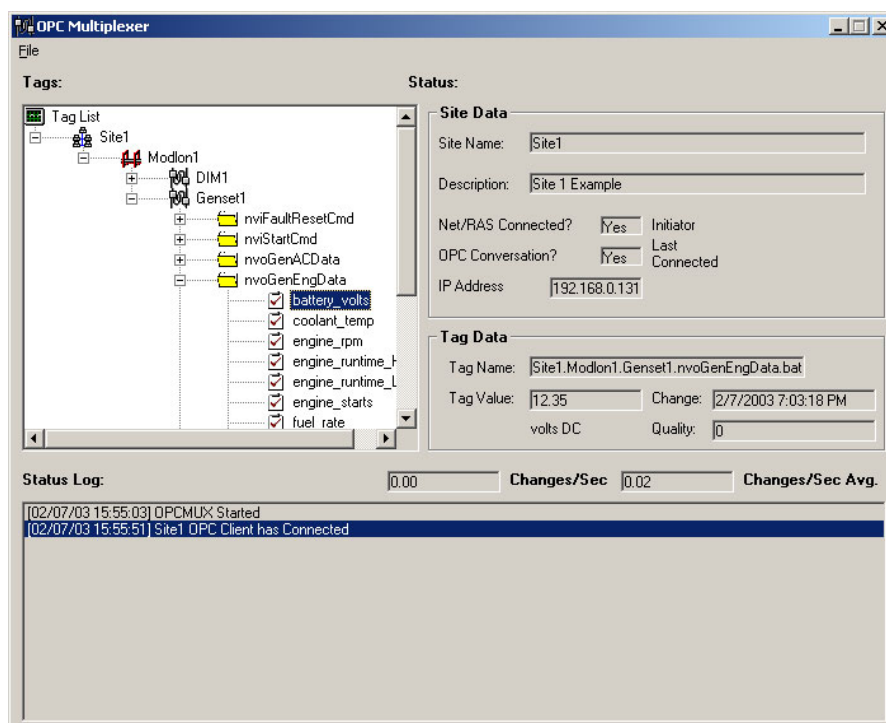


FIGURE 3-3. OPC MULTIPLEXOR – SITE CONNECTED

All Ethernet connected sites will auto-connect upon starting the OPC Multiplexor. The OPCMUX_Client applications running reflect each of the connected sites (see Figure 3-4).

If a connection to a site is lost, the OPC Multiplexor shows the disconnected status and automatically attempts to reconnect the site (see Figure 3-5).

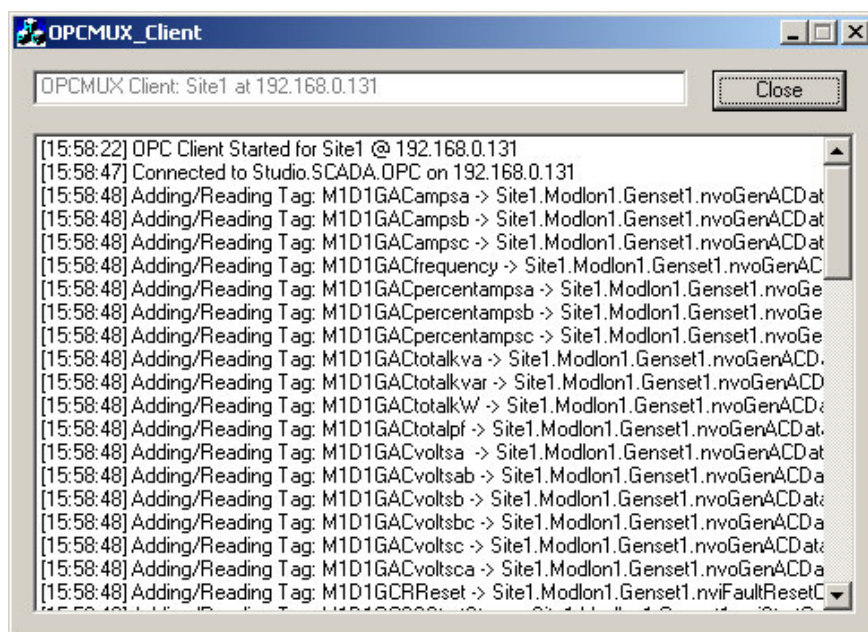


FIGURE 3-4. OPC MULTIPLEXOR – OPC CLIENT COMPONENT

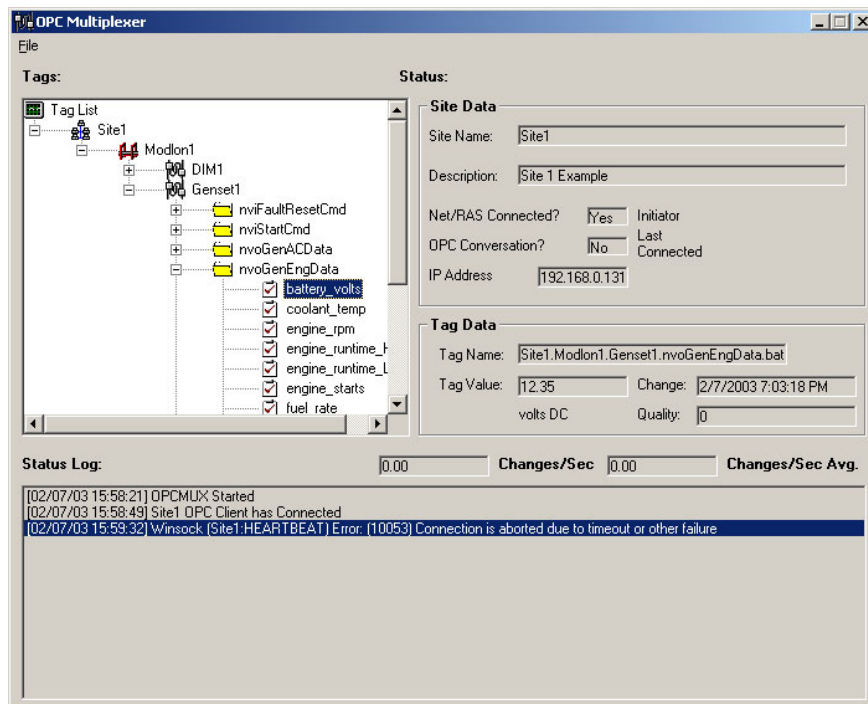


FIGURE 3-5. OPC MULTIPLEXOR – DISCONNECTED CLIENT

Once the site is reconnected, a new OPCMUX_Client session starts and the status is reflected in the

OPC Multiplexor Status Log and Tag Data sections (see Figure 3-6).

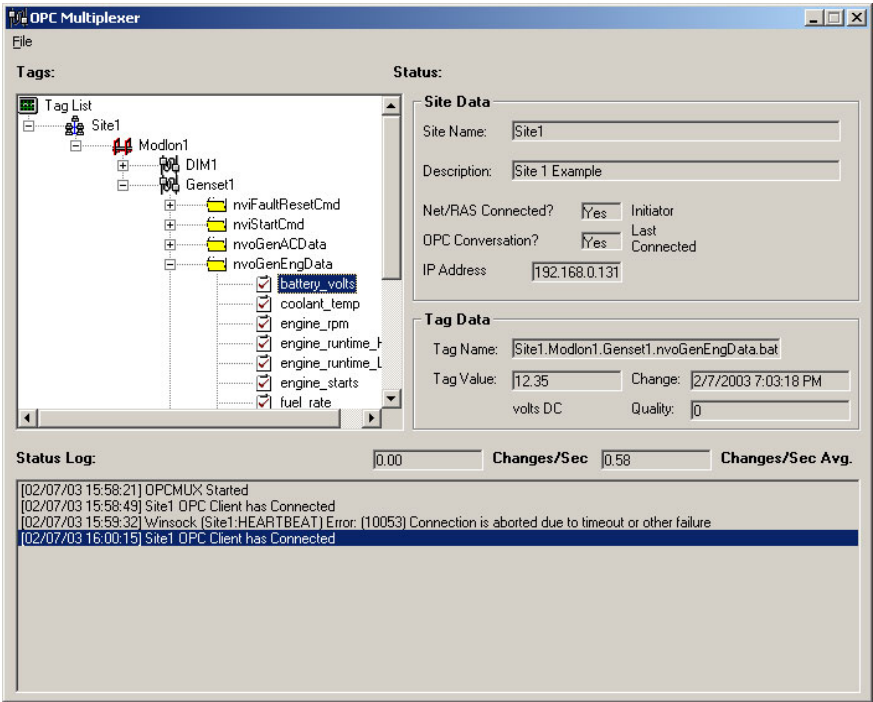


FIGURE 3-6. OPC MULTIPLEXOR – RECONNECTED CLIENT

OPC SERVER

The OPC Server component of the OPC Multiplexor is an OPC 2.0 DA compliant server. The data hosted is both the direct connected and dial-up site tags. The OPC Server class name is:

OPCMUX_Server

The server supports an unlimited number of sites. Each site contains a folder for the ModLon gateways configured for that site.

The General folder under the Site folder includes overall site tags (see Figure 3-7). Table 3-1 describes the purpose of these general tags.

The individual folders under a device item in the ModLon gateway folder follow the same convention as those shown by the OPC Multiplexor in its user interface (see Figure 3-8).

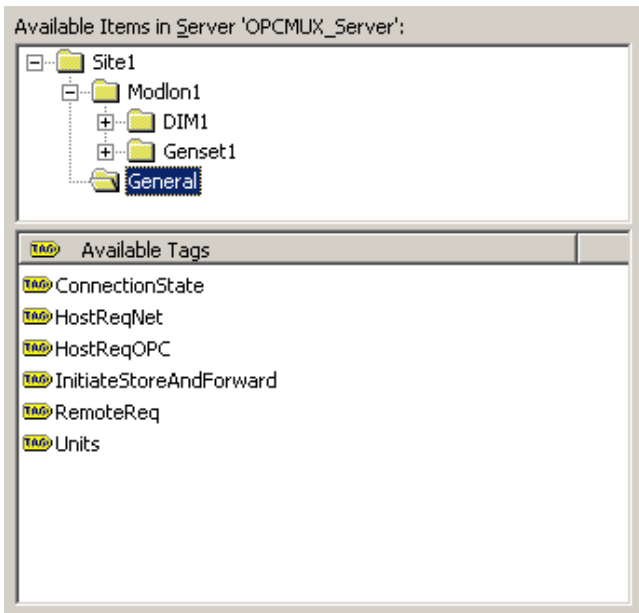


FIGURE 3-7. OPC SERVER GENERAL FOLDER

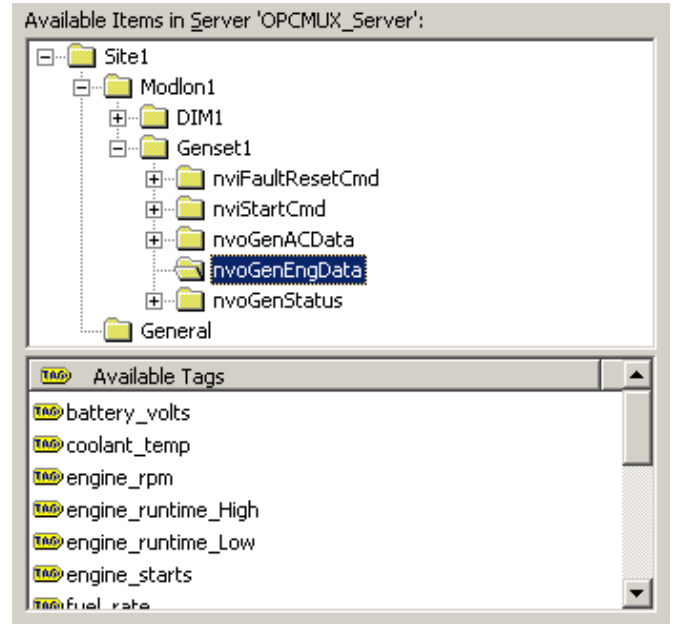


FIGURE 3-8. OPC SERVER DEVICE FOLDERS

TABLE 3-1. OPC SERVER GENERAL TAGS

Tag	Type	Description
ConnectionState	String	Holds the current connection state of the site
HostReqNet	String	A value being written to this field triggers the OPC Multiplexor to check or establish a network connection to the site
HostReqOPC	String	A value being written to this field triggers the OPC Multiplexor to check or establish a network connection to the site and then create an OPC conversation
InitiateStoreAndForward	String	A value being written to this field triggers the OPC Multiplexor to start the ATE Logger processing for the site
RemoteReq	String	A value being written to this field triggers the OPC Multiplexor to check or establish a network connection to the site and start the ATE Logger processing for the site
Units	Integer	Integer representation of the units of measure current in use at the site. 1 = Metric 0 = English

HISTORICAL DATA/ALARM STORAGE AND FORWARDING

The OPC Multiplexor can move historical data and alarm files from the remote devices into the local configuration database for permanent storage. This feature is activated by configuring a site to Store and Forward files at a specified interval. The Site Information dialog within the configuration tools includes the options to specify whether or not the files will be stored and/or forwarded (see Figure 3-9).

Selecting the **Disable Auto Alarm Forward** check box stops the remote WebLink from attempting to

connect to the host on a fault condition and forwarding the current alarm logs. This feature should be disabled for Ethernet connected sites.

Selecting the **Disable Site Historical Logging** check box stops the remote WebLink from creating historical data log files.

The **Store and Forward** day check boxes and **Time** entry field are used to specify the frequency and time to forward the logged files.

This historical data is stored in the configuration database tables listed in Table 3-2.

FIGURE 3-9. SITE CONFIGURATION DIALOG

TABLE 3-2. CONFIGURATION DATABASE TABLES

Table	Description
AT_Alarm	Historical Alarm File Repository Site, Tag, TimeStamp, Fault, and Description
AT_Trend	Historical Data File Repository Site, Tag, TimeStamp, and Value

THIS PAGE INTENTIONALLY BLANK

Appendix A. ModLon Gateway Register Maps

This appendix includes information on register mapping of the following modules to a ModLon Gateway used in FT-10 networks.

- Single PowerCommand Genset
- Paralleling PowerCommand Genset
- Automatic Transfer Switch (ATS) – Simple
- ATS – Detailed
- Digital I/O Module (DIM)

**TABLE A-1. MODLON REGISTER MAPPING INFORMATION – OPTION 1
SINGLE POWERCOMMAND GENSET (SHEET 1 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401			
	Name [2,3]	40002	40102	40202	40302	40402			
	Name [4,5]	40003	40103	40203	40303	40403			
	Name [6,7]	40004	40104	40204	40304	40404			
	Name [8,9]	40005	40105	40205	40305	40405			
	Name [10,11]	40006	40106	40206	40306	40406			
	Name [12,13]	40007	40107	40207	40307	40407			
	Name [14,15]	40008	40108	40208	40308	40408			
	Device Type	40009	40109	40209	40309	40409			
	Control Switch	40010	40110	40210	40310	40410			
	State ¹	40011	40111	40211	40311	40411			
	Fault Code*	40012	40112	40212	40312	40412			
	Fault Type ²	40013	40113	40213	40313	40413			
	Percent kW	40014	40114	40214	40314	40414	0.5		%
	Total kW	40015	40115	40215	40315	40415			
	NFPA 110 ³	40016	40116	40216	40316	40416			
	Extended ⁴	40017	40117	40217	40317	40417			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

**TABLE A-1. MODLON REGISTER MAPPING INFORMATION – OPTION 1
SINGLE POWERCOMMAND GENSET (SHEET 2 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenEngData	Battery Voltage	40035	40135	40235	40335	40435	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	1.0		starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
	Total kwh (Low)	40047	40147	40247	40347	40447	1.0		kwh
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
	Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
Genset Control	Start/Stop	40050	40150	40250	40350	40450			
	Reset	40051	40151	40251	40351	40451			
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

¹ State	
Digital Value	Description
0	Stopped
1	Start Pending
2	Warm-up at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

² Fault Type	
Digital Value	Description
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

³ NFPA110	
Description	Bit
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

⁴ Extended	
Description	Bit
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

**TABLE A-2. MODLON REGISTER MAPPING INFORMATION – OPTION 1
AUTOMATIC TRANSFER SWITCH – DETAILED (SHEET 1 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode ¹	41010	41110	41210	41310	41410			
	State ²	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type ³	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110 ⁴	41016	41116	41216	41316	41416			
	Extended ⁵	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
							Data = Multiplier x (Register + Offset)		

**TABLE A-2. MODLON REGISTER MAPPING INFORMATION – OPTION 1
AUTOMATIC TRANSFER SWITCH – DETAILED (SHEET 2 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoACDataSrc1	Frequency	41035	41135	41235	41335	41435	0.1		Hz
	Total pf	41036	41136	41236	41336	41436	0.00005		PF
	Total kva	41037	41137	41237	41337	41437	1.0		KVA
	Total kW	41038	41138	41238	41338	41438	1.0		KW
	Total kvar	41039	41139	41239	41339	41439	1.0		KVAR
	Volts ab	41040	41140	41240	41340	41440	1.0		Volts
	Volts bc	41041	41141	41241	41341	41441	1.0		Volts
	Volts ca	41042	41142	41242	41342	41442	1.0		Volts
	Volts a	41043	41143	41243	41343	41443	1.0		Volts
	Volts b	41044	41144	41244	41344	41444	1.0		Volts
	Volts c	41045	41145	41245	41345	41445	1.0		Volts
	Amps a	41046	41146	41246	41346	41446	1.0		Amps
	Amps b	41047	41147	41247	41347	41447	1.0		Amps
	Amps c	41048	41148	41248	41348	41448	1.0		Amps
	Percent Amps a	41049	41149	41249	41349	41449	0.5		%
	Percent Amps b	41050	41150	41250	41350	41450	0.5		%
	Percent Amps c	41051	41151	41251	41351	41451	0.5		%
nvoACDataSrc2	Frequency	41052	41152	41252	41352	41452	0.1		Hz
	Total pf	41053	41153	41253	41353	41453	0.00005		PF
	Total kva	41054	41154	41254	41354	41454	1.0		KVA
	Total kW	41055	41155	41255	41355	41455	1.0		KW
	Total kvar	41056	41156	41256	41356	41456	1.0		KVAR
	Volts ab	41057	41157	41257	41357	41457	1.0		Volts
	Volts bc	41058	41158	41258	41358	41458	1.0		Volts
	Volts ca	41059	41159	41259	41359	41459	1.0		Volts
	Volts a	41060	41160	41260	41360	41460	1.0		Volts
	Volts b	41061	41161	41261	41361	41461	1.0		Volts
	Volts c	41062	41162	41262	41362	41462	1.0		Volts
	Amps a	41063	41163	41263	41363	41463	1.0		Amps
	Amps b	41064	41164	41264	41364	41464	1.0		Amps
	Amps c	41065	41165	41265	41365	41465	1.0		Amps
	Percent Amps a	41066	41166	41266	41366	41466	0.5		%
	Percent Amps b	41067	41167	41267	41367	41467	0.5		%
	Percent Amps c	41068	41168	41268	41368	41468	0.5		%
Control	Test	41069	41169	41269	41369	41469			
	Reset	41070	41170	41270	41370	41470			
							Data = Multiplier x (Register + Offset)		

¹ Mode	
Digital Value	Description
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

² State	
Digital Value	Description
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

³ Fault Type	
Digital Value	Description
0	No Faults
1	Warning

⁴ NFPA 110	
Description	Bit
Source 1 Connected	0 (MSB)
Source 2 Connected	1
N/A	2
Not In Auto	3
N/A	4
N/A	5
Charger AC Failure	6
N/A	7
N/A	8
N/A	9
N/A	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15 (LSB)

⁵ Extended	
Description	Bit
Source 1 Available	0 (MSB)
Source 2 Available	1
Source 1 Connected	2
Source 2 Connected	3
ATS Common Alarm	4
Not In Auto	5
Test / Exercise in Progress	6
Low Battery Voltage	7
Load Shed	8
Transfer Inhibit	9
Retransfer Inhibit	10
Fail to Close	11
Fail to Disconnect	12
Fail to Synchronize	13
Bypass to Source 1	14
Bypass to Source 2	15 (LSB)

**TABLE A-3. MODLON REGISTER MAPPING INFORMATION – OPTION 1
DIGITAL INPUT/OUTPUT MODULE (DIM)**

Structure	Data Point	ModBus Register	
		DIM[0]	DIM[1]
nvoNodeStatus	Relay 1	42001	42101
	Relay 2	42002	42102
	Relay 3	42003	42103
	Relay 4	42004	42104
	Relay 5	42005	42105
	Relay 6	42006	42106
	Relay 7	42007	42107
	Relay 8	42008	42108
	Relay 9	42009	42109
	Relay 10	42010	42110
	Relay 11	42011	42111
	Relay 12	42012	42112
	Relay 13	42013	42113
	Relay 14	42014	42114
	Relay 15	42015	42115
	Relay 16	42016	42116
	Input 1	42017	42117
	Input 2	42018	42118
	Input 3	42019	42119
	Input 4	42020	42120
	Input 5	42021	42121
	Input 6	42022	42122
	Input 7	42023	42123
	Input 8	42024	42124
Control	nvi16RelayA	42025	42125

**TABLE A-4. MODLON REGISTER MAPPING INFORMATION – OPTION 2
PARALLELING POWERCOMMAND GENSET (SHEET 1 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401			
	Name [2,3]	40002	40102	40202	40302	40402			
	Name [4,5]	40003	40103	40203	40303	40403			
	Name [6,7]	40004	40104	40204	40304	40404			
	Name [8,9]	40005	40105	40205	40305	40405			
	Name [10,11]	40006	40106	40206	40306	40406			
	Name [12,13]	40007	40107	40207	40307	40407			
	Name [14,15]	40008	40108	40208	40308	40408			
	Device Type	40009	40109	40209	40309	40409			
	Control Switch	40010	40110	40210	40310	40410			
	State ¹	40011	40111	40211	40311	40411			
	Fault Code*	40012	40112	40212	40312	40412			
	Fault Type ²	40013	40113	40213	40313	40413			
	Percent kW	40014	40114	40214	40314	40414	0.5		%
	Total kW	40015	40115	40215	40315	40415			
	NFPA 110 ³	40016	40116	40216	40316	40416			
	Extended ⁴	40017	40117	40217	40317	40417			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplier x (Register + Offset)		

**TABLE A-4. MODLON REGISTER MAPPING INFORMATION – OPTION 2
PARALLELING POWERCOMMAND GENSET (SHEET 2 OF 2)**

Structure	Data Point	ModBus Registers					Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	Multiplier	Offset	Units
nvoGenEngData	Battery Voltage	40035	40135	40235	40335	40435	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	1.0		Starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446			
	Total kwh (Low)	40047	40147	40247	40347	40447	1.0		KWH
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448			
	Total Fuel (Low)	40049	40149	40249	40349	40449	0.01		Gal
nvoGenParaData	Frequency	40050	40150	40250	40350	40450	0.1		Hz
	Volts ab	40051	40151	40251	40351	40451	1.0		Volts
	Volts bc	40052	40152	40252	40352	40452	1.0		Volts
	Volts ca	40053	40153	40253	40353	40453	1.0		Volts
	Volts a	40054	40154	40254	40354	40454	1.0		Volts
	Volts b	40055	40155	40255	40355	40455	1.0		Volts
	Volts c	40056	40156	40256	40356	40456	1.0		Volts
	Customer Faults	40057	40157	40257	40357	40457			
	Network Faults	40058	40158	40258	40358	40458			
	Custom	40059	40159	40259	40359	40459			
	ES State ⁵	40060	40160	40260	40360	40460			
	Load Share State ⁶	40061	40161	40261	40361	40461			
	Load Govern State kw ⁷	40062	40162	40262	40362	40462			
	Load Govern State kvar ⁸	40063	40163	40263	40363	40463			
	Genset CB Position ⁹	40064	40164	40264	40364	40464			
	Utility CB Position ¹⁰	40065	40165	40265	40365	40465			
Genset Control	Start/Stop	40066	40166	40266	40366	40466			
	Reset	40067	40167	40267	40367	40467			
* Fault codes are listed in the genset Operator's/Service Manuals.							Data = Multiplr x (Reg + Offset)		

NOTES:

- For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
- Value not supported in the 3200 controller.
- Value not supported in the 3100 controller.
- Value not supported.
- With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

¹ State	
Digital Value	Description
0	Stopped
1	Start Pending
2	Warm-up at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

² Fault Type	
Digital Value	Description
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

³ NFPA 110	
Description	Bit
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

⁴ Extended	
Description	Bit
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

⁵ ES State	
Digital Value	Description
0	Standby
1	Dead Bus Close
2	Synchronizing
3	Load Share
4	Load Govern

⁶ Load Share State	
Digital Value	Description
0	Not in Load Share
1	Track Load
2	Ramp Load
3	Ramp Unload
4	Load Demand Shutdown

⁷ Load Govern State KW	
Digital Value	Description
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

⁹ Genset CB Position	
Digital Value	Description
0	Open
1	Closed
2	Unavailable
3	Inhibit

⁸ Load Govern State KVAR	
Digital Value	Description
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

¹⁰ Utility CB Position	
Digital Value	Description
0	Open
1	Closed
2	Unavailable
3	Inhibit

**TABLE A-5. MODLON REGISTER MAPPING INFORMATION – OPTION 2
AUTOMATIC TRANSFER SWITCH – SIMPLE**

Structure	Data Point	ModBus Registers					Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	Multiplier	Offset	Units
nvoATSSStatus	Name [0,1]	41001	41101	41201	41301	41401			
	Name [2,3]	41002	41102	41202	41302	41402			
	Name [4,5]	41003	41103	41203	41303	41403			
	Name [6,7]	41004	41104	41204	41304	41404			
	Name [8,9]	41005	41105	41205	41305	41405			
	Name [10,11]	41006	41106	41206	41306	41406			
	Name [12,13]	41007	41107	41207	41307	41407			
	Name [14,15]	41008	41108	41208	41308	41408			
	Device Type	41009	41109	41209	41309	41409			
	Mode ¹	41010	41110	41210	41310	41410			
	State ²	41011	41111	41211	41311	41411			
	Fault Code	41012	41112	41212	41312	41412			
	Fault Type ³	41013	41113	41213	41313	41413			
	Percent Amps	41014	41114	41214	41314	41414	0.5		%
	Total kW	41015	41115	41215	41315	41415			
	NFPA 110 ⁴	41016	41116	41216	41316	41416			
	Extended ⁵	41017	41117	41217	41317	41417			
nvoACDataLoad	Frequency	41018	41118	41218	41318	41418	0.1		Hz
	Total pf	41019	41119	41219	41319	41419	0.00005		PF
	Total kva	41020	41120	41220	41320	41420	1.0		KVA
	Total kW	41021	41121	41221	41321	41421	1.0		KW
	Total kvar	41022	41122	41222	41322	41422	1.0		KVAR
	Volts ab	41023	41123	41223	41323	41423	1.0		Volts
	Volts bc	41024	41124	41224	41324	41424	1.0		Volts
	Volts ca	41025	41125	41225	41325	41425	1.0		Volts
	Volts a	41026	41126	41226	41326	41426	1.0		Volts
	Volts b	41027	41127	41227	41327	41427	1.0		Volts
	Volts c	41028	41128	41228	41328	41428	1.0		Volts
	Amps a	41029	41129	41229	41329	41429	1.0		Amps
	Amps b	41030	41130	41230	41330	41430	1.0		Amps
	Amps c	41031	41131	41231	41331	41431	1.0		Amps
	Percent Amps a	41032	41132	41232	41332	41432	0.5		%
	Percent Amps b	41033	41133	41233	41333	41433	0.5		%
	Percent Amps c	41034	41134	41234	41334	41434	0.5		%
Control	Test	41035	41135	41235	41335	41435			
	Reset	41036	41136	41236	41336	41436			
							Data = Multiplier x (Register + Offset)		

¹ Mode	
Digital Value	Description
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

² State	
Digital Value	Description
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

³ Fault Type	
Digital Value	Description
0	No Faults
1	Warning

⁴ NFPA 110	
Description	Bit
Source 1 Connected	0 (MSB)
Source 2 Connected	1
N/A	2
Not In Auto	3
N/A	4
N/A	5
Charger AC Failure	6
N/A	7
N/A	8
N/A	9
N/A	10
N/A	11
N/A	12
N/A	13
N/A	14
N/A	15 (LSB)

⁵ Extended	
Description	Bit
Source 1 Available	0 (MSB)
Source 2 Available	1
Source 1 Connected	2
Source 2 Connected	3
ATS Common Alarm	4
Not In Auto	5
Test / Exercise in Progress	6
Low Battery Voltage	7
Load Shed	8
Transfer Inhibit	9
Retransfer Inhibit	10
Fail to Close	11
Fail to Disconnect	12
Fail to Synchronize	13
Bypass to Source 1	14
Bypass to Source 2	15 (LSB)

**TABLE A-6. MODLON REGISTER MAPPING INFORMATION – OPTION 2
DIGITAL INPUT/OUTPUT MODULE (DIM)**

Structure	Data Point	ModBus Register	
		DIM[0]	DIM[1]
nvoNodeStatus	Relay 1	42001	42101
	Relay 2	42002	42102
	Relay 3	42003	42103
	Relay 4	42004	42104
	Relay 5	42005	42105
	Relay 6	42006	42106
	Relay 7	42007	42107
	Relay 8	42008	42108
	Relay 9	42009	42109
	Relay 10	42010	42110
	Relay 11	42011	42111
	Relay 12	42012	42112
	Relay 13	42013	42113
	Relay 14	42014	42114
	Relay 15	42015	42115
	Relay 16	42016	42116
	Input 1	42017	42117
	Input 2	42018	42118
	Input 3	42019	42119
	Input 4	42020	42120
	Input 5	42021	42121
	Input 6	42022	42122
	Input 7	42023	42123
	Input 8	42024	42124
Control	nvi16RelayA	42025	42125

**TABLE A-7. MODLON REGISTER MAPPING INFORMATION – OPTION 3
PARALLELING POWERCOMMAND GENSET (SHEET 1 of 3)**

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGenStatus	Name [0,1]	40001	40101	40201	40301	40401	40501	40601	40701	40801	40901			
	Name [2,3]	40002	40102	40202	40302	40402	40502	40602	40702	40802	40902			
	Name [4,5]	40003	40103	40203	40303	40403	40503	40603	40703	40803	40903			
	Name [6,7]	40004	40104	40204	40304	40404	40504	40604	40704	40804	40904			
	Name [8,9]	40005	40105	40205	40305	40405	40505	40605	40705	40805	40905			
	Name [10,11]	40006	40106	40206	40306	40406	40506	40606	40706	40806	40906			
	Name [12,13]	40007	40107	40207	40307	40407	40507	40607	40707	40807	40907			
	Name [14,15]	40008	40108	40208	40308	40408	40508	40608	40708	40808	40908			
	Device Type	40009	40109	40209	40309	40409	40509	40609	40709	40809	40909			
	Control Switch	40010	40110	40210	40310	40410	40510	40610	40710	40810	40910			
	State ¹	40011	40111	40211	40311	40411	40511	40611	40711	40811	40911			
	Fault Code*	40012	40112	40212	40312	40412	40512	40612	40712	40812	40912			
	Fault Type ²	40013	40113	40213	40313	40413	40513	40613	40713	40813	40913			
	Percent kW	40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5		%
	Total kW	40015	40115	40215	40315	40415	40515	40615	40715	40815	40915			
	NFPA 110 ³	40016	40116	40216	40316	40416	40516	40616	40716	40816	40916			
	Extended ⁴	40017	40117	40217	40317	40417	40517	40617	40717	40817	40917			
nvoGenACData	Frequency	40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1		Hz
	Total pf	40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	0.00005		PF
	Total kva	40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0		KVA
	Total kW	40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0		KW
	Total kvar	40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0		KVAR
	Volts ab	40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0		Volts
	Volts bc	40024	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0		Volts
	Volts ca	40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0		Volts
	Volts a	40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0		Volts
	Volts b	40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0		Volts
	Volts c	40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0		Volts
	Amps a	40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0		Amps
	Amps b	40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0		Amps
	Amps c	40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0		Amps
	Percent Amps a	40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	0.5		%
	Percent Amps b	40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	0.5		%
	Percent Amps c	40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5		%
* Fault codes are listed in the genset Operator's/Service Manuals.												Data = Multiplier x (Register + Offset)		

**TABLE A-7. MODLON REGISTER MAPPING INFORMATION – OPTION 3
PARALLELING POWERCOMMAND GENSET (SHEET 2 of 3)**

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGen EngData	Battery Voltage	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Volts DC
	Oil Pressure	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.1		KPA
	Oil Temp (see Note 2)	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	0.1		Deg Kelvin
	Coolant Temp	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	0.1		Deg Kelvin
	Misc Temp 1 (see Note 4)	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	0.1		Deg Kelvin
	Misc Temp 2 (see Note 4)	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	0.1		Deg Kelvin
	Fuel Rate (see Note 3)	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	0.01		GPH
	Engine RPM	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		RPM
	Engine Starts	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Starts
	Eng Runtime (High) (see Notes 1 and 5)	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944			
	Eng Runtime (Low)	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	0.1		Sec
	Total kwh (High) (see Note 1)	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946			
	Total kwh (Low)	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		KWH
	Total Fuel (High) (see Notes 1 and 3)	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948			
	Total Fuel (Low)	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.01		Gal

NOTES:

1. For the Data Points Engine Runtime, the Total kwh and Total Fuel for the two registers designated as high and low are put together as an unsigned double integer. This is accomplished by multiplying the value in the high register by 65536 and adding it to the value in the low register. Most software packages automatically perform this calculation if the value is simply identified as an unsigned double integer.
2. Value not supported in the 3200 controller.
3. Value not supported in the 3100 controller.
4. Value not supported.
5. With 3100 and 2100 controllers, the units are hours. With the 3200 controller, the units are seconds. The multiplier is always 0.1

For all 3100 controllers, the values given are based on using EEPROM firmware, version 2.0 or greater. The values for Engine Runtime and Total kwh are not available on QST-30 gensets.

**TABLE A-7. MODLON REGISTER MAPPING INFORMATION – OPTION 3
PARALLELING POWERCOMMAND GENSET (SHEET 3 of 3)**

Structure	Data Point	ModBus Registers										Scaling		
		GEN[0]	GEN[1]	GEN[2]	GEN[3]	GEN[4]	GEN[5]	GEN[6]	GEN[7]	GEN[8]	GEN[9]	Multiplier	Offset	Units
nvoGenParaData	Frequency	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.1		Hz
	Volts ab	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	1.0		Volts
	Volts bc	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	1.0		Volts
	Volts ca	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	1.0		Volts
	Volts a	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		Volts
	Volts b	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		Volts
	Volts c	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		Volts
	Customer Faults	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957			
	Network Faults	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958			
	Custom	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959			
	ES State ⁵	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960			
	Load Share State ⁶	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961			
	Load Govern State kw ⁷	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962			
	Load Govern State kvar ⁸	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963			
	Genset CB Position ⁹	40064	40164	40264	40364	40464	40564	40664	40764	40864	40964			
	Utility CB Position ¹⁰	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965			
Genset Control	Start/Stop	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966			
	Reset	40067	40167	40267	40367	40467	40567	40667	40767	40867	40967			
	Data = Multiplr x (Reg + Offset)													
* Fault codes are listed in the genset Operator's/Service Manuals.														

* Fault codes are listed in the genset Operator's/Service Manuals.

¹ State	
Digital Value	Description
0	Stopped
1	Start Pending
2	Warmup at Idle
3	Running
4	Cooldown at Rated
5	Cooldown at Idle

² Fault Type	
Digital Value	Description
0	Normal
1	Warning
2	Derate
3	Shutdown with Cooldown
4	Shutdown

³ NFPA 110	
Description	Bit
Normal Power	0 (MSB)
Genset Supplying Load	1
Genset Running	2
Not in Auto	3
High Battery Voltage	4
Low Battery Voltage	5
Charger AC Failure	6
Fail to Start	7
Low Coolant Temperature	8
Pre-High Engine Temperature	9
High Engine Temperature	10
Pre-Low Oil Pressure	11
Low Oil Pressure	12
Overspeed	13
Low Coolant Level	14
Low Fuel Level	15 (LSB)

⁴ Extended	
Description	Bit
Check Genset	0 (MSB)
Ground Fault	1
High AC Voltage	2
Low AC Voltage	3
Under Frequency	4
Overload	5
Overcurrent	6
Short Circuit	7
Reverse KW	8
Reverse KVAR	9
Fail to Sync	10
Fail to Close	11
Load Demand	12
Genset Circuit Breaker Tripped	13
Utility Circuit Breaker Tripped	14
Emergency Stop	15 (LSB)

⁵ ES State	
Digital Value	Description
0	Standby
1	Dead Bus Close
2	Synchronizing
3	Load Share
4	Load Govern

⁶ Load Share State	
Digital Value	Description
0	Not in Load Share
1	Track Load
2	Ramp Load
3	Ramp Unload
4	Load Demand Shutdown

⁷ Load Govern State KW	
Digital Value	Description
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

⁸ Load Govern State KVAR	
Digital Value	Description
0	Not Applicable
1	Ramp Load
2	Track Target Load
3	Ramp Unload
4	Ramp Unload Done

⁹ Genset CB Position	
Digital Value	Description
0	Open
1	Closed
2	Unavailable
3	Inhibit

¹⁰ Utility CB Position	
Digital Value	Description
0	Open
1	Closed
2	Unavailable
3	Inhibit

**TABLE A-8. MODLON REGISTER MAPPING INFORMATION – OPTION 3
AUTOMATIC TRANSFER SWITCH – DETAILED (SHEET 1 of 2)**

Structure	Data Point	ModBus Registers										Scaling	
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	NCM[9]	Multiplier	Offset Units
nvoATSSStatus	Name [0,1]	40001	40101	40201	40301	40401	40501	40601	40701	40801	40901		
	Name [2,3]	40002	40102	40202	40302	40402	40502	40602	40702	40802	40902		
	Name [4,5]	40003	40103	40203	40303	40403	40503	40603	40703	40803	40903		
	Name [6,7]	40004	40104	40204	40304	40404	40504	40604	40704	40804	40904		
	Name [8,9]	40005	40105	40205	40305	40405	40505	40605	40705	40805	40905		
	Name [10,11]	40006	40106	40206	40306	40406	40506	40606	40706	40806	40906		
	Name [12,13]	40007	40107	40207	40307	40407	40507	40607	40707	40807	40907		
	Name [14,15]	40008	40108	40208	40308	40408	40508	40608	40708	40808	40908		
	Device Type	40009	40109	40209	40309	40409	40509	40609	40709	40809	40909		
	Mode ¹	40010	40110	40210	40310	40410	40510	40610	40710	40810	40910		
	State ²	40011	40111	40211	40311	40411	40511	40611	40711	40811	40911		
	Fault Code	40012	40112	40212	40312	40412	40512	40612	40712	40812	40912		
	Fault Type ³	40013	40113	40213	40313	40413	40513	40613	40713	40813	40913		
	Percent Amps	40014	40114	40214	40314	40414	40514	40614	40714	40814	40914	0.5	%
	Total kW	40015	40115	40215	40315	40415	40515	40615	40715	40815	40915		
	NFPA 110 ⁴	40016	40116	40216	40316	40416	40516	40616	40716	40816	40916		
	Extended ⁵	40017	40117	40217	40317	40417	40517	40617	40717	40817	40917		
nvoACDataLoad	Frequency	40018	40118	40218	40318	40418	40518	40618	40718	40818	40918	0.1	Hz
	Total pf	40019	40119	40219	40319	40419	40519	40619	40719	40819	40919	0.00005	PF
	Total kva	40020	40120	40220	40320	40420	40520	40620	40720	40820	40920	1.0	KVA
	Total kW	40021	40121	40221	40321	40421	40521	40621	40721	40821	40921	1.0	KW
	Total kvar	40022	40122	40222	40322	40422	40522	40622	40722	40822	40922	1.0	KVAR
	Volts ab	40023	40123	40223	40323	40423	40523	40623	40723	40823	40923	1.0	Volts
	Volts bc	40024	40124	40224	40324	40424	40524	40624	40724	40824	40924	1.0	Volts
	Volts ca	40025	40125	40225	40325	40425	40525	40625	40725	40825	40925	1.0	Volts
	Volts a	40026	40126	40226	40326	40426	40526	40626	40726	40826	40926	1.0	Volts
	Volts b	40027	40127	40227	40327	40427	40527	40627	40727	40827	40927	1.0	Volts
	Volts c	40028	40128	40228	40328	40428	40528	40628	40728	40828	40928	1.0	Volts
	Amps a	40029	40129	40229	40329	40429	40529	40629	40729	40829	40929	1.0	Amps
	Amps b	40030	40130	40230	40330	40430	40530	40630	40730	40830	40930	1.0	Amps
	Amps c	40031	40131	40231	40331	40431	40531	40631	40731	40831	40931	1.0	Amps
	Percent Amps a	40032	40132	40232	40332	40432	40532	40632	40732	40832	40932	0.5	%
	Percent Amps b	40033	40133	40233	40333	40433	40533	40633	40733	40833	40933	0.5	%
	Percent Amps c	40034	40134	40234	40334	40434	40534	40634	40734	40834	40934	0.5	%
												Data = Multiplier x (Register + Offset)	

**TABLE A-8. MODLON REGISTER MAPPING INFORMATION – OPTION 3
AUTOMATIC TRANSFER SWITCH – DETAILED (SHEET 2 of 2)**

Structure	Data Point	ModBus Registers										Scaling		
		NCM[0]	NCM[1]	NCM[2]	NCM[3]	NCM[4]	NCM[5]	NCM[6]	NCM[7]	NCM[8]	NCM[9]	Multiplier	Offset	Units
InvoACDataSrc1	Frequency	40035	40135	40235	40335	40435	40535	40635	40735	40835	40935	0.1		Hz
	Total pf	40036	40136	40236	40336	40436	40536	40636	40736	40836	40936	0.00005		PF
	Total kva	40037	40137	40237	40337	40437	40537	40637	40737	40837	40937	1.0		KVA
	Total kW	40038	40138	40238	40338	40438	40538	40638	40738	40838	40938	1.0		KW
	Total kvar	40039	40139	40239	40339	40439	40539	40639	40739	40839	40939	1.0		KVAR
	Volts ab	40040	40140	40240	40340	40440	40540	40640	40740	40840	40940	1.0		Volts
	Volts bc	40041	40141	40241	40341	40441	40541	40641	40741	40841	40941	1.0		Volts
	Volts ca	40042	40142	40242	40342	40442	40542	40642	40742	40842	40942	1.0		Volts
	Volts a	40043	40143	40243	40343	40443	40543	40643	40743	40843	40943	1.0		Volts
	Volts b	40044	40144	40244	40344	40444	40544	40644	40744	40844	40944	1.0		Volts
	Volts c	40045	40145	40245	40345	40445	40545	40645	40745	40845	40945	1.0		Volts
	Amps a	40046	40146	40246	40346	40446	40546	40646	40746	40846	40946	1.0		Amps
	Amps b	40047	40147	40247	40347	40447	40547	40647	40747	40847	40947	1.0		Amps
	Amps c	40048	40148	40248	40348	40448	40548	40648	40748	40848	40948	1.0		Amps
InvoACDataSrc2	Percent Amps a	40049	40149	40249	40349	40449	40549	40649	40749	40849	40949	0.5		%
	Percent Amps b	40050	40150	40250	40350	40450	40550	40650	40750	40850	40950	0.5		%
	Percent Amps c	40051	40151	40251	40351	40451	40551	40651	40751	40851	40951	0.5		%
	Frequency	40052	40152	40252	40352	40452	40552	40652	40752	40852	40952	0.1		Hz
	Total pf	40053	40153	40253	40353	40453	40553	40653	40753	40853	40953	0.00005		PF
	Total kva	40054	40154	40254	40354	40454	40554	40654	40754	40854	40954	1.0		KVA
	Total kW	40055	40155	40255	40355	40455	40555	40655	40755	40855	40955	1.0		KW
	Total kvar	40056	40156	40256	40356	40456	40556	40656	40756	40856	40956	1.0		KVAR
	Volts ab	40057	40157	40257	40357	40457	40557	40657	40757	40857	40957	1.0		Volts
	Volts bc	40058	40158	40258	40358	40458	40558	40658	40758	40858	40958	1.0		Volts
	Volts ca	40059	40159	40259	40359	40459	40559	40659	40759	40859	40959	1.0		Volts
	Volts a	40060	40160	40260	40360	40460	40560	40660	40760	40860	40960	1.0		Volts
	Volts b	40061	40161	40261	40361	40461	40561	40661	40761	40861	40961	1.0		Volts
	Volts c	40062	40162	40262	40362	40462	40562	40662	40762	40862	40962	1.0		Volts
Control	Amps a	40063	40163	40263	40363	40463	40563	40663	40763	40863	40963	1.0		Amps
	Amps b	40064	40164	40264	40364	40464	40564	40664	40764	40864	40964	1.0		Amps
	Amps c	40065	40165	40265	40365	40465	40565	40665	40765	40865	40965	1.0		Amps
	Percent Amps a	40066	40166	40266	40366	40466	40566	40666	40766	40866	40966	0.5		%
	Percent Amps b	40067	40167	40267	40367	40467	40567	40667	40767	40867	40967	0.5		%
	Percent Amps c	40068	40168	40268	40368	40468	40568	40668	40768	40868	40968	0.5		%
	Test	40069	40169	40269	40369	40469	40569	40669	40769	40869	40969			
	Reset	40070	40170	40270	40370	40470	40570	40670	40770	40870	40970			
	Data = Multiplr x (Req + Offset)													

¹ Mode	
Digital Value	Description
0	Test
1	Utility/Genset
2	Utility/Utility
3	Genset/Genset

² State	
Digital Value	Description
0	Neutral Position
1	Source 1 Connected
2	Source 2 Connected
3	Source 1 and 2 Connected

³ Fault Type	
Digital Value	Description
0	No Faults
1	Warning

⁴ NFPA 110		
Description	Bit	
Source 1 Connected	0 (MSB)	
Source 2 Connected	1	
N/A	2	
Not In Auto	3	
N/A	4	
N/A	5	
Charger AC Failure	6	
N/A	7	
N/A	8	
N/A	9	
N/A	10	
N/A	11	
N/A	12	
N/A	13	
N/A	14	
N/A	15 (LSB)	

⁵ Extended		
Description	Bit	
Source 1 Available	0 (MSB)	
Source 2 Available	1	
Source 1 Connected	2	
Source 2 Connected	3	
ATS Common Alarm	4	
Not In Auto	5	
Test / Exercise in Progress	6	
Low Battery Voltage	7	
Load Shed	8	
Transfer Inhibit	9	
Retransfer Inhibit	10	
Fail to Close	11	
Fail to Disconnect	12	
Fail to Synchronize	13	
Bypass to Source 1	14	
Bypass to Source 2	15 (LSB)	

Cummins Power Generation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
1-800-888-6626
763-574-5000 International Use
Fax: 763-528-7229



Redistribution or publication of this document
by any means, is strictly prohibited.