OPC SERVER
FOR GAS CHROMATOGRAPHS

GCOPC
USER MANUAL

Applies to both:
Daniel Danalyzer On-line Gas Chromatographs
Rosemount Analytical Process Gas Chromatographs

Part Number 3-9005-005

Revision B
JULY 2005

EMERSON
Process Management

OPC SERVER
GAS CHROMATOGRAPHS
GCOPC v2.00
USER'S MANUAL

NOTICE

DANIEL MEASUREMENT AND CONTROL, INC. AND ROSEMOUNT ANALYTICAL, INC. (COLLECTIVELY, "SELLER") SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS IN THIS MANUAL OR OMISSIONS FROM THIS MANUAL. SELLER MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THIS MANUAL AND, IN NO EVENT, SHALL SELLER BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PRODUCTION, LOSS OF PROFITS, ETC.

PRODUCT NAMES USED HEREIN ARE FOR MANUFACTURER OR SUPPLIER IDENTIFICATION ONLY AND MAY BE TRADEMARKS/REGISTERED TRADEMARKS OF THESE COMPANIES.

THE CONTENTS OF THIS PUBLICATION ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY, AND WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE THEIR ACCURACY, THEY ARE NOT TO BE CONSTRUED AS WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, REGARDING THE PRODUCTS OR SERVICES DESCRIBED HEREIN OR THEIR USE OR APPLICABILITY. WE RESERVE THE RIGHT TO MODIFY OR IMPROVE THE DESIGNS OR SPECIFICATIONS OF SUCH PRODUCTS AT ANY TIME.

SELLER DOES NOT ASSUME RESPONSIBILITY FOR THE SELECTION, USE OR MAINTENANCE OF ANY PRODUCT. RESPONSIBILITY FOR PROPER SELECTION, USE AND MAINTENANCE OF ANY SELLER PRODUCT REMAINS SOLELY WITH THE PURCHASER AND END-USER.

DANIEL AND THE DANIEL LOGO ARE REGISTERED TRADEMARKS OF DANIEL INDUSTRIES, INC. THE ROSEMOUNT AND ROSEMOUNT ANALYTICAL LOGO THE ARE REGISTERED TRADEMARKS OF ROSEMOUNT ANALYTICAL, INC. THE EMERSON LOGO IS A TRADEMARK AND SERVICE MARK OF EMERSON ELECTRIC CO.

WARRANTY

1. **LIMITED WARRANTY:** Subject to the limitations contained in Section 2 herein and except as otherwise expressly provided herein, Daniel Measurement and Control, Inc. and Rosemount Analytical, Inc., (collectively "Seller") warrants that the firmware will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, promptly correct any errors that are found by Seller in the firmware or Services, or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized Seller representative. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller. Except as otherwise expressly provided in the Agreement, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES. **It is understood that corrosion or erosion of materials is not covered by our guarantee.**

2. **LIMITATION OF REMEDY AND LIABILITY:** SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, CORRECTION, REPLACEMENT OR REFUND OF PURCHASE PRICE UNDER THE LIMITED WARRANTY CLAUSE IN SECTION 1 HEREIN. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE AND COST OF CAPITAL.

TABLE OF CONTENTS

APPENDICES

This page intentionally left blank.

1.0 INTRODUCTION

GCOPC is a server application program that acquires both real-time and historical data from Daniel Danalyzer and Rosemount Analytical Process Gas Chromatographs and makes the data available to clients on an Ethernet network using standard OPC protocols. Data acquisition from the gas chromatographs can be via direct connection (RS-232, RS-485) asynchronous serial interfaces using Modbus ASCII or Modbus RTU protocols, or via an Ethernet network connection using Modbus/TCP protocol. The most recent results of the gas chromatograph analysis are made available via an OPC DA interface. Historical results for the most recent seven days of analyses are presented via an OPC HDA interface. Additional information on OPC specifications, including details on DA, HDA, etc. are available from the OPC Foundation website at www.opcfoundation.org.

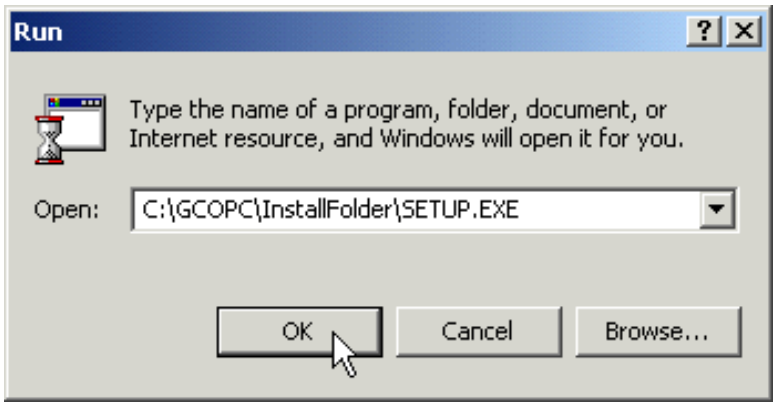
The following table lists the common acronyms, abbreviations, and definitions.

ACRONYM OR ABBREVIATION	DEFINITION
DA	Data Access
HDA	Historical Data Access real-time access to stored data
HMI	Human/Machine Interface
OPC	Open Connectivity via open standards that ensure interoperability of industrial automation and enterprise systems provided by the OPC foundation.
COM	MicroSoft's OLE COM (Component Object Model) set of objects, interfaces and methods used in process and manufacturing applications.
DCOM	MicroSoft's OLE DCOM (Distributed Component Object Model) set of objects, interfaces and methods used in process and manufacturing applications.

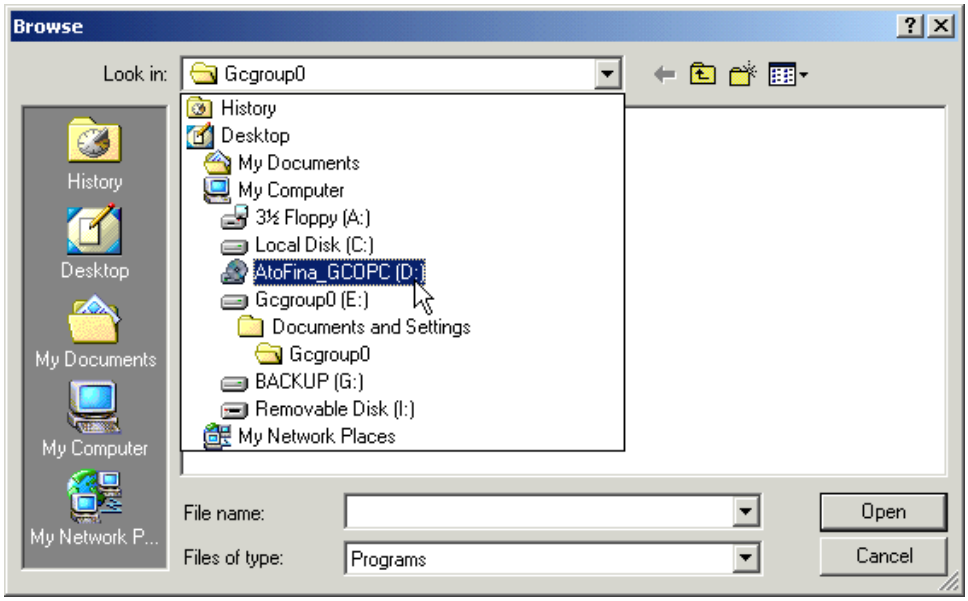
This page intentionally left blank.

2.0 INSTALLATION

To install the GCOPC program, insert the CD into the CD-ROM drive. Note that this program requires Windows Installer v2.0. The Auto-Installer should begin, but if not, select the **Start** menu, and click **Run**. The path to the CD-ROM drive may then be typed in, or click the **Browse** button.

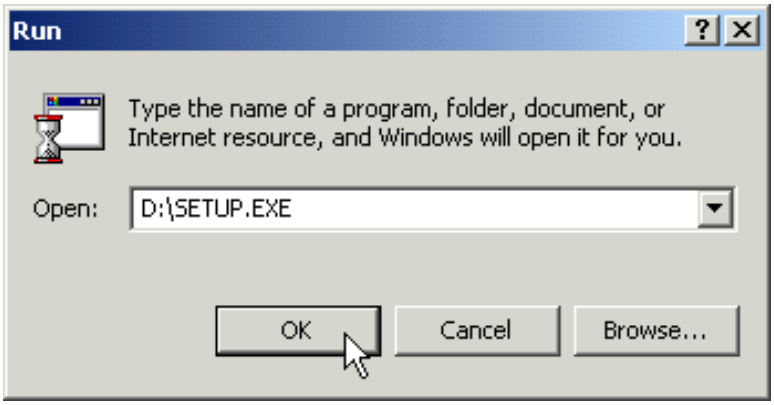


The **Browse** dialog box appears..



Using the **Look in** pull-down menu, select the target CD-ROM, and double-click 'Setup.exe'.

Click the **Run** button via the dialog box. The installation process will proceed. Follow the on-screen instructions.



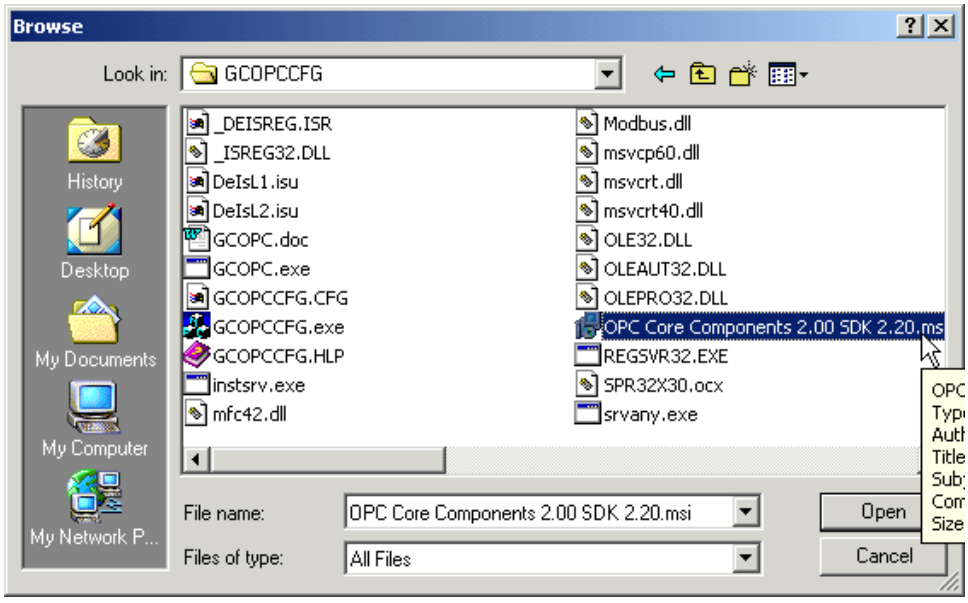
After the installation process is complete, the following files are placed in the **C:\Program Files\Emerson Process Management\GCOPCCFG** folder.

GCOPC.doc (v2.00)
GCOPC.exe (v2.00)
GCOPCCFG.EXE(v2.00)
GCOPCCFG.HLP(v2.00)
instsrv.exe(no version information)
MFC42.dll (v6.0.8665.0)
MODBUS.dll (v1.00)
MSVCP60.dll (v6.0.81668.0)
MSVCRT40.dll (v4.22.0.0)
MSVCRT.dll (v6.0.8797.0)
OLE32.dll (v4.71.2612.0)
OLEAUT32.dll (v2.40.4275.1)
OLEPRO32.dll (v5.0.4275.1)
OPC Core Components 2.00 SDK 2.20.msi (no version information)
REGSVR32.exe (v5.0.1641.1)
srvany.exe(no version information)
WtHDAsvr.dll (v2.0.0.1)
WtOPCSvr.dll (v9.0.0.6)

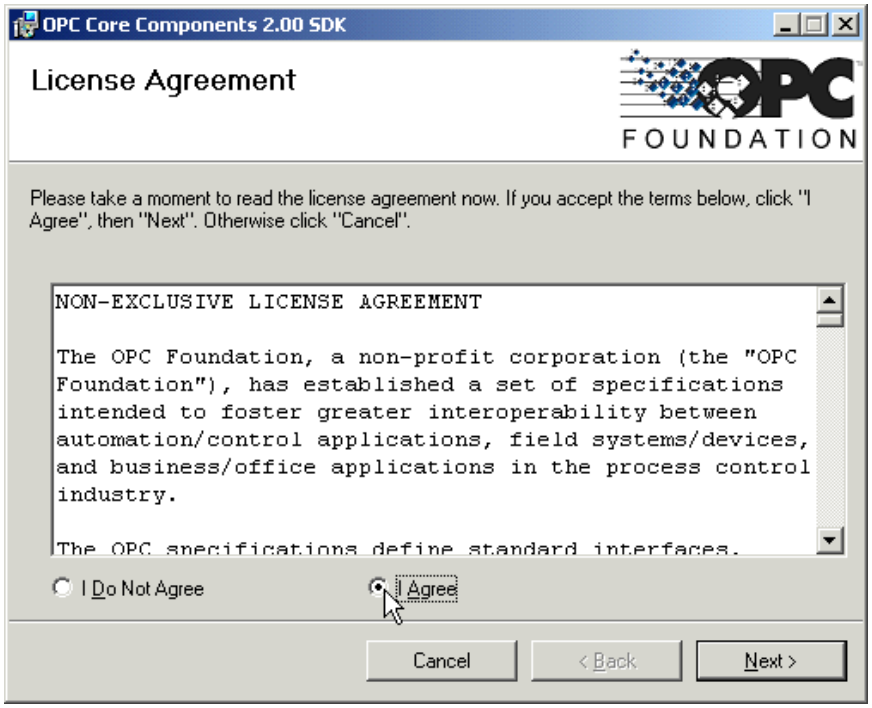
2.1 Installing the Proxy/Stub Drivers (DLLs)

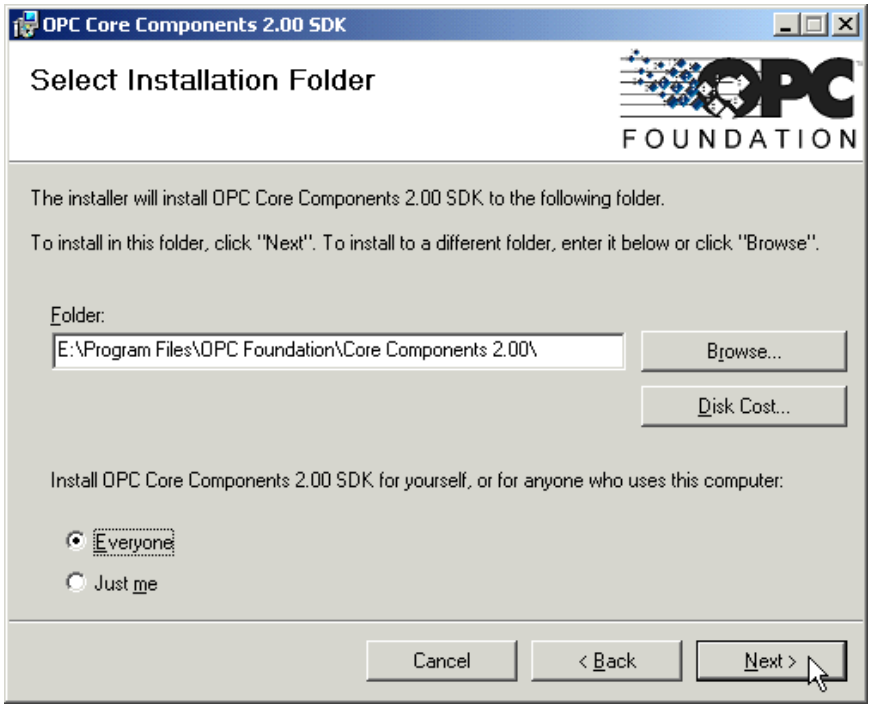
In order to run any OPC client or server, there are several proxy/stub drivers (DLLs) that must be installed and registered. If the Proxy/Stub drivers are not already installed, the 'OPC core components 2.00 SDK 2.20.msi' file must be run. It will perform this task automatically. This file is found in *C:\Program Files\Emerson Process Management\GCOPCCFG* .

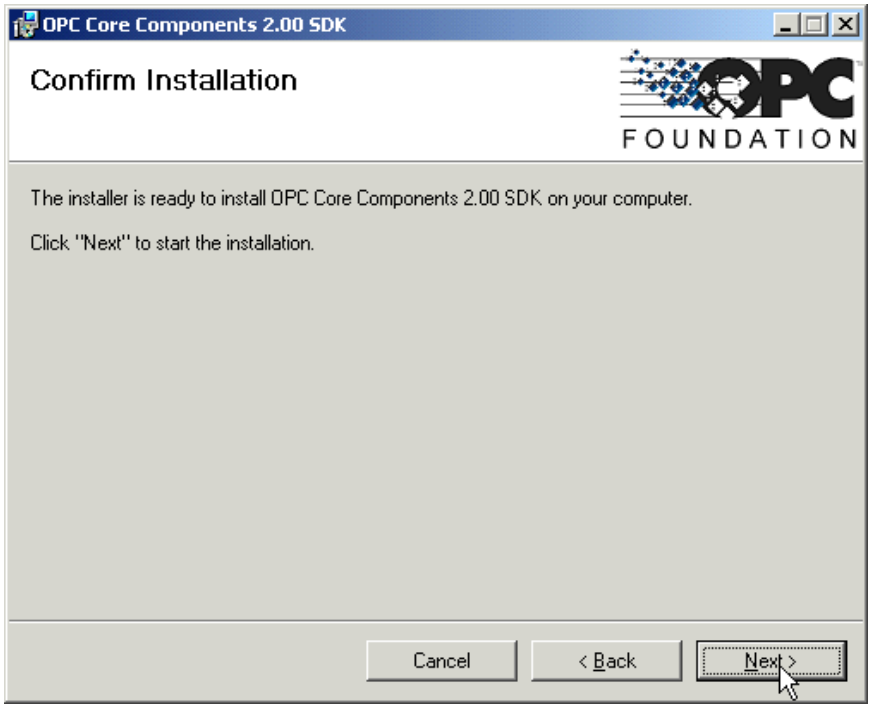
To run the 'OPC core components 2.00 SDK 2.20.msi' file, click the **Start** button, then click **Run**. Click the **Browse** button, and using the **Look in** pull-down menu, select the path *C:\Program Files\Emerson Process Management\GCOPCCFG* . The 'OPC core components 2.00 SDK 2.20.msi' is not an executable file. To select this file, the Windows 'All Files' feature must be selected for the 'Files of type' field at the bottom of this dialog box. When Windows displays all the files in the GCOPC folder, double-click on the 'OPC core components 2.00 SDK 2.20.msi' file.

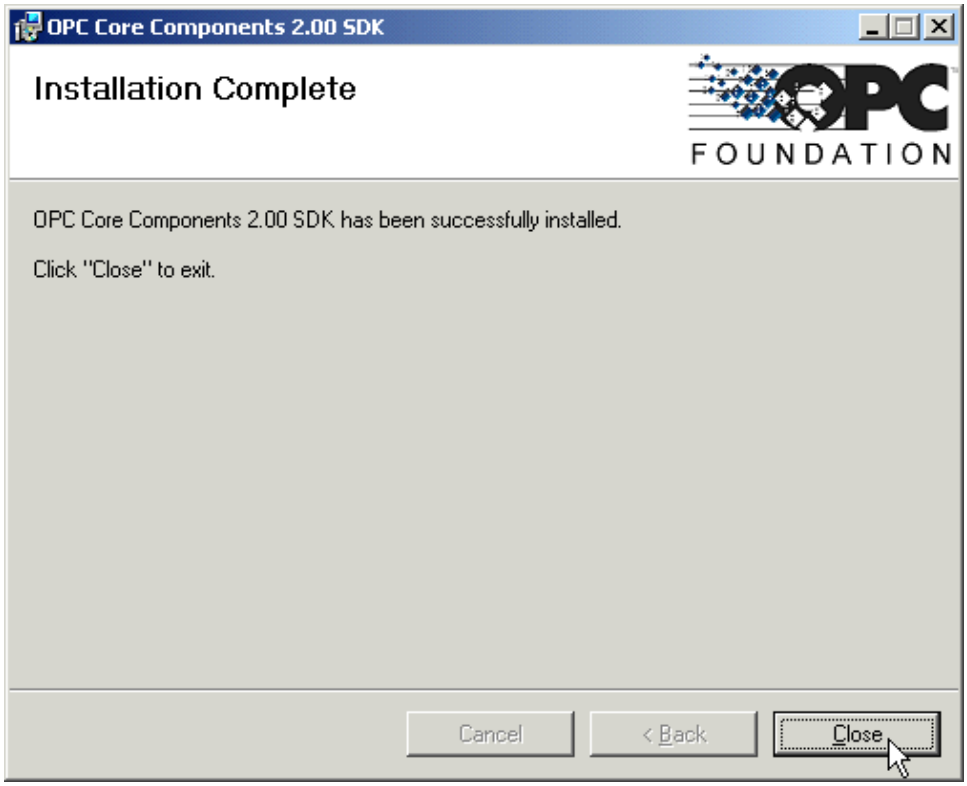


Finally, click the **OK** button in the **Run** dialog box, and follow the on-screen installation instructions.




OPC Core Components 2.00 SDK
Select Installation Folder
FOUNDATION
The installer will install OPC Core Components 2.00 SDK to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
E:\Program Files\OPC Foundation\Core Components 2.00\
Browse...
Disk Cost...
Install OPC Core Components 2.00 SDK for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >


OPC Core Components 2.00 SDK
Confirm Installation
FOUNDATION
The installer is ready to install OPC Core Components 2.00 SDK on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >



The server's DCOM setting must be configured in order for the GCOPC to operate in a distributed environment. If you are unfamiliar with configuring DCOM, contact your Network Administrator or refer to the Knowledge Base at www.microsoft.com. GCOPC has two server interfaces, GCOPCDA and GCOPCHDA.

3.0 OPERATION

The **File** menu contains:

Select - selects an existing server (one per GC) to view/configure. Upon selection, a **GC Server** dialog box will appear.

Controller Def. File - text files that define the tag list, historical data records, as well as other configuration parameters. The format of these files is defined in Section 5.0.

Browse - locate and select the definition file

Server Rate - defines the frequency that GCOPC will poll each GC for new data

Tag Delimiter - defines the character that separates parts of each tag. For example, if '.' is used, tags would appear such as 'Unit1.Flow.Temp'.

Port - At the **Modbus ID** submenu, select the port (serial or Ethernet) to communicate with the GC, configure the port-specific communication parameters, and assign the Modbus address.

Settings Button - To configure the Modbus settings for each GC port, under the **File** menu, click the **Modbus ID** submenu.

Modbus ID - To configure the Modbus settings for each GC port, under the **File** menu, click the **Modbus ID** submenu.

Register Mode - should be left as the default "Daniel" in order to work properly with standard gas chromatograph applications which are supported by GCOPC

Prev/Next buttons - page through defined servers

Save button - save changes

Cancel/Close button - shows cancel if changes have been made or close if no pending changes

Add
- creates a new server (up to maximum 16)
- dialog to name the server
- once named, goes to the configuration dialog as per the **Select** menu

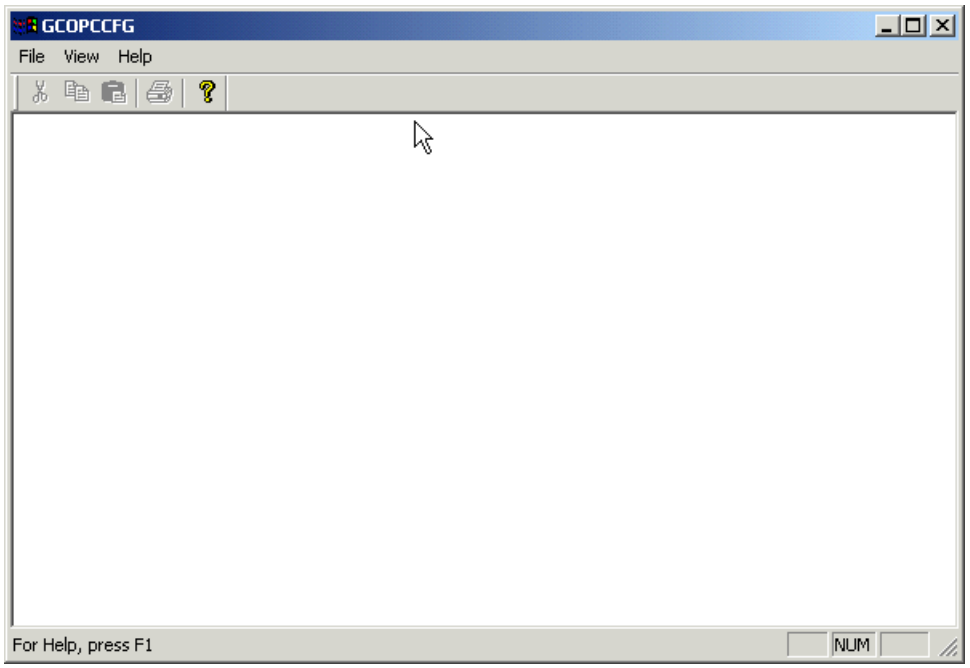
Delete - deletes a server (**Note**: User must delete the service, etc.)

To begin using the GCOPC program for the first time, the operator must run 'GCOPCCFG.exe' and add server(s). The 'GCOPCCFG.exe' program is located in the **GCOPC Installation** folder, which is found via the path *C:\Program Files\Emerson Process Management\GCOPCCFG*. A shortcut may be created on the desktop if desired.

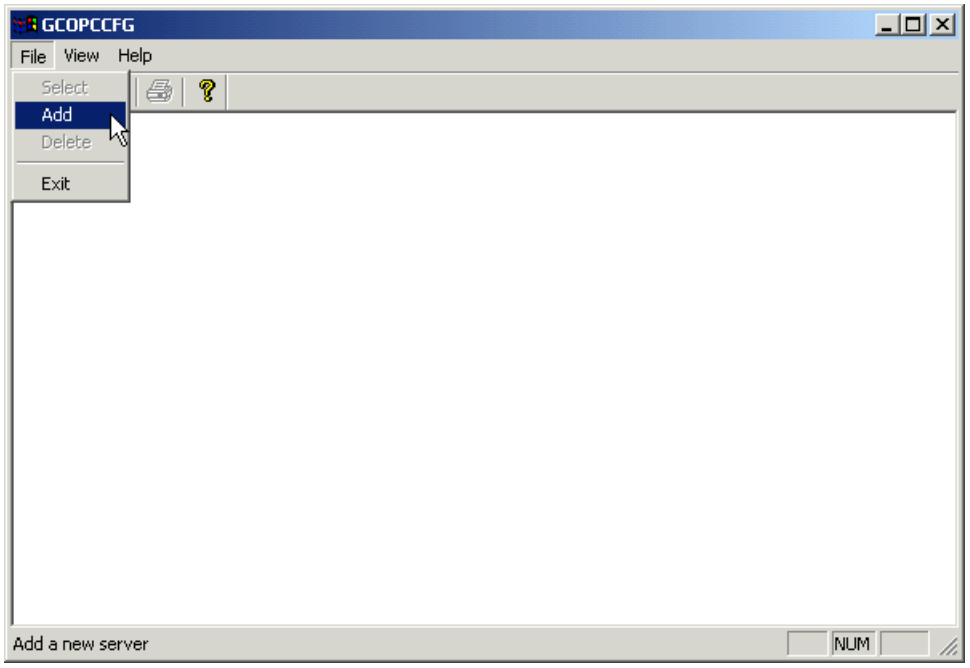
To run 'GCOPCCFG.exe', click the **Start** menu, then click **Run**. Type in the path *C:\Program Files\Emerson Process Management\GCOPCCFG* or use the **Browse** button option.

Using the **Look in** menu from the **Browse** button, locate 'GCOPCCFG.exe' in the **GCOPC** folder (*C:\Progam Files\Emerson Process Management\GCOPCCFG*), and double-click GCOPCCFG.exe.

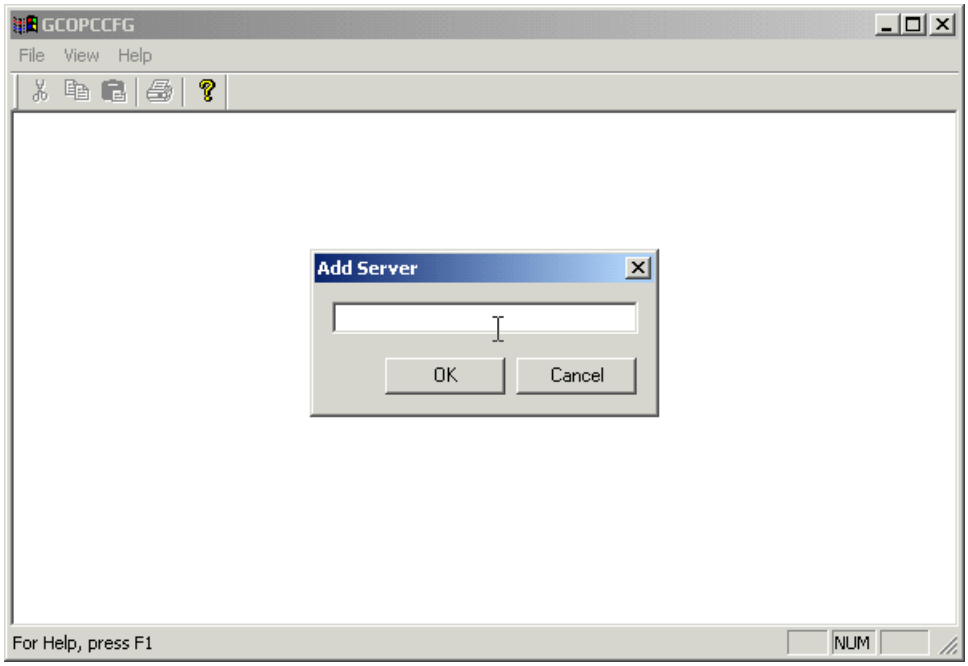
From the **Run** menu, click the **OK** button. The GCOPCFG window will appear.



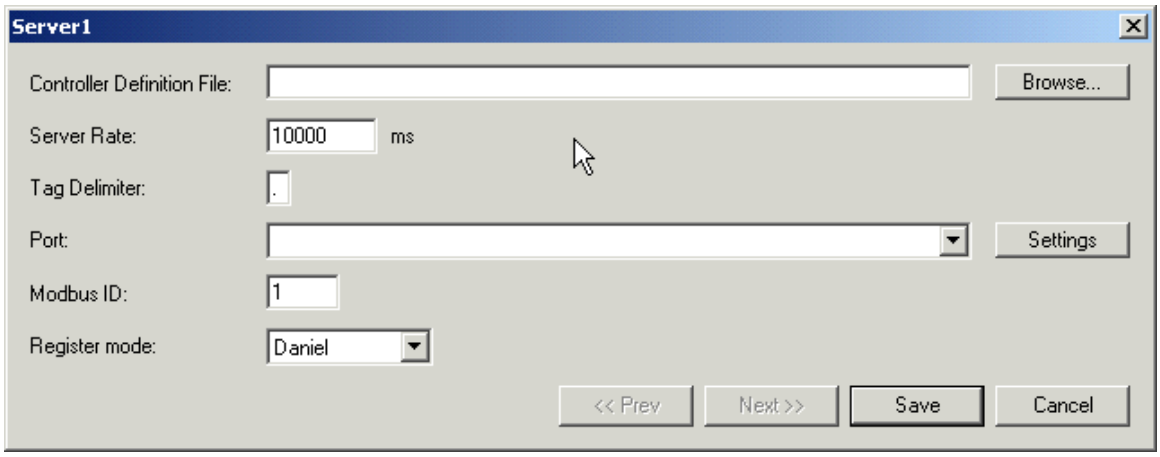
To add a server, select the **File** menu and click the **Add** submenu.



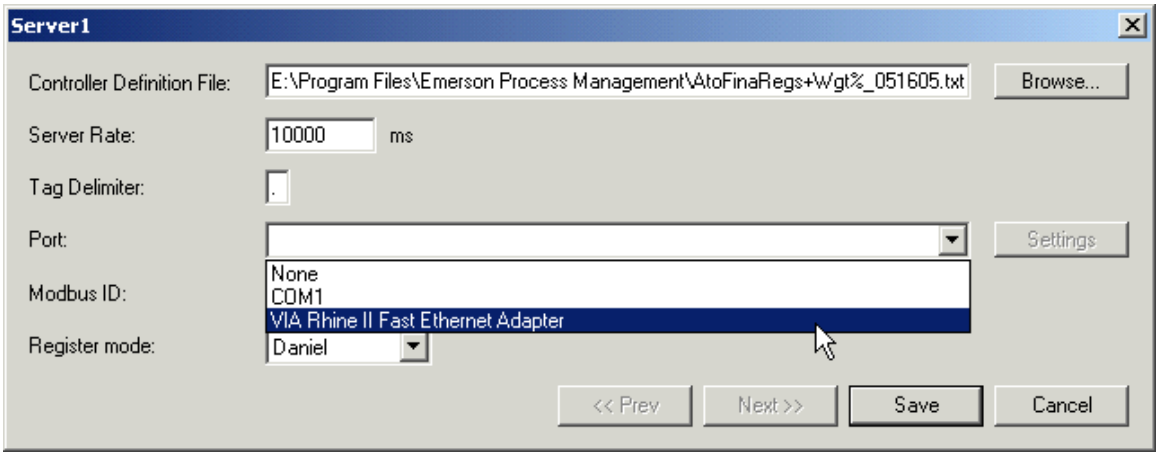
Type in a server name and click the **OK** Button.



The **Server Configuration** dialog box will appear.



The path to the 'Controller Definition File' may be typed in, or use the **Browse** button to locate and assign a 'Controller Definition File' for this server.

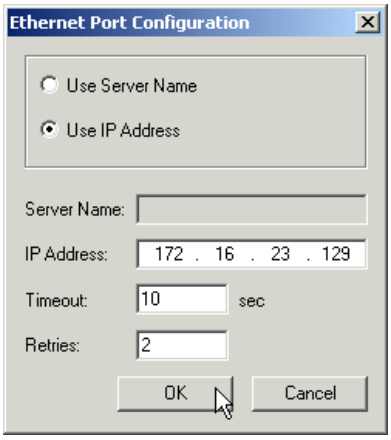


Next, configure which computer port the GCOPC program will use to connect to the GC Controller by choosing from the list of available communication ports in the computer (serial ports and Ethernet cards) via the **Port** dialog box.

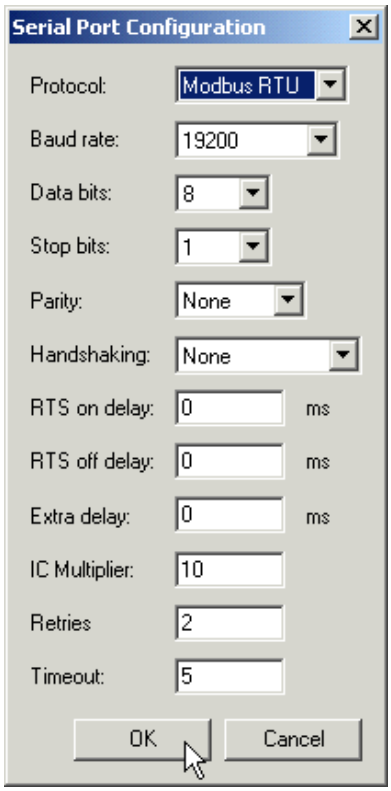
Highlight the desired communications port and click the mouse button.

Once the communications port has been selected, the operator must then set up the communications parameters via the **Settings** button.

Below is the **Ethernet Port Configuration** dialog box. The operator must enter the GC controller's IP Address.

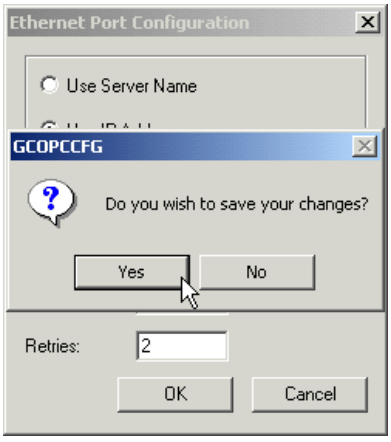


Below is the **Serial Port Configuration** dialog box that will be shown if a serial port is selected for communications. All communications parameters must match the serial port of the GC

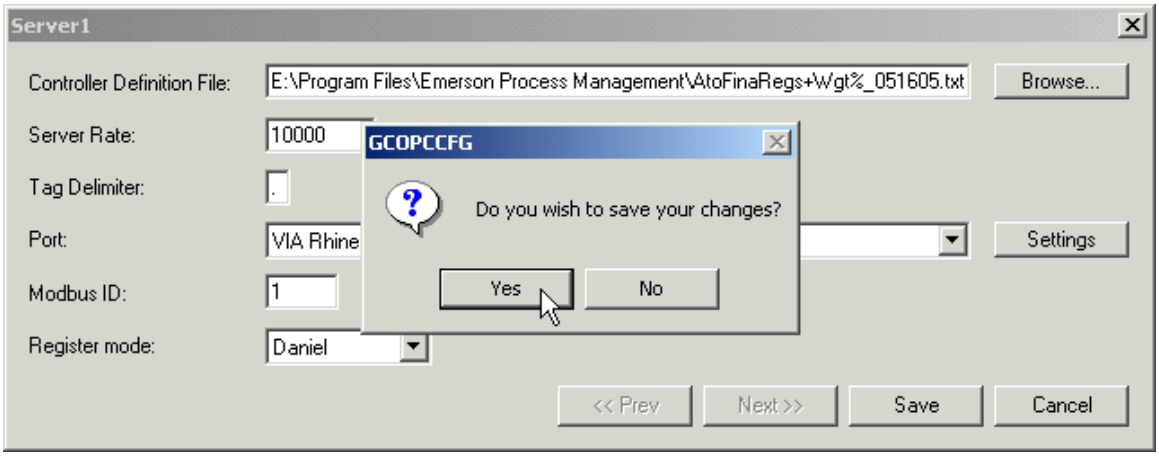


controller.

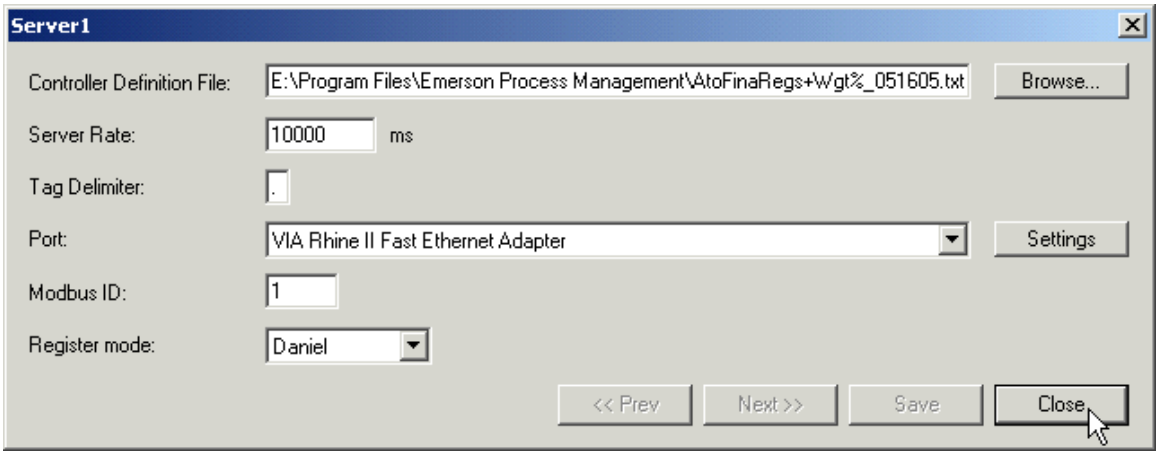
Once all the communications data has been entered, click the **OK** button and the **Save Confirmation** dialog box will appear.



Click **Yes** to save the changes. When Server Configuration window reappears, click the **Save** button to save all changes made. The **Save Confirmation** dialog box will appear.

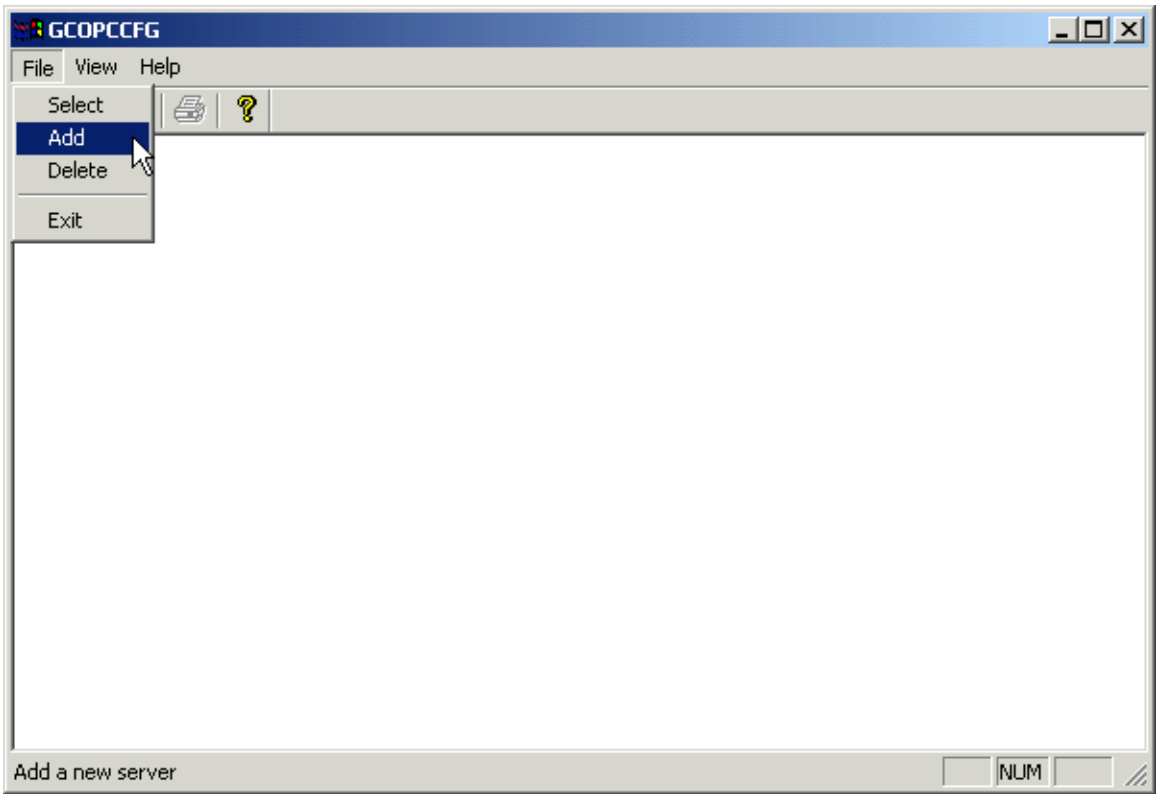


Click the **Yes** button to save the changes made in the **Server Configuration** dialog box.



The operator may exit the Server Configuration window via the **Close** button and return to the main GCOPCCFG window.

By clicking the **File** menu, the operator now has options to **Add** more servers, **Delete** existing servers, or **Select** and edit an existing server. To add another server the operator would repeat the above process.

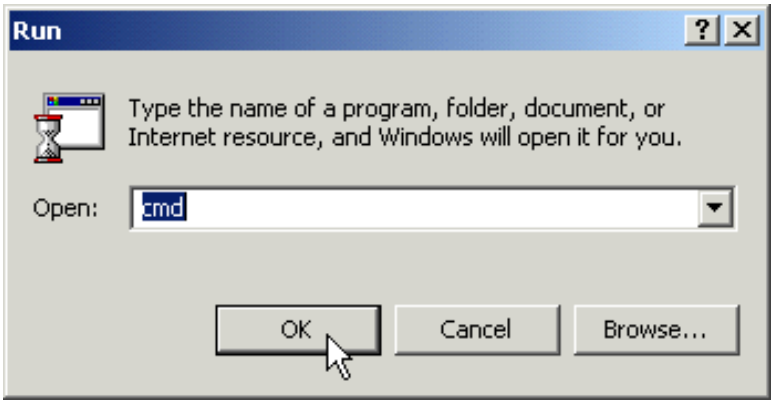


3.1 Setting up the Servers as an NT Service

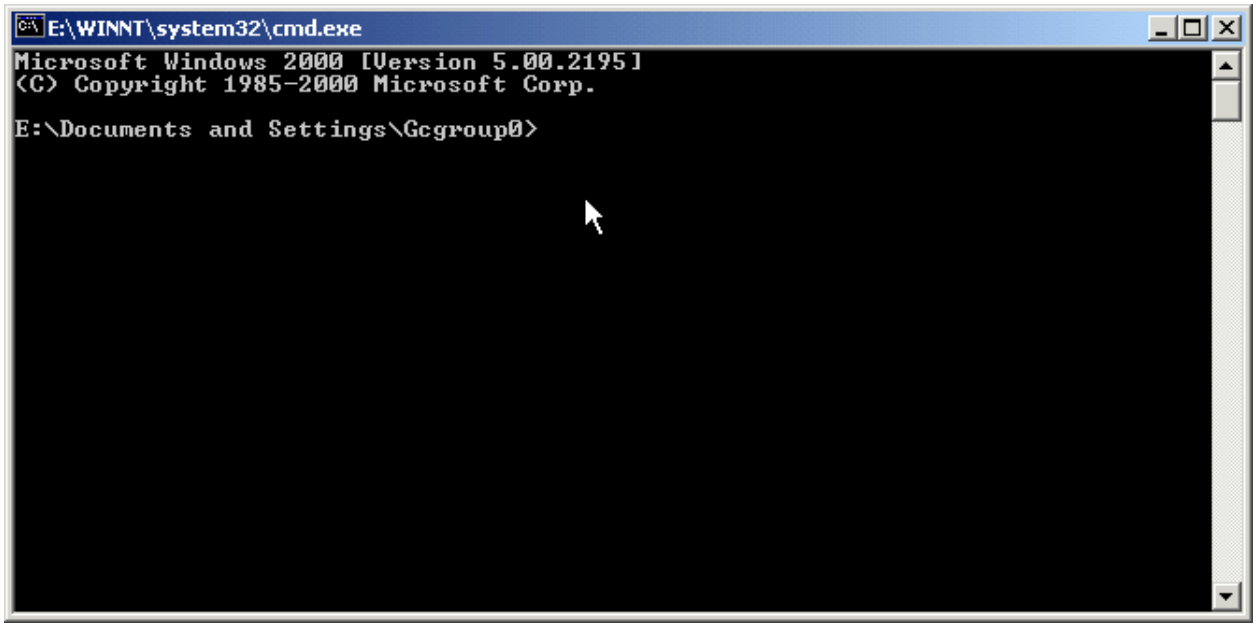
After all servers have been configured per Section 3.0 above, they must be set up as NT Services. This feature allows the GCOPC servers to run in the background transparent to the user. To accomplish this, the operator must execute 'Instsrv.exe' from the installed GCOPCCFG folder. 'Instsrv.exe' installs and removes System Services from NT.

Using the MS-DOS® Prompt, the operator must change to the GCOPCCFG-installed folder found under the path *C:\Program Files\Emerson Process Management\GCOPCCFG* .

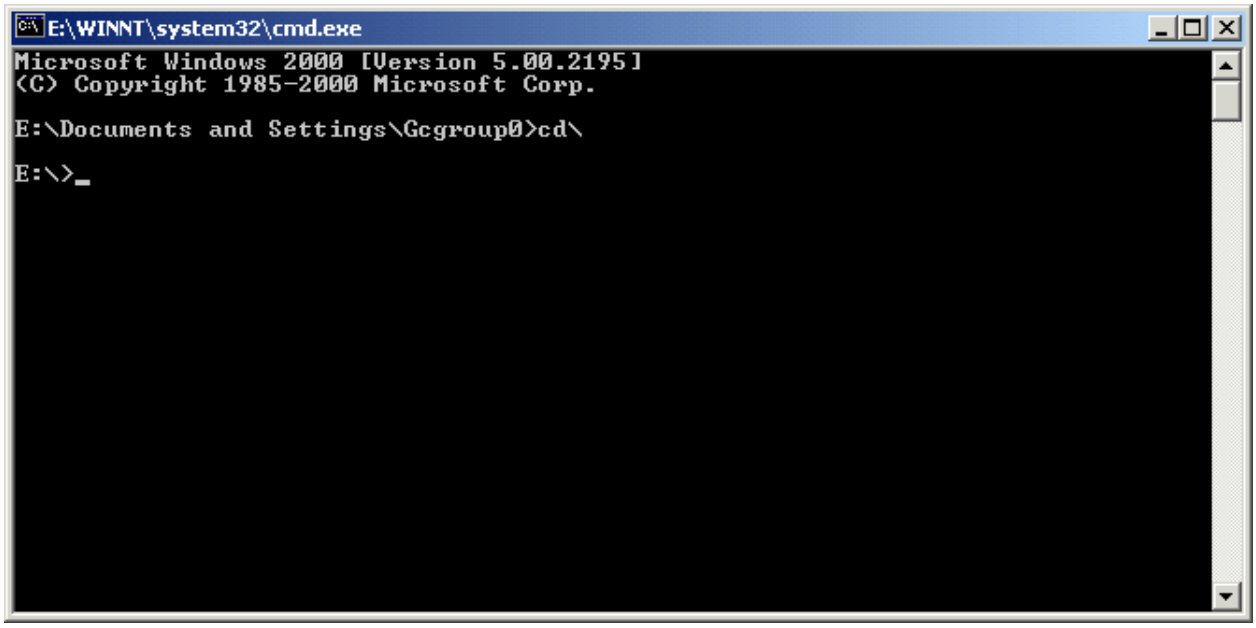
1) Click the Windows **Start** button.
2) Click **Run**.
3) In the **Run** dialog box, type "cmd" and click the **OK** button.



4) This will bring up a DOS window. **Note:** For this example screen, the primary hard drive is *E:\. Most computer's primary hard drive will be C:\.*



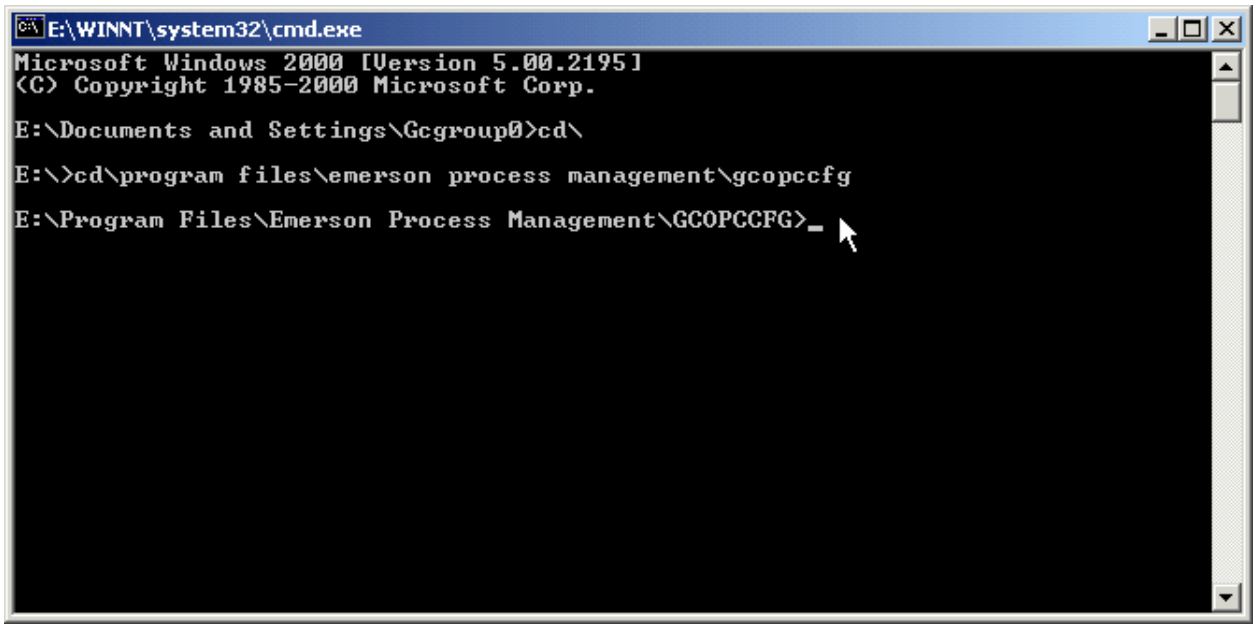
5) Change to the root directory by typing in 'cd\' and press the **Enter** key.



6) From the command prompt, type the following command syntax:

CD\Program Files\Emerson Process Management\GCOPCCFG

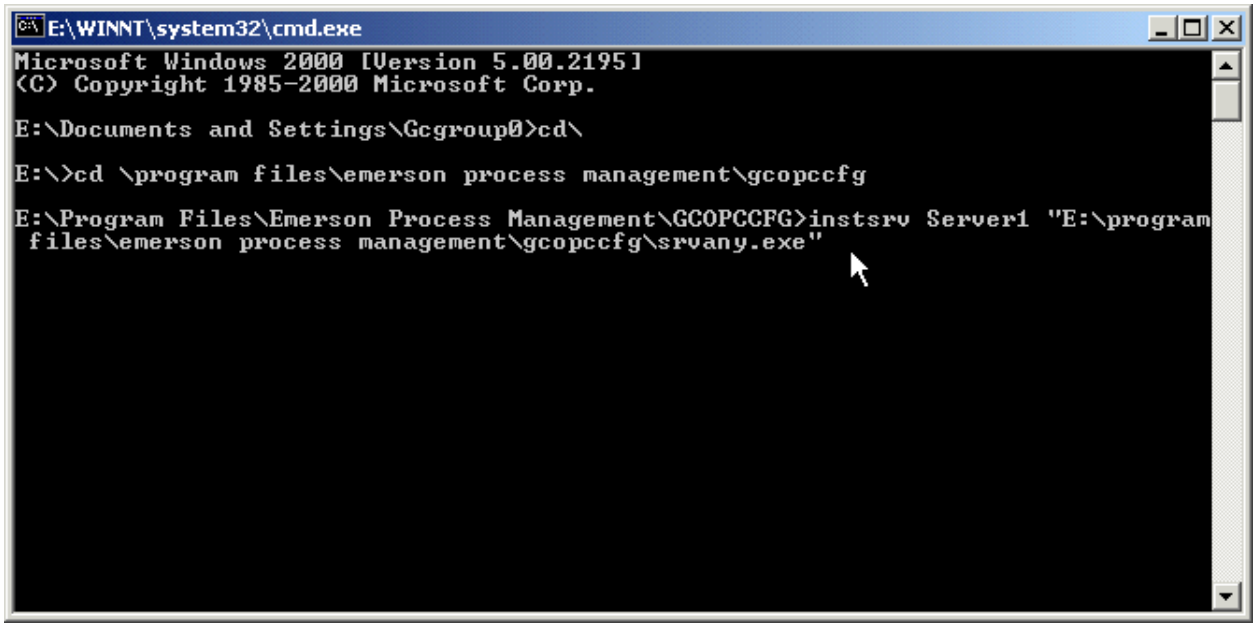
and press the **Enter** key.



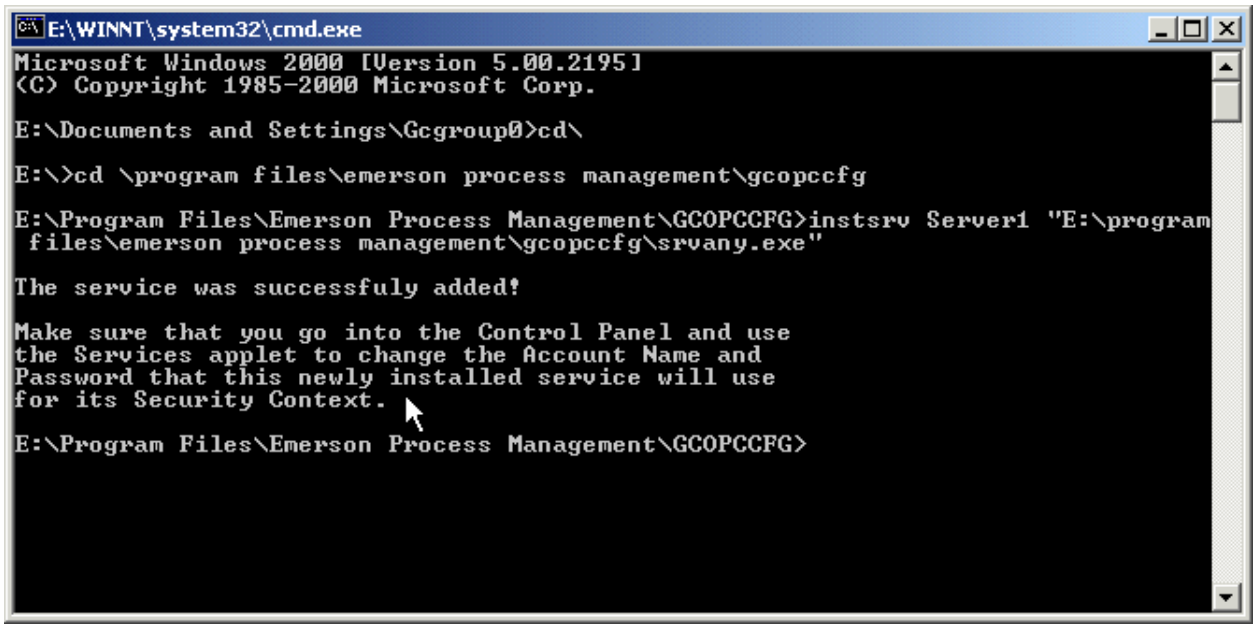
7) From the installed **GCOPC** folder, the command syntax to start the Server as an active service is entered. For this example, the server name 'Server1' is used. Type the following command syntax exactly as shown:

Instsrv Server1 "C:\Program Files\Emerson Process Management\GCOPCCFG\Srvany.exe"

and press the **Enter** key.



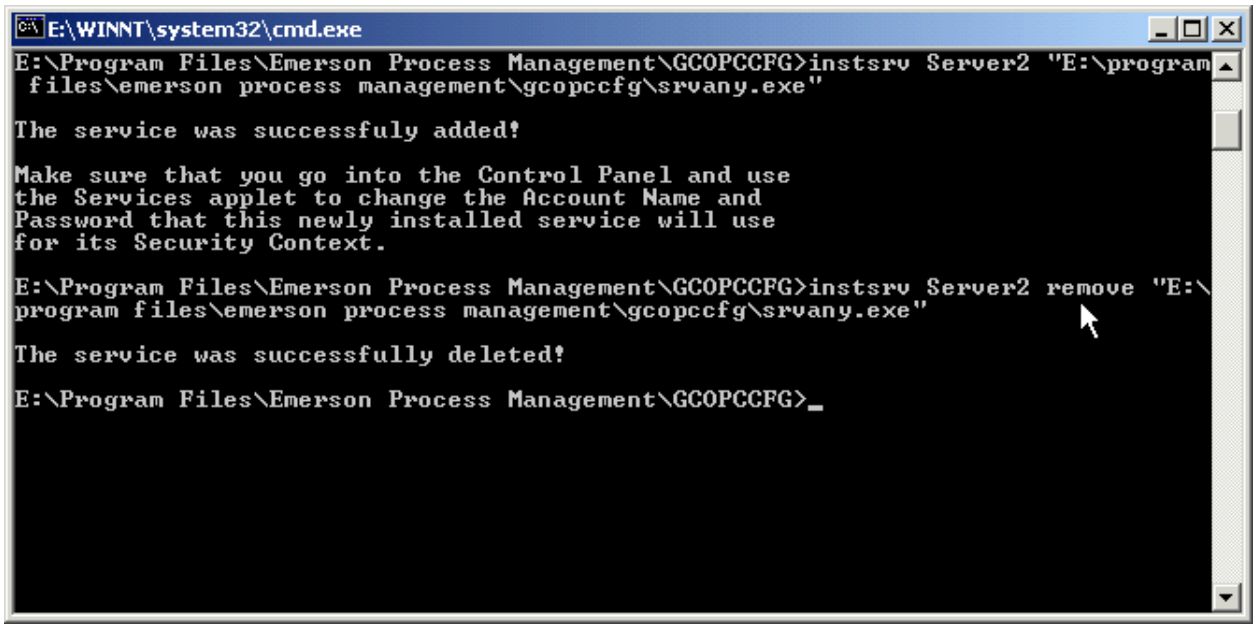
8) At this time, the following message will appear.



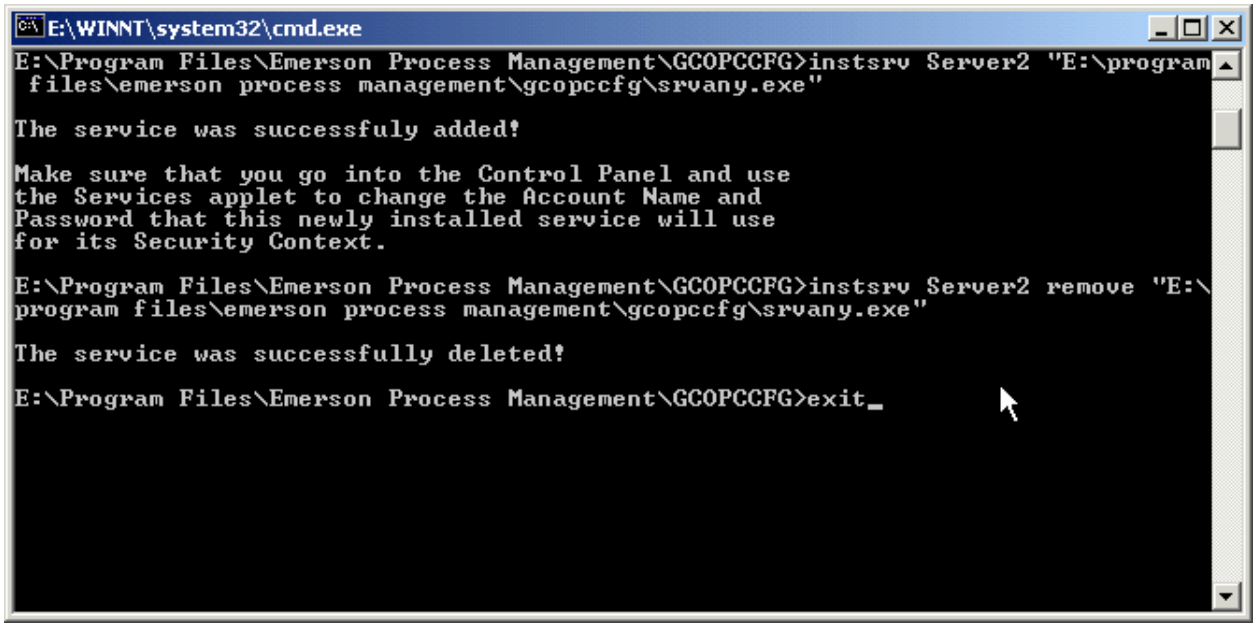
9) Repeat Step 7 for each server. For each server created, a folder will be added to the GCOPCCFG folder bearing its name (i.e. Server1, Server2, Server3…).

Note: The service may be removed in the same manner using the following command syntax:

Instsrv Server1 remove "C:\Program Files\Emerson Process Management\GCOPCCFG\srvany.exe"



To exit the DOS command prompt screen, type **Exit** and press the **Enter** key or using the mouse pointer, click on the X in the upper right-hand corner of the command prompt window.

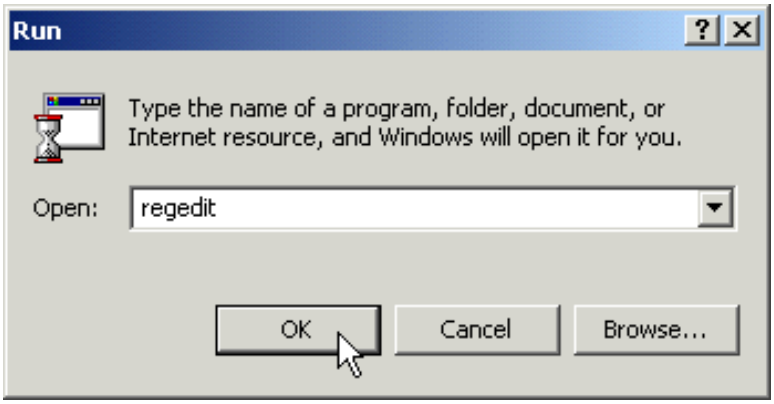


This page intentionally left blank.

4.0 SETTING UP THE SERVICES IN THE REGISTRY

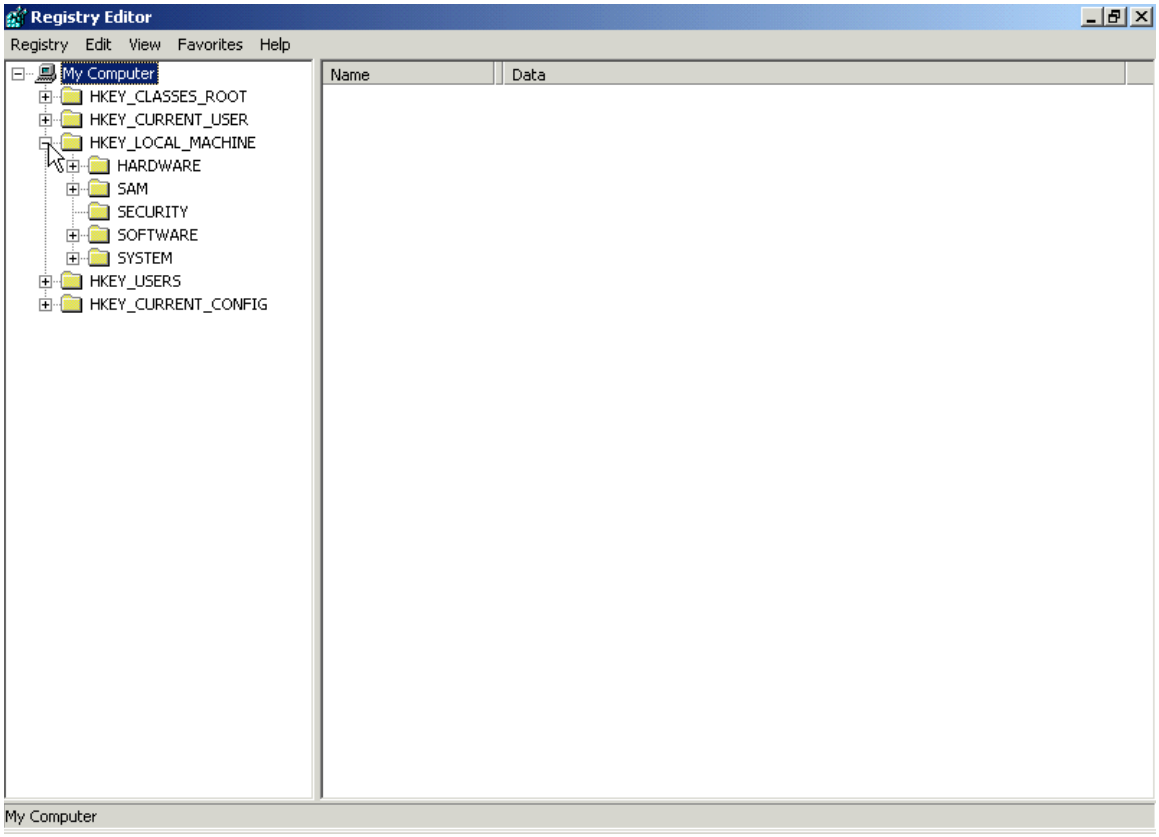
Adding the services to the registry will enable them to be automatically started when the computer is started.

1) Click the **Start** button.
2) Click **Run**.
3) In the **Run** dialog box, type in “regedit”and click the **OK** button,.

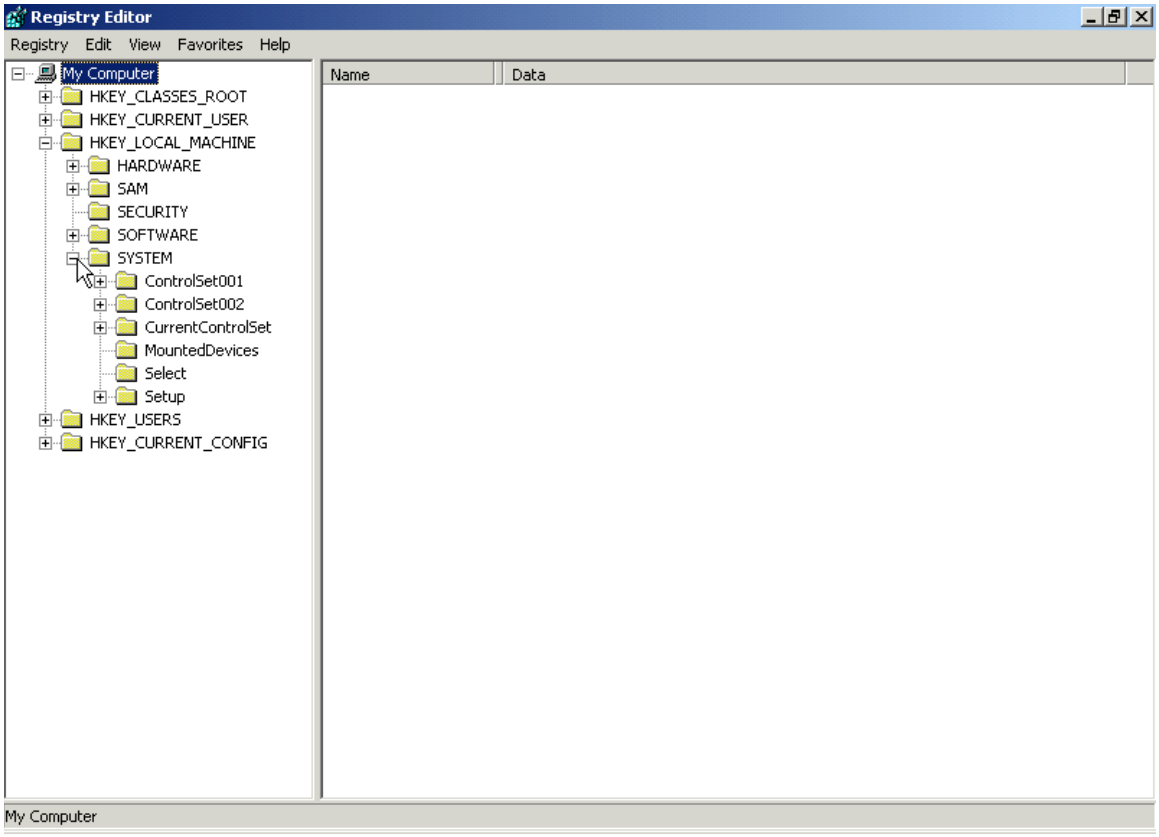


The Registry Editor window appears.

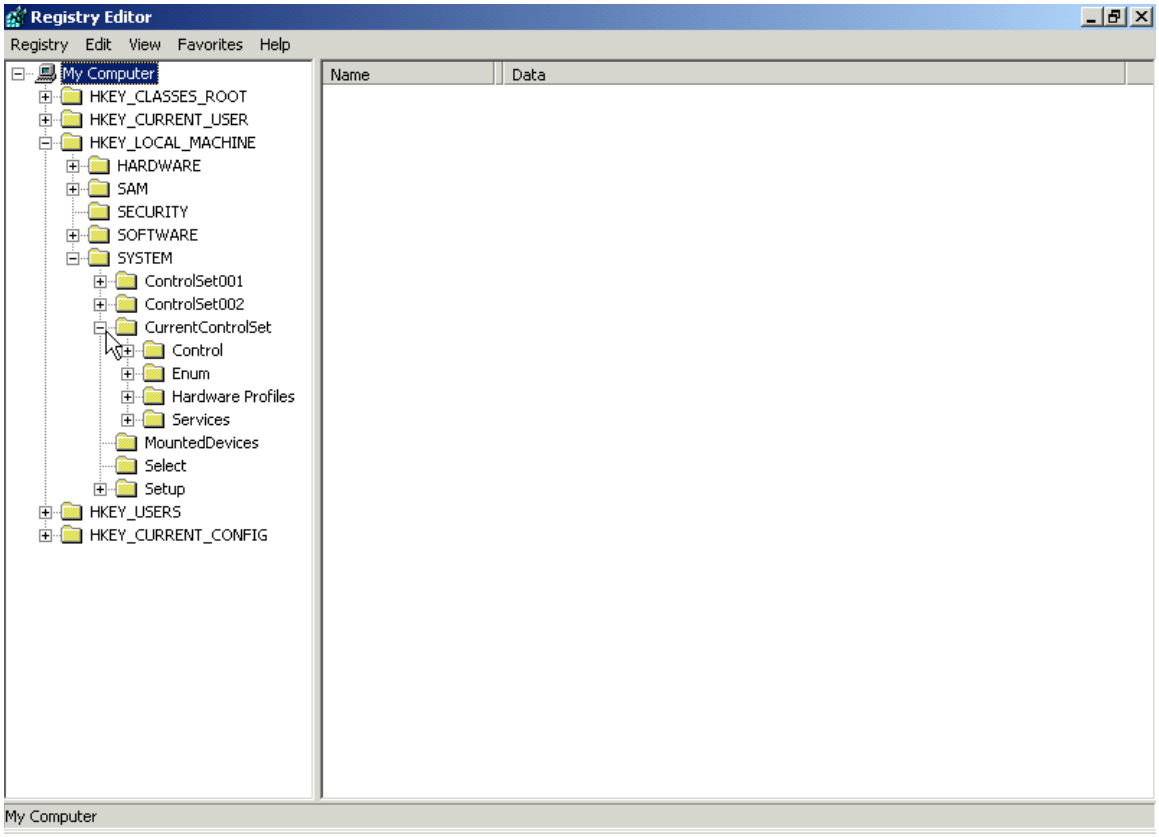
4) Using the mouse pointer, click the '+' sign next to the **HKEY_LOCAL_MACHINE** folder.



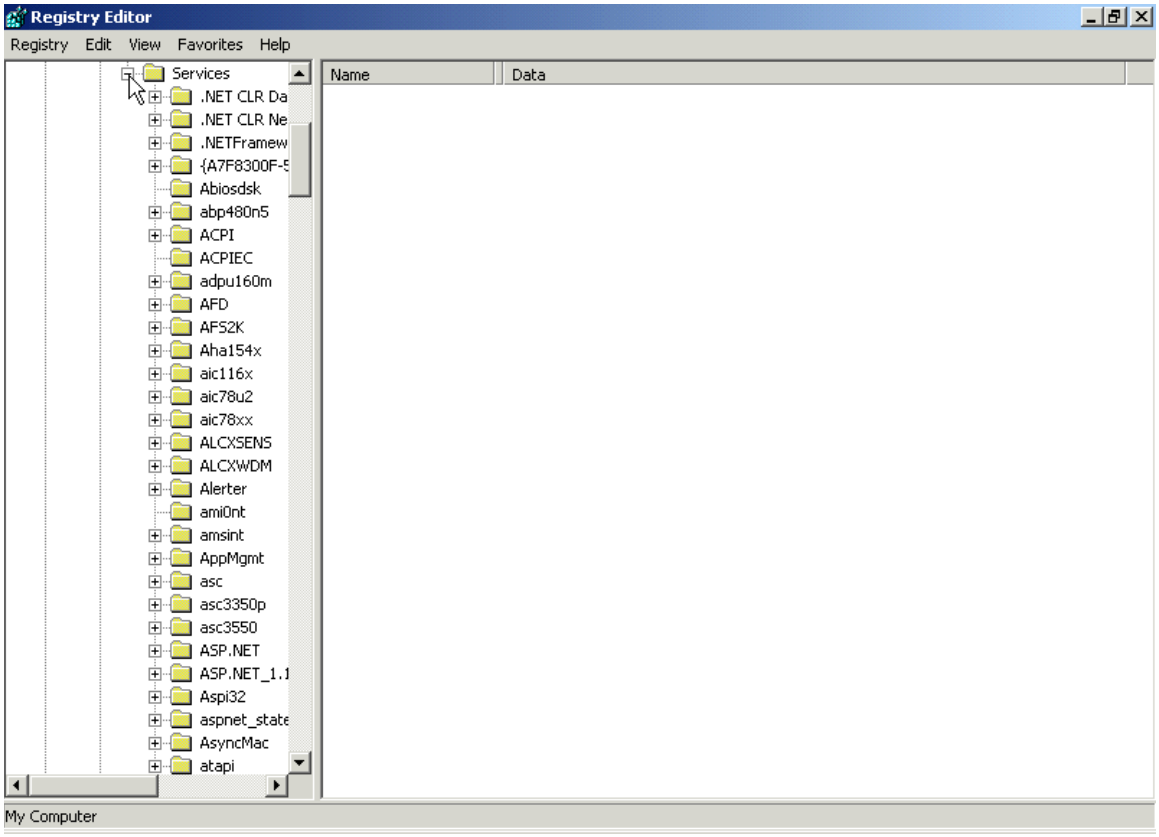
5) Expand the **SYSTEM** folder in the same manner.



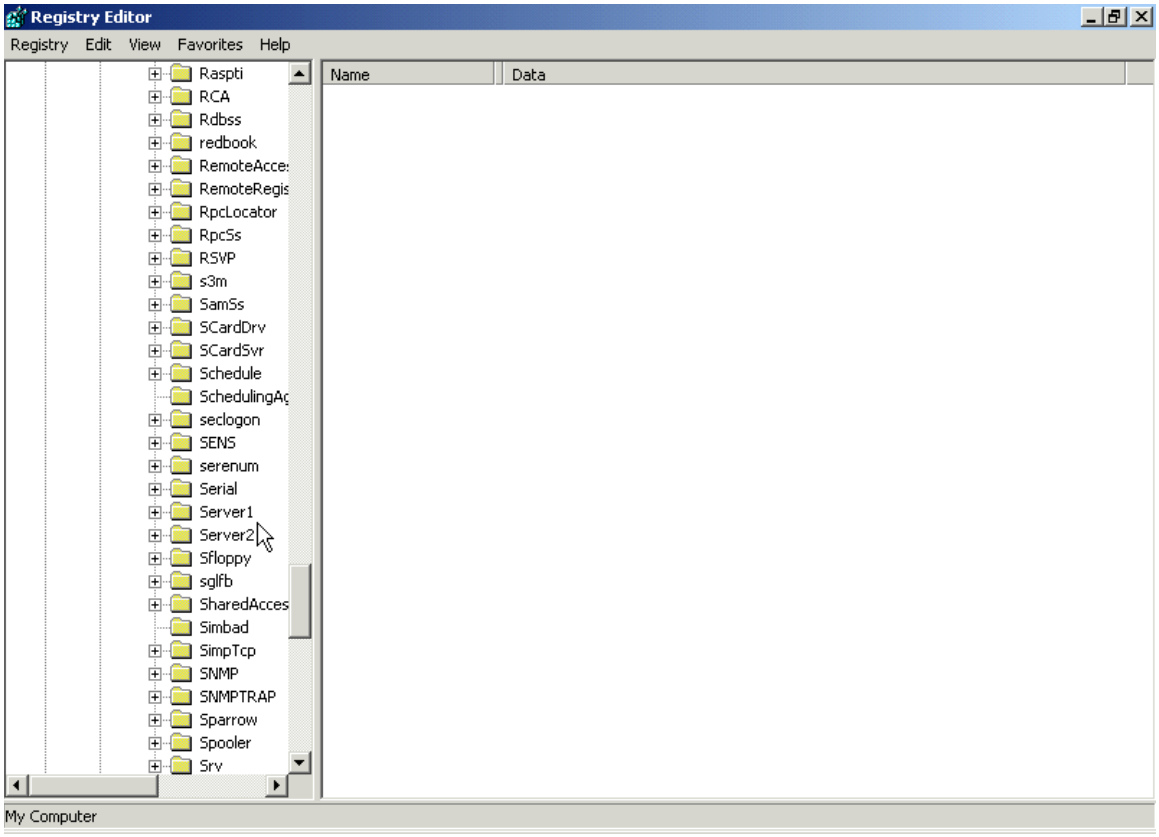
6) Expand the **CurrentControlSet** folder.



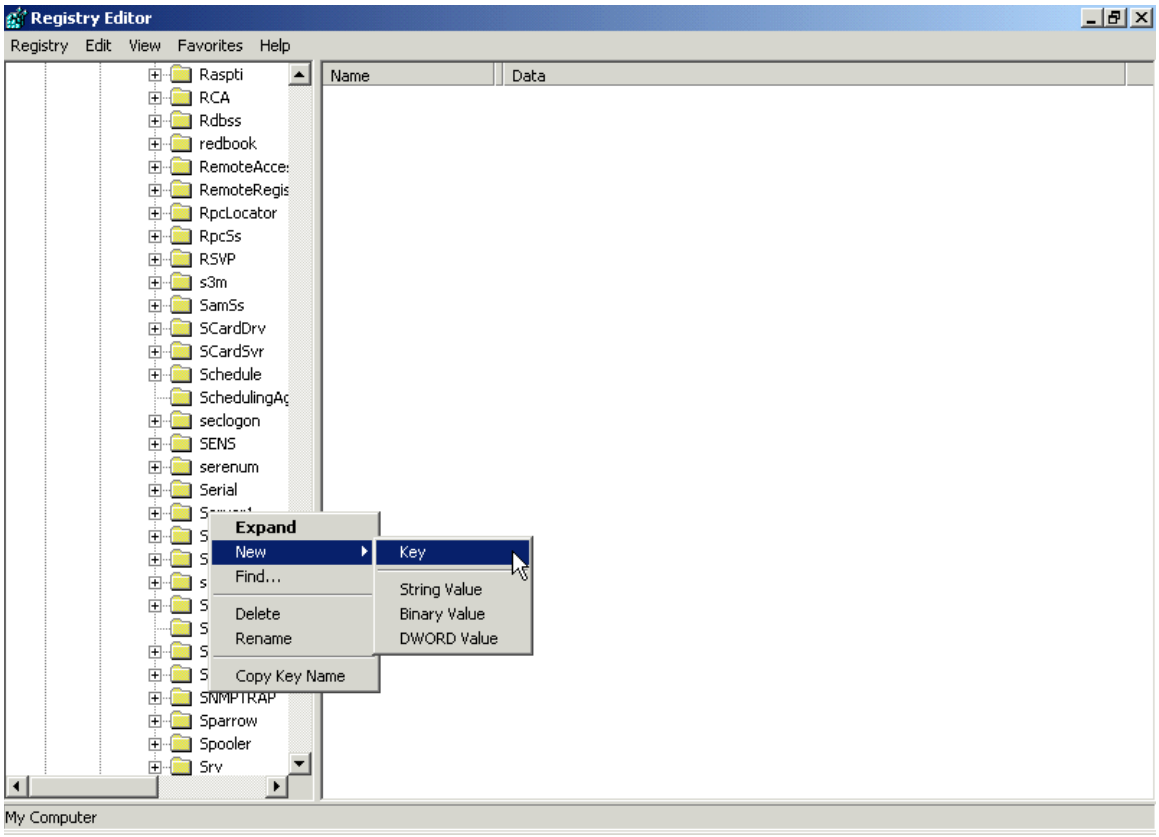
7) Expand the **Services** folder.



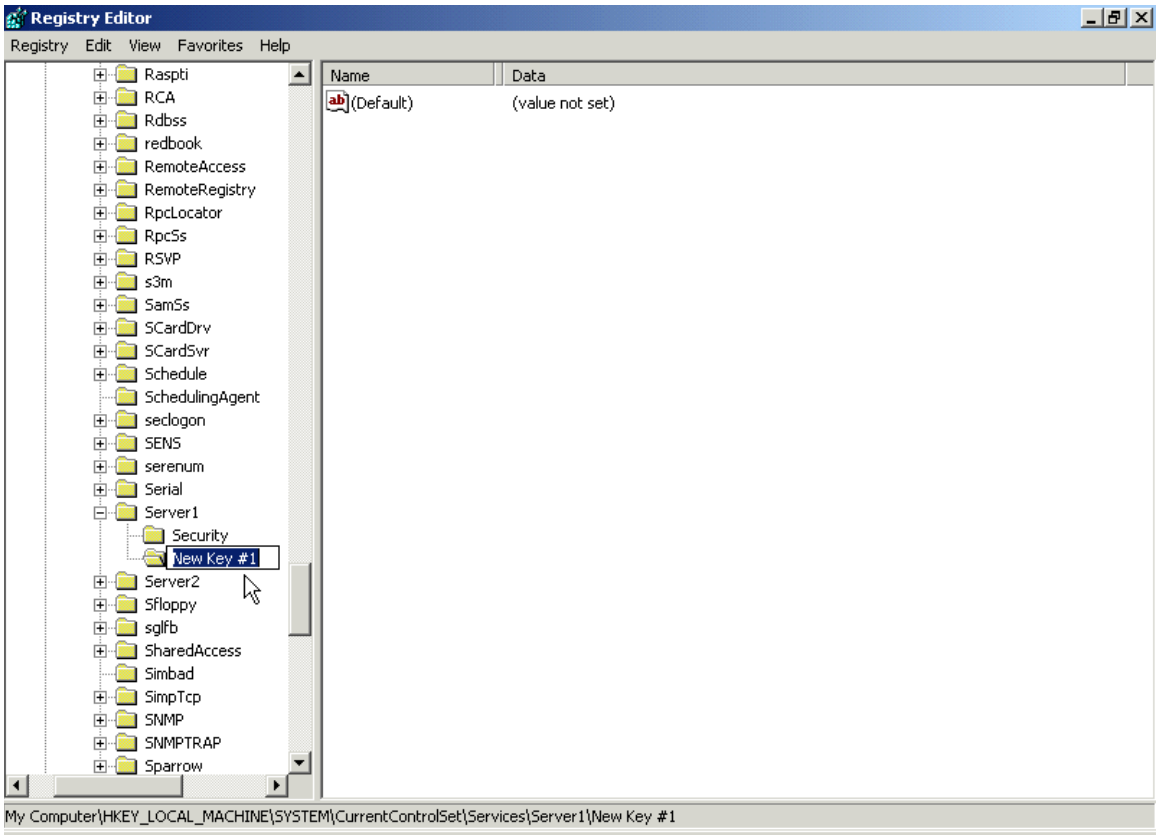
8) Scroll down and locate the GCOPC servers created earlier.



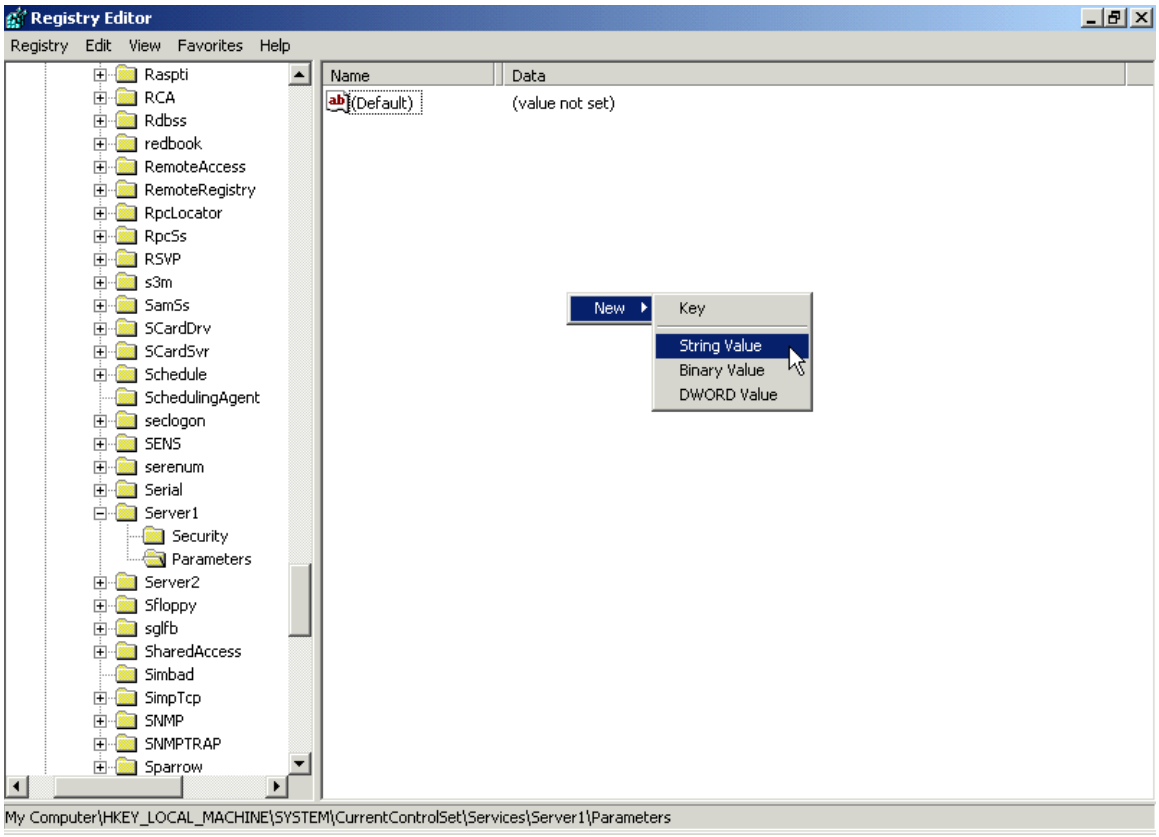
9) Right-click the first GCOPC service with the mouse pointer. Highlight the **New** menu. It will expand to another menu screen. Click the **Key** submenu.



10) A new folder labeled ‘New Key #1' appears. Using the computer’s keyboard, change this folder’s name to ‘Parameters’, and press the **Enter** key to save the change.

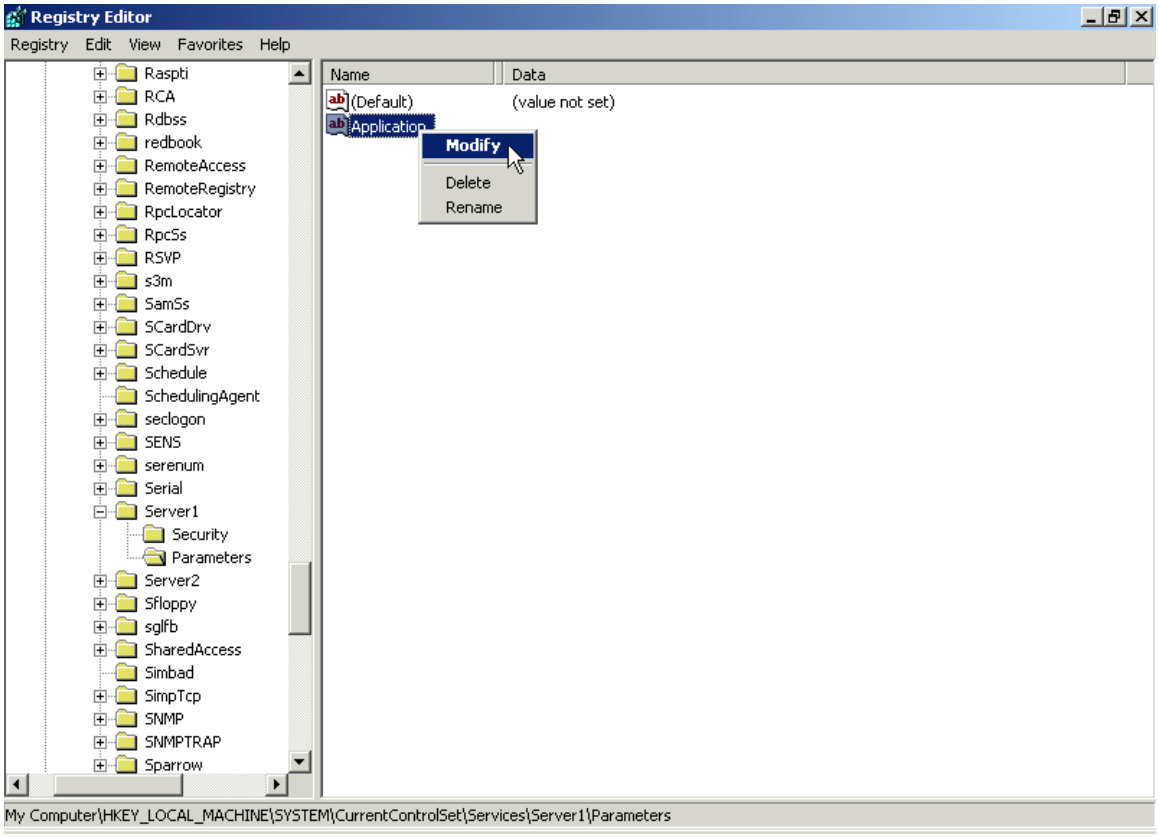


11) Move the mouse pointer to the large screen area to the right, and right-click with the mouse. The following submenus will appear. Highlight the **New** menu, then move the mouse pointer to 'String Value' and left-click.



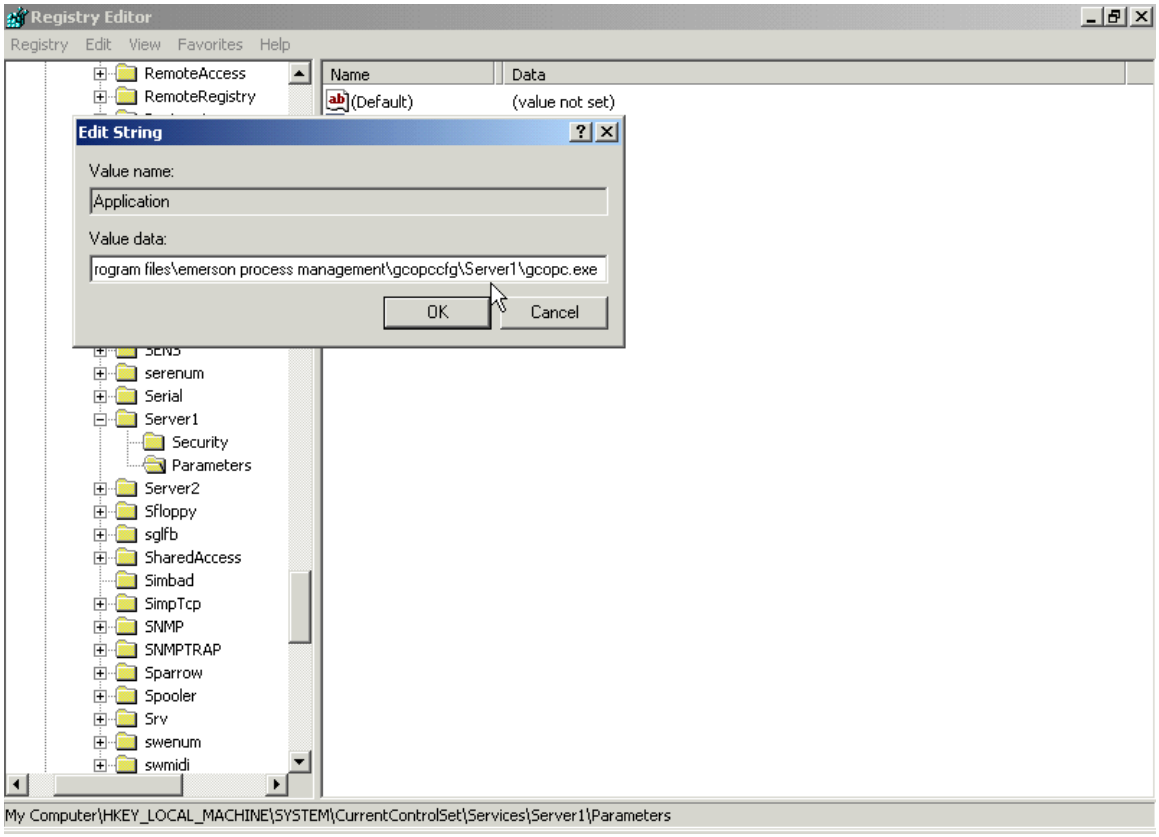
12) A new entry will appear labeled ‘New Value #1'. Using the computer’s keyboard change this name to ‘Application’, and press the **Enter** key to save the change.

13) Right-click the new ‘Application’ entry. The following dialog will appear. Highlight and left-click the **Modify** menu.



14) Type the following path into the Value Data field of the Edit String dialog box with your server name in place of ‘Server 1':

C:\Program Files\Emerson Process Management\GCOPCCFG\Server1\GCOPC.exe

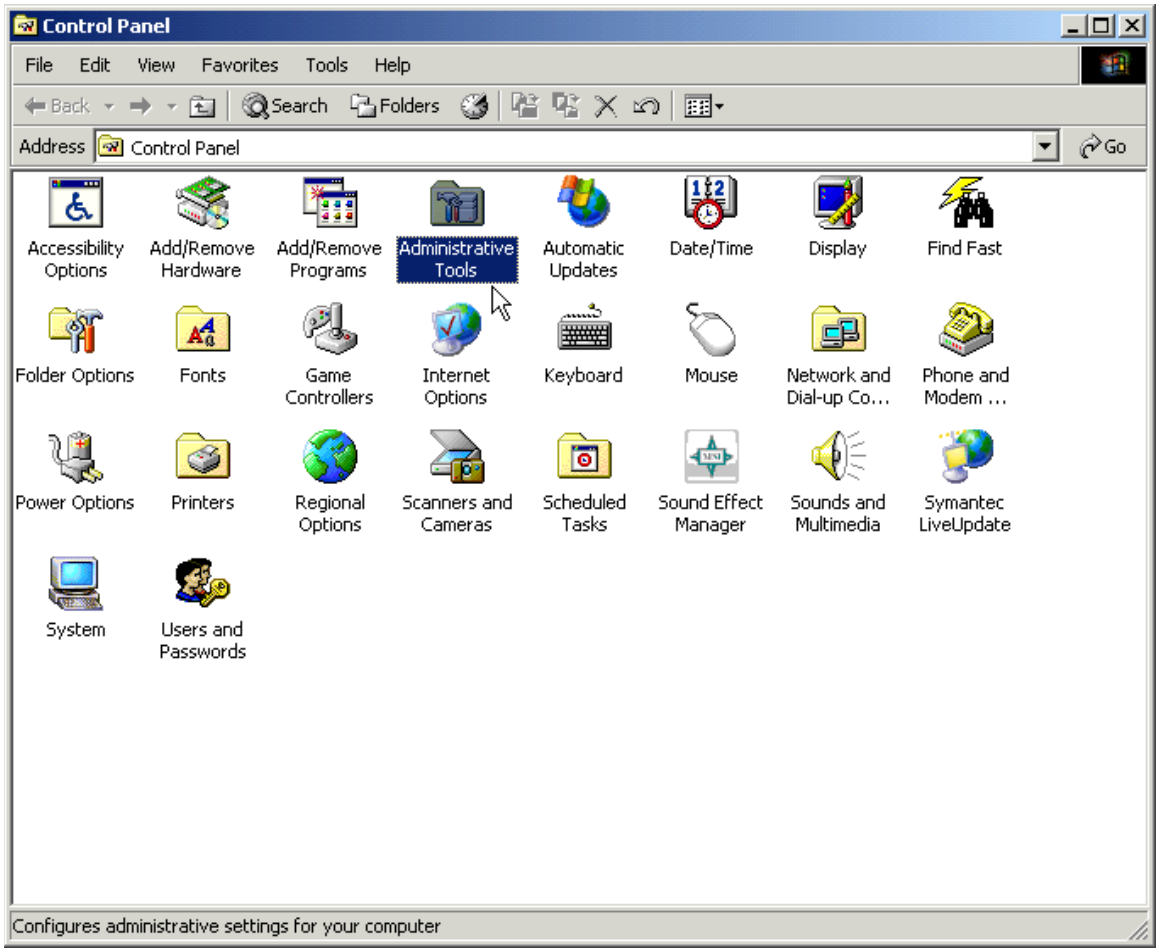


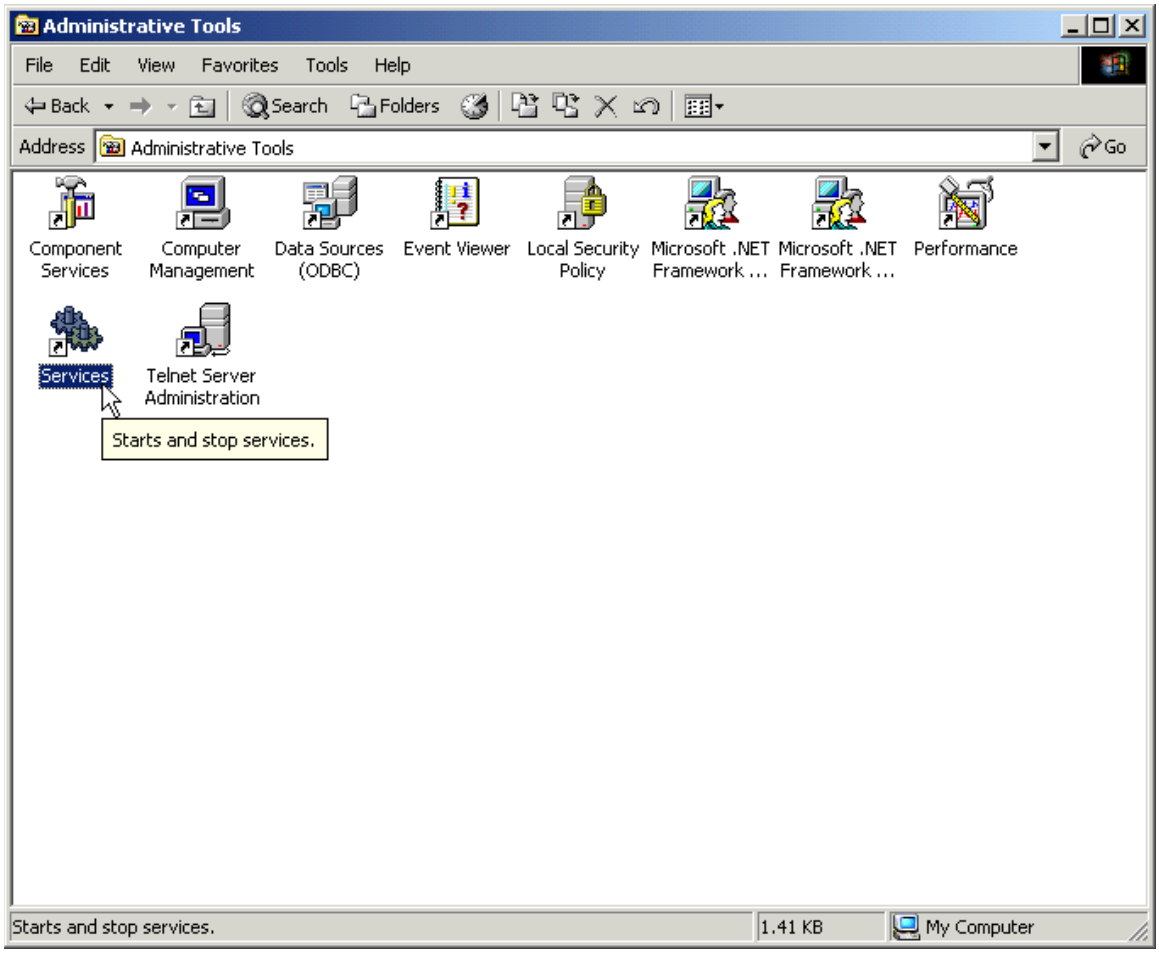
15) Click the **OK** button to save the entry.

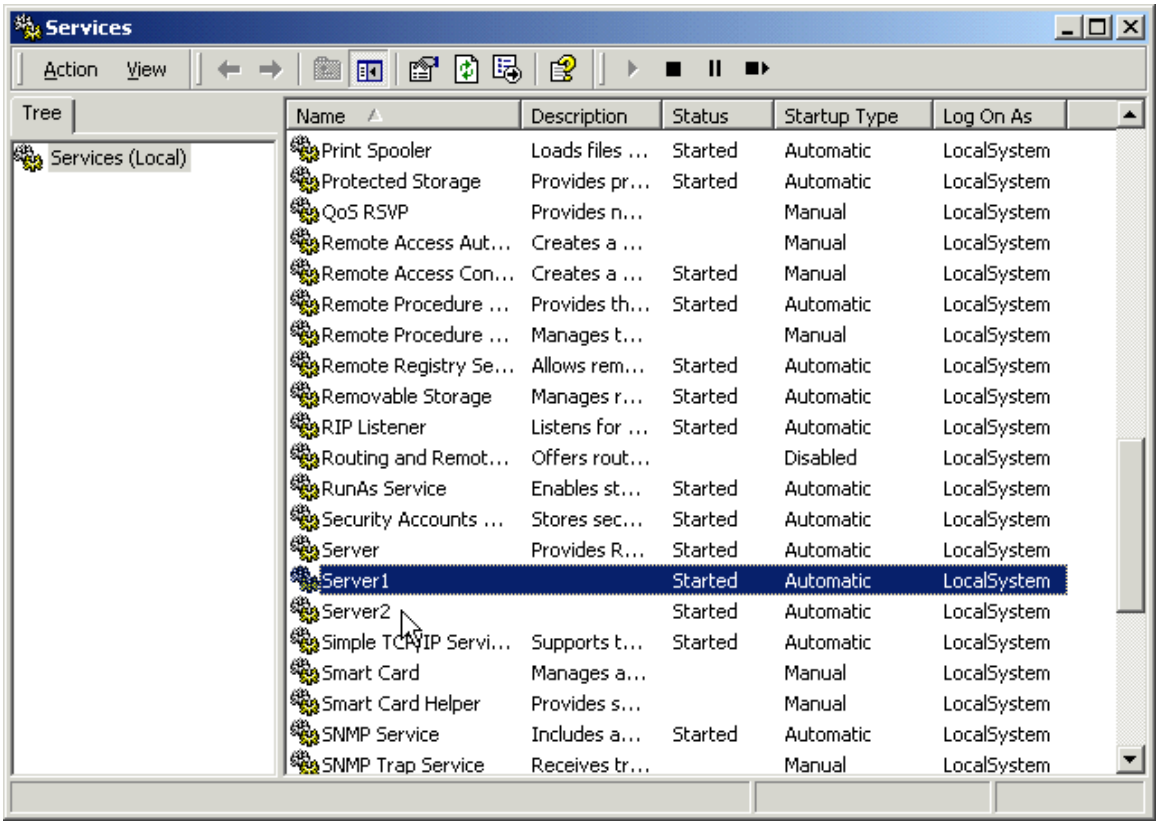
16) Steps 9 thru 15 must be repeated for each server that was created in Section 3.0, Operation.

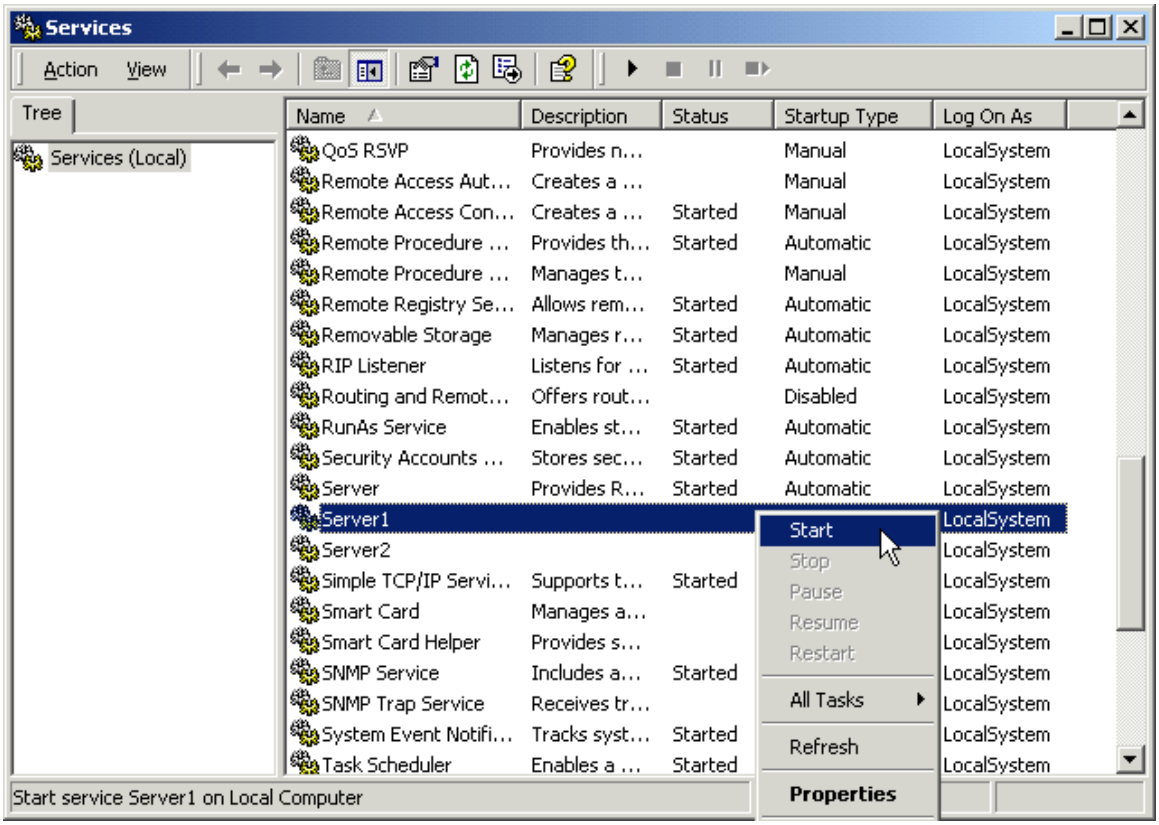
17) When all servers have been configured, close the registry.

The GCOPC servers are now ready to run as NT Services. By default the GCOPC services Startup Type are set to Automatic and will begin each time the computer is started. They can also be manually stopped and started from the *Control Panel* > *Administrative Tools* > *Services* window. Refer to the following screen examples.




Administrative Tools
File Edit View Favorites Tools Help
Back Search Folders
Address Administrative Tools
Go
Component Services
Computer Management
Data Sources (ODBC)
Event Viewer
Local Security Policy
Microsoft .NET Framework ...
Microsoft .NET Framework ...
Performance
Services
Telnet Server Administration
Starts and stop services.
Starts and stop services.
1.41 KB
My Computer


Services
Action View
Tree
Services (Local)
Name Description Status Startup Type Log On As
Print Spooler Loads files ... Started Automatic LocalSystem
Protected Storage Provides pr... Started Automatic LocalSystem
QoS RSVP Provides n... Manual LocalSystem
Remote Access Aut... Creates a ... Manual LocalSystem
Remote Access Con... Creates a ... Started Manual LocalSystem
Remote Procedure ... Provides th... Started Automatic LocalSystem
Remote Procedure ... Manages t... Manual LocalSystem
Remote Registry Se... Allows rem... Started Automatic LocalSystem
Removable Storage Manages r... Started Automatic LocalSystem
RIP Listener Listens for ... Started Automatic LocalSystem
Routing and Remot... Offers rout... Disabled LocalSystem
RunAs Service Enables st... Started Automatic LocalSystem
Security Accounts ... Stores sec... Started Automatic LocalSystem
Server Provides R... Started Automatic LocalSystem
Server1 Started Automatic LocalSystem
Server2 Started Automatic LocalSystem
Simple TCP/IP Servi... Supports t... Started Automatic LocalSystem
Smart Card Manages a... Manual LocalSystem
Smart Card Helper Provides s... Manual LocalSystem
SNMP Service Includes a... Started Automatic LocalSystem
SNMP Trap Service Receives tr... Manual LocalSystem


Services
Action View
Tree
Services (Local)
Name Description Status Startup Type Log On As
QoS RSVP Provides n... Manual LocalSystem
Remote Access Aut... Creates a ... Manual LocalSystem
Remote Access Con... Creates a ... Started Manual LocalSystem
Remote Procedure ... Provides th... Started Automatic LocalSystem
Remote Procedure ... Manages t... Manual LocalSystem
Remote Registry Se... Allows rem... Started Automatic LocalSystem
Removable Storage Manages r... Started Automatic LocalSystem
RIP Listener Listens for ... Started Automatic LocalSystem
Routing and Remot... Offers rout... Disabled LocalSystem
RunAs Service Enables st... Started Automatic LocalSystem
Security Accounts ... Stores sec... Started Automatic LocalSystem
Server Provides R... Started Automatic LocalSystem
Server1 LocalSystem
Server2 LocalSystem
Simple TCP/IP Servi... Supports t... Started LocalSystem
Smart Card Manages a... LocalSystem
Smart Card Helper Provides s... LocalSystem
SNMP Service Includes a... Started LocalSystem
SNMP Trap Service Receives tr... LocalSystem
System Event Notifi... Tracks syst... Started LocalSystem
Task Scheduler Enables a ... Started LocalSystem
Start
Stop
Pause
Resume
Restart
All Tasks
Refresh
Properties
Start service Server1 on Local Computer

This page intentionally left blank.

5.0 PORT DEFINITION FILE FORMAT

The port definition files are ASCII text files as follows:

GUID: required to be the first line of the file.
FAD94BFB-C610-4e3c-988A-A34815AED6A0

DA register blocks:
B`regno`numregs`strmno (strmno is stream number), where regno is the starting register number and numregs is the number of registers in the block (i.e. B`7623`28).

DA register definitions:
R`name`type`ro/rw, where name is the tag name of the register, type is the data type (F – float, I – int16, L – int32, or B – Boolean), and ro/rw is read-only or read/write (i.e. R`Hydrogen`F`RW).

DA Quality code register definitions:
Q`regno`numregs`strmno, where regno is the starting register number and numregs is the number of registers (i.e. Q`5018`28). If quality codes are to be read from the GC, there should be one quality code register for each DA data register. Otherwise, GCOPC will provide the quality codes.

DA Timestamp register definitions:
T`regno`numregs`strmno, where regno is the starting register number and numregs is the number of registers (i.e. T`7621`2). Current implementation is such that 2 registers (one for date and the other for time) contain the date and time for all of the DA data.

HDA register definitions:
H`regno`numrecs`strmno, where regno is the register number and numrecs is the number of archive records that may be retrieved from that register (i.e. H`751`254).

HDA newest record register:
N`regno, where regno is the register from which to read the record number of the newest archive record (i.e. N`regno`strmno).

HDA database dimensions:
D`maxrecs`items/rec`strmno, where maxrecs is the maximum number of archive records and items/rec is the number of data points within that archive (i.e. D`761`28).

HDA record items:

I`strmno`name`type`units`description, where name is the name of the data item, type is the data type (F, I, L, or B per above), units is the engineering units associated with the item, and description is a brief description of that item (i.e.I`Hydrogen`F`Mole %`Mole Percent – Hydrogen). These lines should be ordered consistently with the ordering of the items within the archive.

6.0 SAMPLE PORT DEFINITION FILE

The following is a listing of the sample port definition file.

```
FAD94BFB-C61D-4e3c-988A-A34815AFD6A0
// DA Register block (B`regno`numregs`strmno)
B`7623`28`1
// DA Registers (R`name`type`ro/rw)
R`Strm1-Mole%-Hydrogen`F`RO
R`Strm1-Mole%-Nitrogen`F`RO
R`Strm1-Mole%-Carbon_Monoxide`F`RO
R`Strm1-Mole%-Methane`F`RO
R`Strm1-Mole%-C5+`F`RO
R`Strm1-Mole%-Propane`F`RO
R`Strm1-Mole%-Propylene`F`RO
R`Strm1-Mole%-i-Butane`F`RO
R`Strm1-Mole%-n-Butane`F`RO
R`Strm1-Mole%-Butene-1`F`RO
R`Strm1-Mole%-Trans-2-Butene`F`RO
R`Strm1-Mole%-CIS-2-Butene`F`RO
R`Strm1-Mole%-1,3-Butadiene`F`RO
R`Strm1-Mole%-Carbon_Dioxide`F`RO
R`Strm1-Mole%-Ethylene`F`RO
R`Strm1-Mole%-Ethane`F`RO
R`Strm1-Spare_1`F`RO
R`Strm1-Spare_2`F`RO
R`Strm1-Net_BTU_Dry`F`RO
R`Strm1-Relative_Density`F`RO
R`Strm1-Unnormalized_Total_Mole%`F`RO
R`Strm1-User_Calculation_#1`F`RO
R`Strm1-User_Calculation_#2`F`RO
R`Strm1-User_Calculation_#3`F`RO
R`Strm1-Flare_Temperature`F`RO
R`Strm1-Flare_Pressure`F`RO
R`Strm1-Flare_Flowrate`F`RO
R`Strm1-Spare_3`F`RO
B`7527`18`1
R`Strm1-Weight%-Hydrogen`F`RO
R`Strm1-Weight%-Nitrogen`F`RO
R`Strm1-Weight%-Carbon_Monoxide`F`RO
R`Strm1-Weight%-Methane`F`RO
```

R`Strm1-Weight%-C5+`F`RO
R`Strm1-Weight%-Propane`F`RO
R`Strm1-Weight%-Propylene`F`RO
R`Strm1-Weight%-i-Butane`F`RO
R`Strm1-Weight%-n-Butane`F`RO
R`Strm1-Weight%-Butene-1`F`RO
R`Strm1-Weight%-Trans-2-Butene`F`RO
R`Strm1-Weight%-CIS-2-Butene`F`RO
R`Strm1-Weight%-1,3-Butadiene`F`RO
R`Strm1-Weight%-Carbon_Dioxide`F`RO
R`Strm1-Weight%-Ethylene`F`RO
R`Strm1-Weight%-Ethane`F`RO
R`Strm1-Spare_4`F`RO
R`Strm1-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)
T`7621`2`1
// DA Register block (B`regno`numregs`strmno)
B`7653`28`2
// DA Registers (R`name`type`ro/rw)
R`Strm2-Mole%-Hydrogen`F`RO
R`Strm2-Mole%-Nitrogen`F`RO
R`Strm2-Mole%-Carbon_Monoxide`F`RO
R`Strm2-Mole%-Methane`F`RO
R`Strm2-Mole%-C5+`F`RO
R`Strm2-Mole%-Propane`F`RO
R`Strm2-Mole%-Propylene`F`RO
R`Strm2-Mole%-i-Butane`F`RO
R`Strm2-Mole%-n-Butane`F`RO
R`Strm2-Mole%-Butene-1`F`RO
R`Strm2-Mole%-Trans-2-Butene`F`RO
R`Strm2-Mole%-CIS-2-Butene`F`RO
R`Strm2-Mole%-1,3-Butadiene`F`RO
R`Strm2-Mole%-Carbon_Dioxide`F`RO
R`Strm2-Mole%-Ethylene`F`RO
R`Strm2-Mole%-Ethane`F`RO
R`Strm2-Spare_1`F`RO
R`Strm2-Spare_2`F`RO
R`Strm2-Net_BTU_Dry`F`RO
R`Strm2-Relative_Density`F`RO

R`Strm2-Unnormalized_Total_Mole%`F`RO
R`Strm2-User_Calculation_#1`F`RO
R`Strm2-User_Calculation_#2`F`RO
R`Strm2-User_Calculation_#3`F`RO
R`Strm2-Flare_Temperature`F`RO
R`Strm2-Flare_Pressure`F`RO
R`Strm2-Flare_Flowrate`F`RO
R`Strm2-Spare_3`F`RO
B`7545`18`2
R`Strm2-Weight%-Hydrogen`F`RO
R`Strm2-Weight%-Nitrogen`F`RO
R`Strm2-Weight%-Carbon_Monoxide`F`RO
R`Strm2-Weight%-Methane`F`RO
R`Strm2-Weight%-C5+`F`RO
R`Strm2-Weight%-Propane`F`RO
R`Strm2-Weight%-Propylene`F`RO
R`Strm2-Weight%-i-Butane`F`RO
R`Strm2-Weight%-n-Butane`F`RO
R`Strm2-Weight%-Butene-1`F`RO
R`Strm2-Weight%-Trans-2-Butene`F`RO
R`Strm2-Weight%-CIS-2-Butene`F`RO
R`Strm2-Weight%-1,3-Butadiene`F`RO
R`Strm2-Weight%-Carbon_Dioxide`F`RO
R`Strm2-Weight%-Ethylene`F`RO
R`Strm2-Weight%-Ethane`F`RO
R`Strm2-Spare_4`F`RO
R`Strm2-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)
T`7651`2`2
// DA Register block (B`regno`numregs`strmno)
B`7683`28`3
// DA Registers (R`name`type`ro/rw)
R`Strm3-Mole%-Hydrogen`F`RO
R`Strm3-Mole%-Nitrogen`F`RO
R`Strm3-Mole%-Carbon_Monoxide`F`RO
R`Strm3-Mole%-Methane`F`RO
R`Strm3-Mole%-C5+`F`RO
R`Strm3-Mole%-Propane`F`RO
R`Strm3-Mole%-Propylene`F`RO

R`Strm3-Mole%-i-Butane`F`RO
R`Strm3-Mole%-n-Butane`F`RO
R`Strm3-Mole%-Butene-1`F`RO
R`Strm3-Mole%-Trans-2-Butene`F`RO
R`Strm3-Mole%-CIS-2-Butene`F`RO
R`Strm3-Mole%-1,3-Butadiene`F`RO
R`Strm3-Mole%-Carbon_Dioxide`F`RO
R`Strm3-Mole%-Ethylene`F`RO
R`Strm3-Mole%-Ethane`F`RO
R`Strm3-Spare_1`F`RO
R`Strm3-Spare_2`F`RO
R`Strm3-Net_BTU_Dry`F`RO
R`Strm3-Relative_Density`F`RO
R`Strm3-Unnormalized_Total_Mole%`F`RO
R`Strm3-User_Calculation_#1`F`RO
R`Strm3-User_Calculation_#2`F`RO
R`Strm3-User_Calculation_#3`F`RO
R`Strm3-Flare_Temperature`F`RO
R`Strm3-Flare_Pressure`F`RO
R`Strm3-Flare_Flowrate`F`RO
R`Strm3-Spare_3`F`RO
B`7563`18`3
R`Strm3-Weight%-Hydrogen`F`RO
R`Strm3-Weight%-Nitrogen`F`RO
R`Strm3-Weight%-Carbon_Monoxide`F`RO
R`Strm3-Weight%-Methane`F`RO
R`Strm3-Weight%-C5+`F`RO
R`Strm3-Weight%-Propane`F`RO
R`Strm3-Weight%-Propylene`F`RO
R`Strm3-Weight%-i-Butane`F`RO
R`Strm3-Weight%-n-Butane`F`RO
R`Strm3-Weight%-Butene-1`F`RO
R`Strm3-Weight%-Trans-2-Butene`F`RO
R`Strm3-Weight%-CIS-2-Butene`F`RO
R`Strm3-Weight%-1,3-Butadiene`F`RO
R`Strm3-Weight%-Carbon_Dioxide`F`RO
R`Strm3-Weight%-Ethylene`F`RO
R`Strm3-Weight%-Ethane`F`RO
R`Strm3-Spare_4`F`RO
R`Strm3-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)

```
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)
T`7681`2`3
// DA Register block (B`regno`numregs`strmno)
B`7713`28`4
// DA Registers (R`name`type`ro/rw)
R`Strm4-Mole%-Hydrogen`F`RO
R`Strm4-Mole%-Nitrogen`F`RO
R`Strm4-Mole%-Carbon_Monoxide`F`RO
R`Strm4-Mole%-Methane`F`RO
R`Strm4-Mole%-C5+`F`RO
R`Strm4-Mole%-Propane`F`RO
R`Strm4-Mole%-Propylene`F`RO
R`Strm4-Mole%-i-Butane`F`RO
R`Strm4-Mole%-n-Butane`F`RO
R`Strm4-Mole%-Butene-1`F`RO
R`Strm4-Mole%-Trans-2-Butene`F`RO
R`Strm4-Mole%-CIS-2-Butene`F`RO
R`Strm4-Mole%-1,3-Butadiene`F`RO
R`Strm4-Mole%-Carbon_Dioxide`F`RO
R`Strm4-Mole%-Ethylene`F`RO
R`Strm4-Mole%-Ethane`F`RO
R`Strm4-Spare_1`F`RO
R`Strm4-Spare_2`F`RO
R`Strm4-Net_BTU_Dry`F`RO
R`Strm4-Relative_Density`F`RO
R`Strm4-Unnormalized_Total_Mole%`F`RO
R`Strm4-User_Calculation_#1`F`RO
R`Strm4-User_Calculation_#2`F`RO
R`Strm4-User_Calculation_#3`F`RO
R`Strm4-Flare_Temperature`F`RO
R`Strm4-Flare_Pressure`F`RO
R`Strm4-Flare_Flowrate`F`RO
R`Strm4-Spare_3`F`RO
B`7581`18`4
R`Strm4-Weight%-Hydrogen`F`RO
R`Strm4-Weight%-Nitrogen`F`RO
R`Strm4-Weight%-Carbon_Monoxide`F`RO
R`Strm4-Weight%-Methane`F`RO
R`Strm4-Weight%-C5+`F`RO
R`Strm4-Weight%-Propane`F`RO
```

R`Strm4-Weight%-Propylene`F`RO
R`Strm4-Weight%-i-Butane`F`RO
R`Strm4-Weight%-n-Butane`F`RO
R`Strm4-Weight%-Butene-1`F`RO
R`Strm4-Weight%-Trans-2-Butene`F`RO
R`Strm4-Weight%-CIS-2-Butene`F`RO
R`Strm4-Weight%-1,3-Butadiene`F`RO
R`Strm4-Weight%-Carbon_Dioxide`F`RO
R`Strm4-Weight%-Ethylene`F`RO
R`Strm4-Weight%-Ethane`F`RO
R`Strm4-Spare_4`F`RO
R`Strm4-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)
T`7711`2`4
// DA Register block (B`regno`numregs`strmno)
B`7743`28`5
// DA Registers (R`name`type`ro/rw)
R`Strm5-Mole%-Hydrogen`F`RO
R`Strm5-Mole%-Nitrogen`F`RO
R`Strm5-Mole%-Carbon_Monoxide`F`RO
R`Strm5-Mole%-Methane`F`RO
R`Strm5-Mole%-C5+`F`RO
R`Strm5-Mole%-Propane`F`RO
R`Strm5-Mole%-Propylene`F`RO
R`Strm5-Mole%-i-Butane`F`RO
R`Strm5-Mole%-n-Butane`F`RO
R`Strm5-Mole%-Butene-1`F`RO
R`Strm5-Mole%-Trans-2-Butene`F`RO
R`Strm5-Mole%-CIS-2-Butene`F`RO
R`Strm5-Mole%-1,3-Butadiene`F`RO
R`Strm5-Mole%-Carbon_Dioxide`F`RO
R`Strm5-Mole%-Ethylene`F`RO
R`Strm5-Mole%-Ethane`F`RO
R`Strm5-Spare_1`F`RO
R`Strm5-Spare_2`F`RO
R`Strm5-Net_BTU_Dry`F`RO
R`Strm5-Relative_Density`F`RO
R`Strm5-Unnormalized_Total_Mole%`F`RO
R`Strm5-User_Calculation_#1`F`RO

R`Strm5-User_Calculation_#2`F`RO
R`Strm5-User_Calculation_#3`F`RO
R`Strm5-Flare_Temperature`F`RO
R`Strm5-Flare_Pressure`F`RO
R`Strm5-Flare_Flowrate`F`RO
R`Strm5-Spare_3`F`RO
B`7491`18`5
R`Strm5-Weight%-Hydrogen`F`RO
R`Strm5-Weight%-Nitrogen`F`RO
R`Strm5-Weight%-Carbon_Monoxide`F`RO
R`Strm5-Weight%-Methane`F`RO
R`Strm5-Weight%-C5+`F`RO
R`Strm5-Weight%-Propane`F`RO
R`Strm5-Weight%-Propylene`F`RO
R`Strm5-Weight%-i-Butane`F`RO
R`Strm5-Weight%-n-Butane`F`RO
R`Strm5-Weight%-Butene-1`F`RO
R`Strm5-Weight%-Trans-2-Butene`F`RO
R`Strm5-Weight%-CIS-2-Butene`F`RO
R`Strm5-Weight%-1,3-Butadiene`F`RO
R`Strm5-Weight%-Carbon_Dioxide`F`RO
R`Strm5-Weight%-Ethylene`F`RO
R`Strm5-Weight%-Ethane`F`RO
R`Strm5-Spare_4`F`RO
R`Strm5-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)
T`7741`2`5
// DA Register block (B`regno`numregs`strmno)
B`7773`28`6
// DA Registers (R`name`type`ro/rw)
R`Strm6-Mole%-Hydrogen`F`RO
R`Strm6-Mole%-Nitrogen`F`RO
R`Strm6-Mole%-Carbon_Monoxide`F`RO
R`Strm6-Mole%-Methane`F`RO
R`Strm6-Mole%-C5+`F`RO
R`Strm6-Mole%-Propane`F`RO
R`Strm6-Mole%-Propylene`F`RO
R`Strm6-Mole%-i-Butane`F`RO
R`Strm6-Mole%-n-Butane`F`RO

R`Strm6-Mole%-Butene-1`F`RO
R`Strm6-Mole%-Trans-2-Butene`F`RO
R`Strm6-Mole%-CIS-2-Butene`F`RO
R`Strm6-Mole%-1,3-Butadiene`F`RO
R`Strm6-Mole%-Carbon_Dioxide`F`RO
R`Strm6-Mole%-Ethylene`F`RO
R`Strm6-Mole%-Ethane`F`RO
R`Strm6-Spare_1`F`RO
R`Strm6-Spare_2`F`RO
R`Strm6-Net_BTU_Dry`F`RO
R`Strm6-Relative_Density`F`RO
R`Strm6-Unnormalized_Total_Mole%`F`RO
R`Strm6-User_Calculation_#1`F`RO
R`Strm6-User_Calculation_#2`F`RO
R`Strm6-User_Calculation_#3`F`RO
R`Strm6-Flare_Temperature`F`RO
R`Strm6-Flare_Pressure`F`RO
R`Strm6-Flare_Flowrate`F`RO
R`Strm6-Spare_3`F`RO
B`7509`18`6
R`Strm6-Weight%-Hydrogen`F`RO
R`Strm6-Weight%-Nitrogen`F`RO
R`Strm6-Weight%-Carbon_Monoxide`F`RO
R`Strm6-Weight%-Methane`F`RO
R`Strm6-Weight%-C5+`F`RO
R`Strm6-Weight%-Propane`F`RO
R`Strm6-Weight%-Propylene`F`RO
R`Strm6-Weight%-i-Butane`F`RO
R`Strm6-Weight%-n-Butane`F`RO
R`Strm6-Weight%-Butene-1`F`RO
R`Strm6-Weight%-Trans-2-Butene`F`RO
R`Strm6-Weight%-CIS-2-Butene`F`RO
R`Strm6-Weight%-1,3-Butadiene`F`RO
R`Strm6-Weight%-Carbon_Dioxide`F`RO
R`Strm6-Weight%-Ethylene`F`RO
R`Strm6-Weight%-Ethane`F`RO
R`Strm6-Spare_4`F`RO
R`Strm6-Spare_5`F`RO
// DA Quality code registers (Q`regno`numregs`strmno)
// None for now
// DA Timestamp registers (T`regno`numregs`strmno)

```
T`7771`2`6
// HDA database dimensions (D`maxrecs`items/rec`strmno)
D`762`28`1
D`762`28`2
D`762`28`3
D`762`28`4
D`762`28`5
D`762`28`6
// HDA newest record register (N`regno`strmno)
N`3112`1
N`3115`2
N`3118`3
N`3121`4
N`3124`5
N`3127`6
// HDA register to from which to read records (H`regno`numrecs`strmno)
H`751`254`1
H`761`254`1
H`771`254`1
H`752`254`2
H`762`254`2
H`772`254`2
H`753`254`3
H`763`254`3
H`773`254`3
H`754`254`4
H`764`254`4
H`774`254`4
H`755`254`5
H`765`254`5
H`775`254`5
H`756`254`6
H`766`254`6
H`776`254`6
// HDA record items (in order) (I`strmno`name`type`units`description)
I`1`Strm1-Weight%-Hydrogen`F`Weight %`Stream 1 - Weight Percent - Hydrogen
I`1`Strm1-Weight%-Nitrogen`F`Weight %`Stream 1 - Weight Percent - Nitrogen
I`1`Strm1-Weight%-Carbon_Monoxide`F`Weight %`Stream 1 - Weight Percent - Carbon Monoxide
I`1`Strm1-Weight%-Methane`F`Weight %`Stream 1 - Weight Percent - Methane
I`1`Strm1-Weight%-C5+`F`Weight %`Stream 1 - Weight Percent - C5+
I`1`Strm1-Weight%-Propane`F`Weight %`Stream 1 - Weight Percent - Propane
```

I`1`Strm1-Weight%-Propylene`F`Weight %`Stream 1 - Weight Percent - Propylene
I`1`Strm1-Weight%-i-Butane`F`Weight %`Stream 1 - Weight Percent - i-Butane
I`1`Strm1-Weight%-n-Butane`F`Weight %`Stream 1 - Weight Percent - n-Butane
I`1`Strm1-Weight%-Butene-1`F`Weight %`Stream 1 - Weight Percent - Butene-1
I`1`Strm1-Weight%-Trans-2-Butene`F`Weight %`Stream 1 - Weight Percent - Trans-2-Butene
I`1`Strm1-Weight%-CIS-2-Butene`F`Weight %`Stream 1 - Weight Percent - CIS-2-Butene
I`1`Strm1-Weight%-1,3-Butadiene`F`Weight %`Stream 1 - Weight Percent - 1,3-Butadiene
I`1`Strm1-Weight%-Carbon_Dioxide`F`Weight %`Stream 1 - Weight Percent - Carbon Dioxide
I`1`Strm1-Weight%-Ethylene`F`Weight %`Weight Stream 1 - Percent - Ethylene
I`1`Strm1-Weight%-Ethane`F`Weight %`Stream 1 - Weight Percent - Ethane
I`1`Strm1-Spare_1`F``
I`1`Strm1-Spare_2`F``
I`1`Strm1-Net_BTU_Dry`F`BTU`Stream 1 - Net Dry BTU
I`1`Strm1-Relative_Density`F``Stream 1 - Relative Density
I`1`Strm1-Unnormalized_Total_Mole%`F`Mole %`Stream 1 - Unnormalized Total Mole Percent
I`1`Strm1-User_Calculation_#1`F``Stream 1 - User Calculation #1
I`1`Strm1-User_Calculation_#2`F``Stream 1 - User Calculation #2
I`1`Strm1-User_Calculation_#3`F``Stream 1 - User Calculation #3
I`1`Strm1-Flare_Temperature`F`DEG F`Stream 1 - Flare Temperature (average during analysis from samples every 4 seconds)
I`1`Strm1-Flare_Pressure`F`PSIA`Stream 1 - Flare Pressure (average during analysis from samples every 4 seconds)
I`1`Strm1-Flare_Flowrate`F`BBLS/HR`Stream 1 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`1`Strm1-Spare_3`F``
I`2`Strm2-Weight%-Hydrogen`F`Weight %`Stream 2 - Weight Percent - Hydrogen
I`2`Strm2-Weight%-Nitrogen`F`Weight %`Stream 2 - Weight Percent - Nitrogen
I`2`Strm2-Weight%-Carbon_Monoxide`F`Weight %`Stream 2 - Weight Percent - Carbon Monoxide
I`2`Strm2-Weight%-Methane`F`Weight %`Stream 2 - Weight Percent - Methane
I`2`Strm2-Weight%-C5+`F`Weight %`Stream 2 - Weight Percent - C5+
I`2`Strm2-Weight%-Propane`F`Weight %`Stream 2 - Weight Percent - Propane
I`2`Strm2-Weight%-Propylene`F`Weight %`Stream 2 - Weight Percent - Propylene
I`2`Strm2-Weight%-i-Butane`F`Weight %`Stream 2 - Weight Percent - i-Butane
I`2`Strm2-Weight%-n-Butane`F`Weight %`Stream 2 - Weight Percent - n-Butane
I`2`Strm2-Weight%-Butene-1`F`Weight %`Stream 2 - Weight Percent - Butene-1
I`2`Strm2-Weight%-Trans-2-Butene`F`Weight %`Stream 2 - Weight Percent - Trans-2-Butene
I`2`Strm2-Weight%-CIS-2-Butene`F`Weight %`Stream 2 - Weight Percent - CIS-2-Butene
I`2`Strm2-Weight%-1,3-Butadiene`F`Weight %`Stream 2 - Weight Percent - 1,3-Butadiene
I`2`Strm2-Weight%-Carbon_Dioxide`F`Weight %`Stream 2 - Weight Percent - Carbon Dioxide
I`2`Strm2-Weight%-Ethylene`F`Weight %`Weight Stream 2 - Percent - Ethylene
I`2`Strm2-Weight%-Ethane`F`Weight %`Stream 2 - Weight Percent - Ethane

I`2`Strm2-Spare_1`F``
I`2`Strm2-Spare_2`F``
I`2`Strm2-Net_BTU_Dry`F`BTU`Stream 2 - Net Dry BTU
I`2`Strm2-Relative_Density`F``Stream 2 - Relative Density
I`2`Strm2-Unnormalized_Total_Mole%`F`Mole %`Stream 2 - Unnormalized Total Mole Percent
I`2`Strm2-User_Calculation_#1`F``Stream 2 - User Calculation #1
I`2`Strm2-User_Calculation_#2`F``Stream 2 - User Calculation #2
I`2`Strm2-User_Calculation_#3`F``Stream 2 - User Calculation #3
I`2`Strm2-Flare_Temperature`F`DEG F`Stream 2 - Flare Temperature (average during analysis from samples every 4 seconds)
I`2`Strm2-Flare_Pressure`F`PSIA`Stream 2 - Flare Pressure (average during analysis from samples every 4 seconds)
I`2`Strm2-Flare_Flowrate`F`BBLS/HR`Stream 2 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`2`Strm2-Spare_3`F``
I`3`Strm3-Weight%-Hydrogen`F`Weight %`Stream 3 - Weight Percent - Hydrogen
I`3`Strm3-Weight%-Nitrogen`F`Weight %`Stream 3 - Weight Percent - Nitrogen
I`3`Strm3-Weight%-Carbon_Monoxide`F`Weight %`Stream 3 - Weight Percent - Carbon Monoxide
I`3`Strm3-Weight%-Methane`F`Weight %`Stream 3 - Weight Percent - Methane
I`3`Strm3-Weight%-C5+`F`Weight %`Stream 3 - Weight Percent - C5+
I`3`Strm3-Weight%-Propane`F`Weight %`Stream 3 - Weight Percent - Propane
I`3`Strm3-Weight%-Propylene`F`Weight %`Stream 3 - Weight Percent - Propylene
I`3`Strm3-Weight%-i-Butane`F`Weight %`Stream 3 - Weight Percent - i-Butane
I`3`Strm3-Weight%-n-Butane`F`Weight %`Stream 3 - Weight Percent - n-Butane
I`3`Strm3-Weight%-Butene-1`F`Weight %`Stream 3 - Weight Percent - Butene-1
I`3`Strm3-Weight%-Trans-2-Butene`F`Weight %`Stream 3 - Weight Percent - Trans-2-Butene
I`3`Strm3-Weight%-CIS-2-Butene`F`Weight %`Stream 3 - Weight Percent - CIS-2-Butene
I`3`Strm3-Weight%-1,3-Butadiene`F`Weight %`Stream 3 - Weight Percent - 1,3-Butadiene
I`3`Strm3-Weight%-Carbon_Dioxide`F`Weight %`Stream 3 - Weight Percent - Carbon Dioxide
I`3`Strm3-Weight%-Ethylene`F`Weight %`Weight Stream 3 - Percent - Ethylene
I`3`Strm3-Weight%-Ethane`F`Weight %`Stream 3 - Weight Percent - Ethane
I`3`Strm3-Spare_1`F``
I`3`Strm3-Spare_2`F``
I`3`Strm3-Net_BTU_Dry`F`BTU`Stream 3 - Net Dry BTU
I`3`Strm3-Relative_Density`F``Stream 3 - Relative Density
I`3`Strm3-Unnormalized_Total_Mole%`F`Mole %`Stream 3 - Unnormalized Total Mole Percent
I`3`Strm3-User_Calculation_#1`F``Stream 3 - User Calculation #1
I`3`Strm3-User_Calculation_#2`F``Stream 3 - User Calculation #2
I`3`Strm3-User_Calculation_#3`F``Stream 3 - User Calculation #3
I`3`Strm3-Flare_Temperature`F`DEG F`Stream 3 - Flare Temperature (average during analysis from samples every 4 seconds)

I`3`Strm3-Flare_Pressure`F`PSIA`Stream 3 - Flare Pressure (average during analysis from samples every 4 seconds)
I`3`Strm3-Flare_Flowrate`F`BBLS/HR`Stream 3 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`3`Strm3-Spare_3`F``
I`4`Strm4-Weight%-Hydrogen`F`Weight %`Stream 4 - Weight Percent - Hydrogen
I`4`Strm4-Weight%-Nitrogen`F`Weight %`Stream 4 - Weight Percent - Nitrogen
I`4`Strm4-Weight%-Carbon_Monoxide`F`Weight %`Stream 4 - Weight Percent - Carbon Monoxide
I`4`Strm4-Weight%-Methane`F`Weight %`Stream 4 - Weight Percent - Methane
I`4`Strm4-Weight%-C5+`F`Weight %`Stream 4 - Weight Percent - C5+
I`4`Strm4-Weight%-Propane`F`Weight %`Stream 4 - Weight Percent - Propane
I`4`Strm4-Weight%-Propylene`F`Weight %`Stream 4 - Weight Percent - Propylene
I`4`Strm4-Weight%-i-Butane`F`Weight %`Stream 4 - Weight Percent - i-Butane
I`4`Strm4-Weight%-n-Butane`F`Weight %`Stream 4 - Weight Percent - n-Butane
I`4`Strm4-Weight%-Butene-1`F`Weight %`Stream 4 - Weight Percent - Butene-1
I`4`Strm4-Weight%-Trans-2-Butene`F`Weight %`Stream 4 - Weight Percent - Trans-2-Butene
I`4`Strm4-Weight%-CIS-2-Butene`F`Weight %`Stream 4 - Weight Percent - CIS-2-Butene
I`4`Strm4-Weight%-1,3-Butadiene`F`Weight %`Stream 4 - Weight Percent - 1,3-Butadiene
I`4`Strm4-Weight%-Carbon_Dioxide`F`Weight %`Stream 4 - Weight Percent - Carbon Dioxide
I`4`Strm4-Weight%-Ethylene`F`Weight %`Weight Stream 4 - Percent - Ethylene
I`4`Strm4-Weight%-Ethane`F`Weight %`Stream 4 - Weight Percent - Ethane
I`4`Strm4-Spare_1`F``
I`4`Strm4-Spare_2`F``
I`4`Strm4-Net_BTU_Dry`F`BTU`Stream 4 - Net Dry BTU
I`4`Strm4-Relative_Density`F``Stream 4 - Relative Density
I`4`Strm4-Unnormalized_Total_Mole%`F`Mole %`Stream 4 - Unnormalized Total Mole Percent
I`4`Strm4-User_Calculation_#1`F``Stream 4 - User Calculation #1
I`4`Strm4-User_Calculation_#2`F``Stream 4 - User Calculation #2
I`4`Strm4-User_Calculation_#3`F``Stream 4 - User Calculation #3
I`4`Strm4-Flare_Temperature`F`DEG F`Stream 4 - Flare Temperature (average during analysis from samples every 4 seconds)
I`4`Strm4-Flare_Pressure`F`PSIA`Stream 4 - Flare Pressure (average during analysis from samples every 4 seconds)
I`4`Strm4-Flare_Flowrate`F`BBLS/HR`Stream 4 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`4`Strm4-Spare_3`F``
I`5`Strm5-Weight%-Hydrogen`F`Weight %`Stream 5 - Weight Percent - Hydrogen
I`5`Strm5-Weight%-Nitrogen`F`Weight %`Stream 5 - Weight Percent - Nitrogen
I`5`Strm5-Weight%-Carbon_Monoxide`F`Weight %`Stream 5 - Weight Percent - Carbon Monoxide
I`5`Strm5-Weight%-Methane`F`Weight %`Stream 5 - Weight Percent - Methane
I`5`Strm5-Weight%-C5+`F`Weight %`Stream 5 - Weight Percent - C5+

I`5`Strm5-Weight%-Propane`F`Weight %`Stream 5 - Weight Percent - Propane
I`5`Strm5-Weight%-Propylene`F`Weight %`Stream 5 - Weight Percent - Propylene
I`5`Strm5-Weight%-i-Butane`F`Weight %`Stream 5 - Weight Percent - i-Butane
I`5`Strm5-Weight%-n-Butane`F`Weight %`Stream 5 - Weight Percent - n-Butane
I`5`Strm5-Weight%-Butene-1`F`Weight %`Stream 5 - Weight Percent - Butene-1
I`5`Strm5-Weight%-Trans-2-Butene`F`Weight %`Stream 5 - Weight Percent - Trans-2-Butene
I`5`Strm5-Weight%-CIS-2-Butene`F`Weight %`Stream 5 - Weight Percent - CIS-2-Butene
I`5`Strm5-Weight%-1,3-Butadiene`F`Weight %`Stream 5 - Weight Percent - 1,3-Butadiene
I`5`Strm5-Weight%-Carbon_Dioxide`F`Weight %`Stream 5 - Weight Percent - Carbon Dioxide
I`5`Strm5-Weight%-Ethylene`F`Weight %`Weight Stream 5 - Percent - Ethylene
I`5`Strm5-Weight%-Ethane`F`Weight %`Stream 5 - Weight Percent - Ethane
I`5`Strm5-Spare_1`F``
I`5`Strm5-Spare_2`F``
I`5`Strm5-Net_BTU_Dry`F`BTU`Stream 5 - Net Dry BTU
I`5`Strm5-Relative_Density`F``Stream 5 - Relative Density
I`5`Strm5-Unnormalized_Total_Mole%`F`Mole %`Stream 5 - Unnormalized Total Mole Percent
I`5`Strm5-User_Calculation_#1`F``Stream 5 - User Calculation #1
I`5`Strm5-User_Calculation_#2`F``Stream 5 - User Calculation #2
I`5`Strm5-User_Calculation_#3`F``Stream 5 - User Calculation #3
I`5`Strm5-Flare_Temperature`F`DEG F`Stream 5 - Flare Temperature (average during analysis from samples every 4 seconds)
I`5`Strm5-Flare_Pressure`F`PSIA`Stream 5 - Flare Pressure (average during analysis from samples every 4 seconds)
I`5`Strm5-Flare_Flowrate`F`BBLS/HR`Stream 5 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`5`Strm5-Spare_3`F``
I`6`Strm6-Weight%-Hydrogen`F`Weight %`Stream 6 - Weight Percent - Hydrogen
I`6`Strm6-Weight%-Nitrogen`F`Weight %`Stream 6 - Weight Percent - Nitrogen
I`6`Strm6-Weight%-Carbon_Monoxide`F`Weight %`Stream 6 - Weight Percent - Carbon Monoxide
I`6`Strm6-Weight%-Methane`F`Weight %`Stream 6 - Weight Percent - Methane
I`6`Strm6-Weight%-C5+`F`Weight %`Stream 6 - Weight Percent - C5+
I`6`Strm6-Weight%-Propane`F`Weight %`Stream 6 - Weight Percent - Propane
I`6`Strm6-Weight%-Propylene`F`Weight %`Stream 6 - Weight Percent - Propylene
I`6`Strm6-Weight%-i-Butane`F`Weight %`Stream 6 - Weight Percent - i-Butane
I`6`Strm6-Weight%-n-Butane`F`Weight %`Stream 6 - Weight Percent - n-Butane
I`6`Strm6-Weight%-Butene-1`F`Weight %`Stream 6 - Weight Percent - Butene-1
I`6`Strm6-Weight%-Trans-2-Butene`F`Weight %`Stream 6 - Weight Percent - Trans-2-Butene
I`6`Strm6-Weight%-CIS-2-Butene`F`Weight %`Stream 6 - Weight Percent - CIS-2-Butene
I`6`Strm6-Weight%-1,3-Butadiene`F`Weight %`Stream 6 - Weight Percent - 1,3-Butadiene
I`6`Strm6-Weight%-Carbon_Dioxide`F`Weight %`Stream 6 - Weight Percent - Carbon Dioxide
I`6`Strm6-Weight%-Ethylene`F`Weight %`Weight Stream 6 - Percent - Ethylene

I`6`Strm6-Weight%-Ethane`F`Weight %`Stream 6 - Weight Percent - Ethane
I`6`Strm6-Spare_1`F``
I`6`Strm6-Spare_2`F``
I`6`Strm6-Net_BTU_Dry`F`BTU`Stream 6 - Net Dry BTU
I`6`Strm6-Relative_Density`F``Stream 6 - Relative Density
I`6`Strm6-Unnormalized_Total_Mole%`F`Mole %`Stream 6 - Unnormalized Total Mole Percent
I`6`Strm6-User_Calculation_#1`F``Stream 6 - User Calculation #1
I`6`Strm6-User_Calculation_#2`F``Stream 6 - User Calculation #2
I`6`Strm6-User_Calculation_#3`F``Stream 6 - User Calculation #3
I`6`Strm6-Flare_Temperature`F`DEG F`Stream 6 - Flare Temperature (average during analysis from samples every 4 seconds)
I`6`Strm6-Flare_Pressure`F`PSIA`Stream 6 - Flare Pressure (average during analysis from samples every 4 seconds)
I`6`Strm6-Flare_Flowrate`F`BBLS/HR`Stream 6 - Flare Flowrate (average during analysis from samples every 4 seconds)
I`6`Strm6-Spare_3`F``

7.0 THEORY OF OPERATION

Each GCOPC server polls a GC for real-time data at the configured server rate. The polled data is used to update the OPC DA interface values. These values are then made available to any subscribed OPC DA clients. The data for each stream will be updated at the end of each analysis cycle. All data will change at the same time and be associated with a single timestamp (obtained from the cycle start time for the completed analysis).

The Sample Port Definition File (Section 6.0) includes three types of real-time data points:

- Analysis Results
- User Calculation
- Temperature, Pressure, and Flowrate

The first type includes the component concentrations, including two spares, the Net Heating Value (Net BTU Dry), Relative Density (specific gravity), and Un-normalized Total Mole Percent, all of which are calculated as part of the standard chromatographic calculations.

The second type includes the three points labeled User Calculation #1, User Calculation #2, and User Calculation #3. These allow the user to add up to three special calculations which can be included in the results. The algorithms are defined by the user and the calculations are performed with the standard calculations at the end of the analysis; hence the results are updated at the same time as the standard results. The *MON2000 Software for Gas Chromatographs Manual* (P/N 3-9000-522) includes a discussion of user calculations.

The third type of points are Flare Temperature, Flare pressure, Flare Flowrate, and Spare 3. These points are updated at the end of the analysis but their values are calculated by averaging samples of the analog inputs obtained approximately every 2 seconds during the analysis. At the end of the analysis the average values so calculated become the “current” values for these points and a new averaging process is begun for the next analysis.

At the end of each analysis a record is added to a file in the GC which includes the values of each of the DA data points. This file expands to a maximum of 762 records, which at the average analysis cycle time of four minutes is 2 days, 2 hours, and 48 minutes of analysis results. After 762 records the oldest record is overwritten with the most recent record, thus the GC always has the results of the most recent 762 analyses. The record number of the most recently written record is accessible to the GCOPC via a specified modbus register, and is used to allow the program to determine the oldest and newest record. Upon startup, the GCOPC program queries the GC to determine the number of historical records and recollects them all (up to 762). It then creates its own copy of the file which exists in the GC. When the GCOPC program detects the end of an analysis, it updates its file to match the updated GC file. This file is used to serve information to the HDA clients in response to requests for data from selected date/time intervals. Timestamps associated with data points in the historical data records are set to the cycle start time of the corresponding analysis.

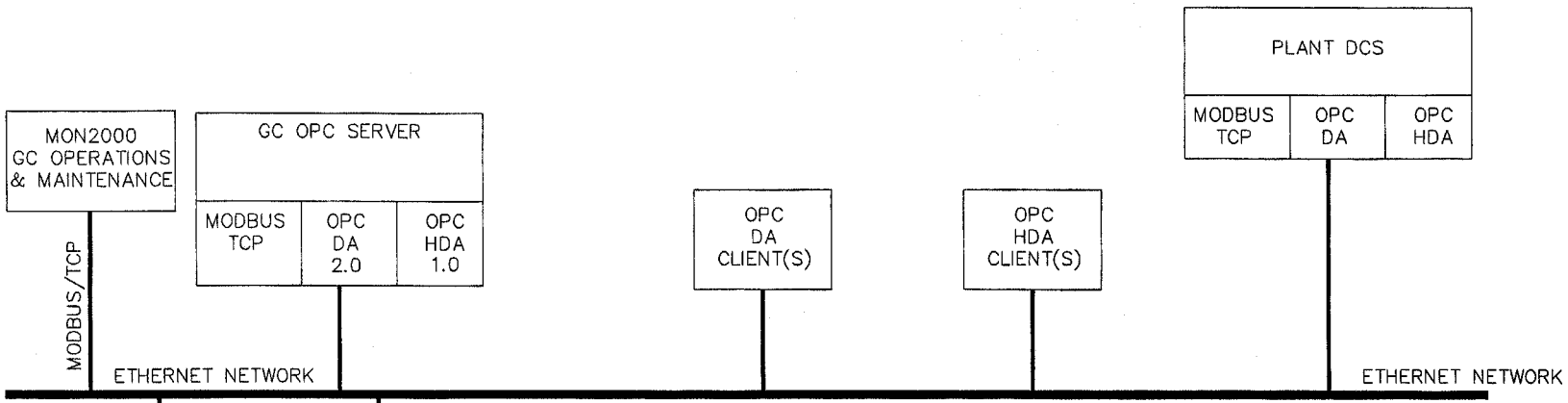
APPENDIX A

DRAWINGS

This appendix contains the drawing for OPC Server for Gas Chromatographs typical network architecture.

BE-21298 OPC Server for Gas Chromatographs Typical Network Architecture

This page is intentionally left blank.



DA data

MODBUS REGISTERS		MODBUS REGISTERS		MODBUS REGISTERS	
7527	Weight Percent – Hydrogen	7623	Mole Percent – Hydrogen	7637	Mole Percent – Ethylene
7528	Weight Percent – Nitrogen	7624	Mole Percent – Nitrogen	7638	Mole Percent – Ethane
7529	Weight Percent – Carbon Monoxide	7625	Mole Percent – Carbon Monoxide	7639	Component 1
7530	Weight Percent – Methane	7626	Mole Percent – Methane	7640	Component 2
7531	Weight Percent – C5+	7627	Mole Percent – C5+	7641	Net BTU Dry
7532	Weight Percent – Propane	7628	Mole Percent – Propane	7642	Relative Density
7533	Weight Percent – Propylene	7629	Mole Percent – Propylene	7643	Unnormalized Total Mode Percent
7534	Weight Percent – i–Butane	7630	Mole Percent – i–Butane	7644	User #1 (User Calc defined by User_1_ndx)
7535	Weight Percent – n–Butane	7631	Mole Percent – n–Butane	7645	User #2 (User Calc defined by User_2_ndx)
7536	Weight Percent – Butene–1	7632	Mole Percent – Butene–1	7646	User #3 (User Calc defined by User_3_ndx)
7537	Weight Percent – Trans–2–Butene	7633	Mole Percent – Trans–2–Butene	7647	Flare Temperature (from Analog Input #1 – average during last analysis)
7538	Weight Percent – CIS–2–Butene	7634	Mole Percent – CIS–2–Butene	7648	Flare Pressure (from Analog Input #2 – average during last analysis)
7539	Weight Percent – 1,3–Butadiene	7635	Mole Percent – 1,3–Butadiene	7649	Flare Flow Rate (from Analog Input #3 – average during last analysis)
7540	Weight Percent – Carbon Dioxide	7636	Mole Percent – Carbon Dioxide	7650	Spare3 Analog (from Analog Input #4 – average during last analysis)
7541	Weight Percent – Ethylene				
7542	Weight Percent – Ethane				
7543	Spare–4				
7544	Spare–5				

HDA data

Results data for each of the most recent 762 analyses (about 8 days assuming 15 minute analysis cycle) will be available via the OPC HDA interface. For each analysis the data points available will be as in the list for DA data points above.

SI METRIC					
THIRD ANGLE PROJECTION					
MATERIAL N/A	B	2-14-05	HM	ECO–XX–5000217	EM JRB
	A	10–7–04	HM	RELEASED	EM	JB
FINISH N/A	REV	DATE	DRN	DESCRIPTION	CHKD	APPD
PROJ. FILE NO. – NONE	FILENAME: BE21298B1.dwg, DATE: 02–14–05, TIME: 7:51 A.M.				

GEOMETRIC TOLERANCES & DIMENSIONS PER ANSI Y14.5 LATEST REVISION

UNLESS OTHERWISE NOTED ALL DIMENSIONS IN INCHES
X.XX ±.015
X.XXX ±.005
ANGULAR ±0° 30'
FINISH 200 RA MAX

BREAK ALL SHARP CORNERS TO .003–.015 RADIUS AND REMOVE ALL BURRS

EMERSON. Process Management

DRN JB/HM	DATE 9/29/04	DWG NO. BE–21298	REV B
CHKD EM	DATE 10–7–04		
APPD JB	DATE 10–7–04	SCALE NTS	P/N SEE ORDER	SHT 1 OF 1

TITLE

OPC SERVER FOR GAS CHROMATOGRAPHS TYPICAL NETWORK ARCHITECTURE

WARRANTY CLAIM PROCEDURES

To make a warranty claim, you, the Purchaser, must:

1. Provide Daniel Measurement Services (DMS), a division of Emerson Process Management, with proof of the Date of Purchase and proof of the Date of Shipment of the product in question.

2. Return the product to DMS within twelve (12) months of the date of original shipment of the product, or within eighteen (18) months of the date of original shipment of the product to destinations outside of the United States. The Purchaser must prepay any shipping charges. In addition, the Purchaser is responsible for insuring any product shipped for return, and assumes the risk of loss of the product during shipment.

3. To obtain Warranty service or to locate the nearest DMS office, sales, or service center call (713) 827-6314, Fax (713) 827-6312 write to:

   Daniel Measurement Services
   a division of Emerson Process Management
   11100 Brittmoore Park Drive
   Houston, Texas 77041

   Or contact DMS via the following site:

   www.emersonprocess.com/daniel

4. When contacting DMS for product service, the Purchaser is asked to provide information as indicated on the following page entitled "Customer Repair Report".

5. For product returns from locations outside the United States, it will be necessary for you to obtain the import consignment address so that DMS's customs broker can handle the importation with the U.S. Customs Service.

6. DMS offers both on call and contract maintenance service designed to afford single source responsibility for all its products.

7. DMS reserves the right to make changes at any time to any product to improve its design and to insure the best available product.

CUSTOMER REPAIR REPORT

FOR SERVICE, COMPLETE THIS FORM, AND RETURN IT ALONG WITH THE AFFECTED EQUIPMENT TO CUSTOMER SERVICE AT THE ADDRESS INDICATED BELOW.

COMPANY NAME: _____

TECHNICAL CONTACT: _____ PHONE: _____

REPAIR P. O. #: _____ IF WARRANTY, UNIT S/N: _____

INVOICE ADDRESS: _____

_____

_____

SHIPPING ADDRESS: _____

_____

_____

RETURN SHIPPING METHOD: _____

EQUIPMENT MODEL #: _____ S/N: _____ FAILURE DATE: _____

DESCRIPTION OF PROBLEM: _____

_____

_____

_____

WHAT WAS HAPPENING AT TIME OF FAILURE? _____

_____

_____

_____

ADDITIONAL COMMENTS: _____

_____

_____

_____

REPORT PREPARED BY: _____ TITLE: _____

IF YOU REQUIRE TECHNICAL ASSISTANCE, PLEASE FAX OR WRITE THE CUSTOMER SERVICE DEPARTMENT AT:

DANIEL MEASUREMENT SERVICES
DIVISION OF EMERSON PROCESS MANAGEMENT
ATTN: CUSTOMER SERVICE
11100 BRITTMOORE PARK DRIVE
HOUSTON, TEXAS 77041

PHONE: (713) 827-6314
FAX: (713) 827-6312

FOR FASTEST SERVICE CONTACT DMS VIA OUR WEBSITE:
www.emersonprocess.com/daniel

Daniel Measurement and Control, Inc., Daniel Measurement Services, Inc., and Rosemount Analytical, Inc., Divisions of Emerson Process Management reserve the right to make changes to any of its products or services at any time without prior notification in order to improve that product or service and to supply the best product or service possible.

www.emersonprocess.com/daniel