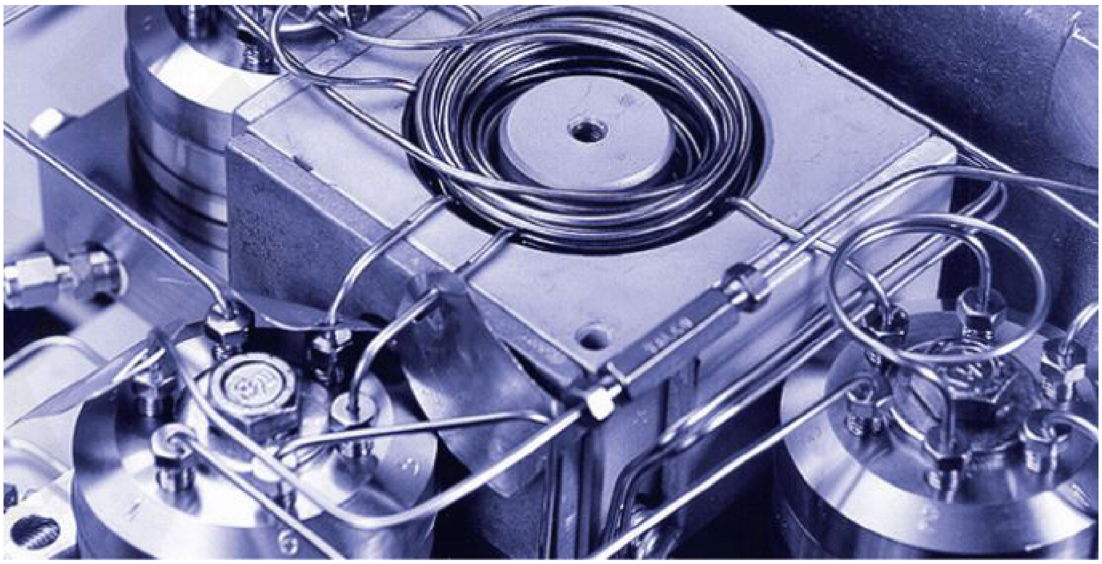
Manual
MS-00809-0100-2000, Rev AB
May 2023

Rosemount™ MON2000 Software for Gas Chromatographs

Applies to the Rosemount 500, 700, and 1000 Gas Chromatographs



ROSEMOUNT™

EMERSON™

Notice

EMERSON (“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.

Warranty

1. LIMITED WARRANTY: Subject to the limitations contained in Section 2 herein and except as otherwise expressly provided herein, Emerson (“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.

Contents

1 Introduction

Welcome to the *MON2000 User Manual* (P/N 00809-0100-2000), a user guide that accompanies the MON2000 software produced by Emerson.

Use this manual for installing the MON2000 and Modbus Test (WinMB) software programs, getting started, checking various gas chromatograph (GC) application settings, and configuring and monitoring your GC system.

1.1 Description of Manual

See the following section summaries or the Table of Contents for more information.

Section 1 – Introduction

This section includes:

- summary listing of the manual sections
- description of the MON2000 User Guide online help file
- description of the MON2000 software program

Section 2 – Installation and Startup

This section includes:

- short description of the MON2000 software
- minimum system requirements for installing MON2000 on a 32-bit Microsoft® Windows® platform
- installation and Startup instructions
- establishing communications and Logon procedures
- instructions for customizing MON2000 and setting up security
- instructions for downloading an application and using the Offline Edit function to change an application's configuration

Section 3 – Getting Started

This section includes:

- instructions on how to log on and log off
- navigation instructions for MON2000
- listing of available procedures and keyboard shortcuts
- access and navigation instructions for the MON2000 User Guide online help file

Section 4 – Control Functions

This section includes:

- description of available Control functions and detailed step procedures

Section 5 – Application Functions

This section includes:

- description of available GC Application functions and detailed step procedures

Section 6 – Chromatogram Viewer

This section includes:

- description of available Chromatogram Viewer functions and detailed step procedures to view, save, and print chromatograms

Section 7 – Reports

This section includes:

- descriptions of available reports and sample outputs
- instructions on how to generate and print a given report

Section 8 – Logs

This section includes:

- description of Maintenance, Alarm, and Event logs
- description of the Parameter List
- step procedures for viewing, editing, and clearing logs

Section 9 – Data Collection

This section includes:

- descriptions of Data Collection and Auto-Sequencing
- instructions on how to configure, generate and run the Data Collection and Auto-Sequencing function using MON2000 PLUS

Section 10 – Modbus Test

This section includes:

- short description of the WinMB software
- minimum system requirements for installing WinMB on a 32-bit Microsoft® Windows® platform
- installation and start up instructions
- description of available Modbus Test functions and detailed step procedures
- description of the WinMB online help file and navigation instructions

Appendix A, PC Config Report

This appendix provides a sample PC Config Report for reference only.

Appendix B, Component Data Table

This appendix provides two sample Component Data Tables for reference only.

Appendix C, Data Computations

This appendix discusses the various equations and computations involved with acquisition and analysis tasks.

Appendix D, Analog Output Cal. 2350A GC

This appendix demonstrates how to calibrate an analog output for a 2350A GC Controller, using the **MON2000** software.

Appendix E, Upgrade 2350A GC S/W and 2350 EPROMS

This appendix describes how to upgrade the GC software and the 2350 GC Controller EPROMS, the 2350A WinSystems CPU, P/C104 Bus, and DiskOnChip.

Appendix F, Modbus Reg. List for 2350A GC

This appendix explains the differences between SIM_2251 and User_Modbus protocols, and lists the corresponding Modbus registers used by the 2350A GC Controller.

1.2 Description of Online Help

Use the User Guide online help file to quickly access information regarding any MON2000 function. Using Online Help for more detailed information.

1.3 Description of MON2000

MON2000 is a menu-driven, Windows-based software program designed to operate the gas chromatograph (GCs). MON2000 runs on an IBM-compatible personal computer (PC) and serves as an interface between you and the GC unit. MON2000 can run on a Windows® 95, Windows 98, Windows 2000, Windows XP or Windows NT operating system.

MON2000, combined with the GC application(s), offers a complete software package for operating and monitoring one or more GC systems from a single PC. MON2000 includes security features to help prevent unauthorized access to GC data or control. MON2000 also includes, for trouble-shooting purposes, an auxiliary program (WinMB) to selectively poll the GC Modbus registers (Modbus Test for more information).

Note
When configured for RS-485 multi-drop networking, MON2000 can interface with up to 32 GC units, either in a stand-alone configuration or via a network.

Note
When configured for Ethernet networking MON2000 can interface with a number of GC Units limited only by the number of available TCP/IP addresses.

GC functions that can be initiated or controlled by MON2000 include:

- alarm parameters
- alarm and event processing
- analog scale adjustments
- analyses
- baseline runs
- calculation assignments and configurations
- calibrations
- component assignments and configurations
- diagnostics
- event sequences
- halt operations
- stream assignments and sequences
- valve activations

- timing adjustments

Reports that can be generated by MON2000 per the GC application:

- 24-Hour Averages
- Analysis
- Calibration
- Final Calibration
- Hourly Averages
- Monthly Averages
- PC Configuration
- Raw Data
- Variable Averages
- Weekly Averages

Logs that are maintained by MON2000:

- Alarm Log
- Event Log
- Parameter List
- Maintenance Log

1.4 Cybersecurity Recommendations for Model 500 and MON2000/MON2000 PLUS Users

Install Model 500 GC in Secure Environment with Physical Protection

- Install Model 500 GC in Secure Environment with Physical Protection
- Scan the USB shipped with the GC with anti-virus software before use
- Store all the GC related files including application files, drawings, and documents in the secure network/drive with restricted access

Install MON2000/MON2000 PLUS on a Secure PC

- Access to PC should be protected by adequate username/password
- With restricted admin privileges on PC - OS configuration, install software, etc.
- Restrict network ports and connection of mass storage devices/removable media
- Resides on a private LAN with firewall and network access control list configured for blocking illegitimate access
- With antivirus software kept current on PC
- With Windows automatic updates enabled on PC
- PC updated with Windows security patches
- With physical access controls - locked room, key-card entry, etc.

Connect to Model 500 GC via MON2000/MON2000 PLUS on Secure Network

- Ethernet: Resides on a private LAN with firewall and network access control list configured for blocking illegitimate access
- Cellular Modem: VPN should be utilized with the required ports open
- Network devices updated with all available security patches
- With antivirus software kept current on all computers in the network
- With physical access controls for network devices – physical locks, ID verification, etc.
- Follow industry best practices for secure network

Control Access to Model 500 GC Using Personal Identification Numbers (PIN's) of Sufficient Complexity

- The PIN length should be at least 10 numeric characters
- All default users should be removed after GC commissioning or PIN upgrade to comply with the PIN complexity guidelines
- Use a unique PIN for each user
- Avoid sharing PIN's with other users

Control Access to User Profile for Model 500 GC Using Admin Password of Sufficient Complexity

- The Admin Password length should be at least 10 alphanumeric characters
- The Admin Password should include at least one number, mix of upper/lower case characters, and at least one special character (!@#$%^&*_-+=:?)
- The default Admin Password should be changed after GC commissioning by using the password complexity guidelines
- Avoid sharing the password with non-admin users

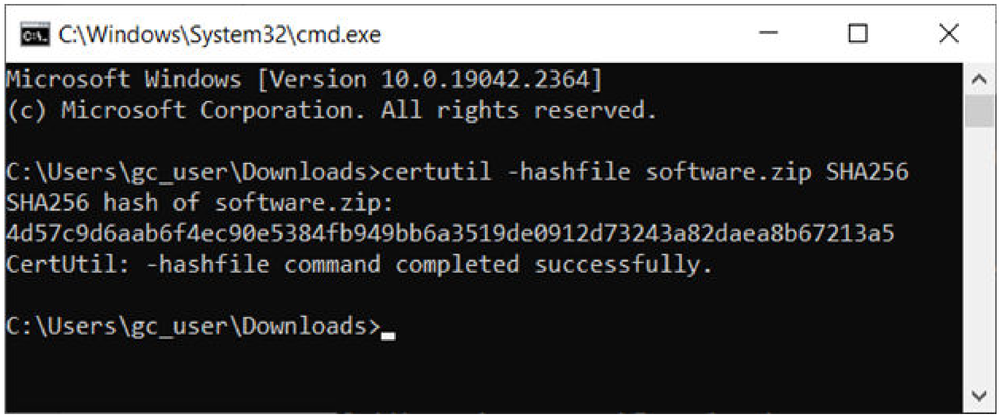
Upload/Download Files of the Approved Types to/from Model 500 GC

- Upload/Download Files of the Approved Types to/from Model 500 GC
- The Approved Types of files include .xls, .xlsx, .pdf, .tif/.tiff, .trd (Trend File), .cgm (CGM File), and .cmp (CGM Comparison File)
- Scan the mass storage device with the latest anti-virus software before uploading any files to GC

Check Integrity for Distributed Binaries

- A hash value will be provided for some SW/FW files distributed by Emerson GC so that the user can verify the integrity of the file
- The hashing algorithm SHA-256 is used for calculating the hash value of the binary file
- There are many programs for calculating the SHA-256 hash including Windows Command Prompt , Windows PowerShell, and Third-Party Software (e.g. Hash Tool). The user can use a program of choice to calculate the SHA-256 hash value of the downloaded file and compare it to the value specified on the download page.
- The following is an example of using Windows Command Prompt to calculate the SHA-256 hash value:
  - In a command line, run the command:
    - certutil -hashfile [filename] SHA256
  - For example:

- certutil -hashfile software.zip SHA256



2 Installation and Setup

This section lists the system requirements to run MON2000 and provides installation procedures as well as initial logon instructions, communications setup, and software configuration.

2.1 System Requirements

To achieve maximum performance when running the MON2000 software, ensure your PC system meets the following requirements.

Compatible operating systems:

- Windows® Vista, Windows® 7, Windows® 8 or Windows® 10
- Internet Explorer® 9 or higher

Minimum hardware specifications:

- 1 gigahertz (GHz) 32-bit or 64-bit processor
- 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- 1 GB available hard disk space
- Super VGA Monitor with 1024x768 or higher resolution
- One Ethernet Port for connecting to Gas Chromatographs
- Windows®-compatible modem for remote connections (Optional)
- Windows®-compatible printer for printing reports (Optional)

2.2 Installing MON2000

To install MON2000, do the following:

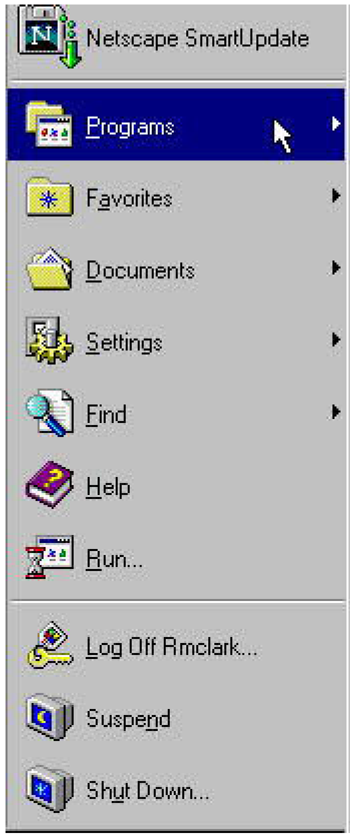
Note
If you are upgrading MON2000, you must install the new software with same directory as the current version.

Procedure

1. Either place the MON2000 CD in your CD-ROM drive or insert Installation Disk 1 into your floppy drive.
2. Launch Windows® Explorer® by either:

    a) Clicking the 

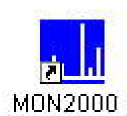
button (see the taskbar) to access the *Programs* menu option.



b) Double-clicking the Windows® Explorer® icon on your desktop.

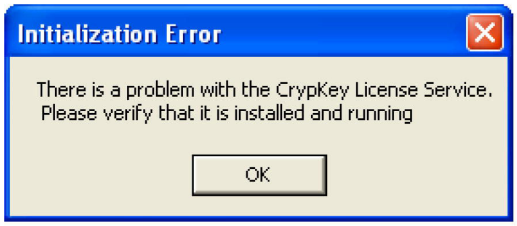
3. Access either your CD-ROM drive or floppy drive.
4. Double-click the **setup.exe** file.
5. The Installation Wizard begins. Follow the instructions provided on each screen.

   Upon successful installation, Windows® automatically creates a MON2000 icon on your desktop.



2.3 Installing the CrypKey License Service for MON2000 PLUS

The CrypKey License Service must be installed on all NT-based systems. If you try to run MON2000 PLUS before installing the CrypKey License Service, an error will result.



To install the CrypKey License Service, do the following:

Procedure

1. After installing MON2000 PLUS, the program folder should display automatically; if it doesn't, open Windows® Explorer® and access the MON2000 PLUS program folder.
2. Double-click the **SETUPEX.EXE** file.

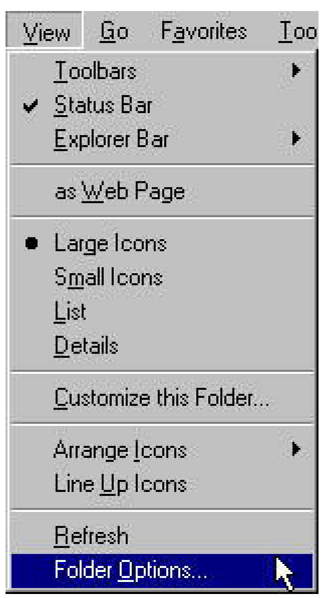
   MON2000 PLUS can now be started. You have 30 days to evaluate the application. Once the trial period expires, you must obtain a license to continue to use MON2000 PLUS.

2.4 Copying MON2000 to Disks

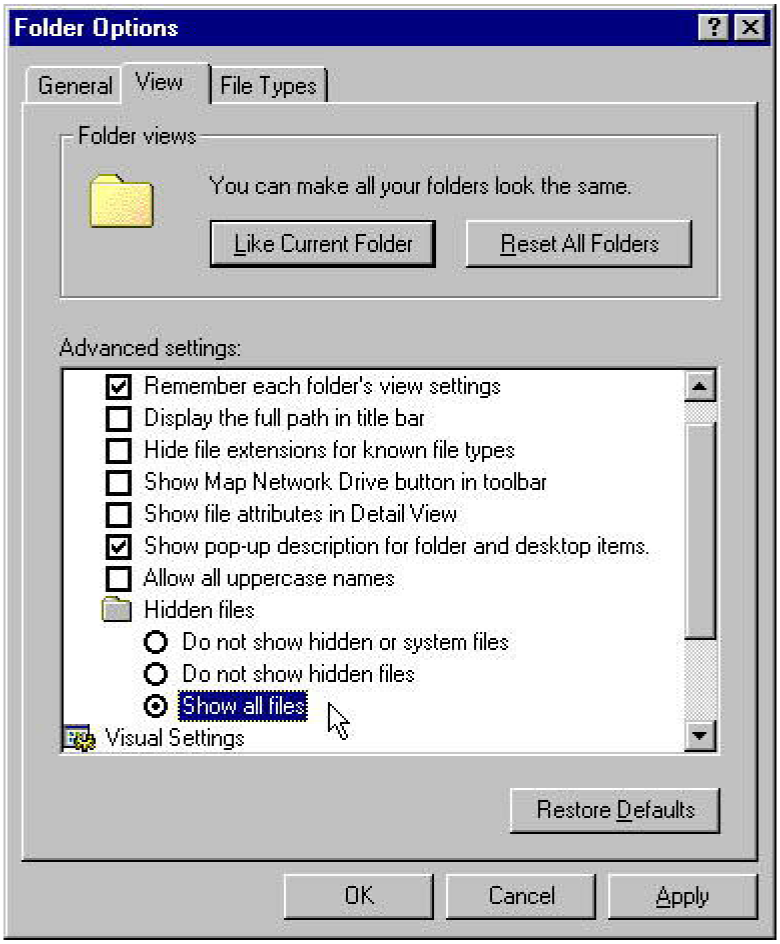
Use this procedure to copy the MON2000 installation files to 3 floppy disks for future installation.

Procedure

1. Label 3 blank formatted 3.5-inch floppy disks "MON2000 Install Disk 1", "MON2000 Install Disk 2", and "MON2000 Install Disk 3".
2. Place the MON2000 CD in your CD-ROM drive.
3. Launch Windows® Explorer®.
4. Ensure that the Show all files option in Windows® Explorer® is selected.
   a) Use the **View** → **Folder Options** menu to access the Folder Options dialog.



b) Click the **View** tab.



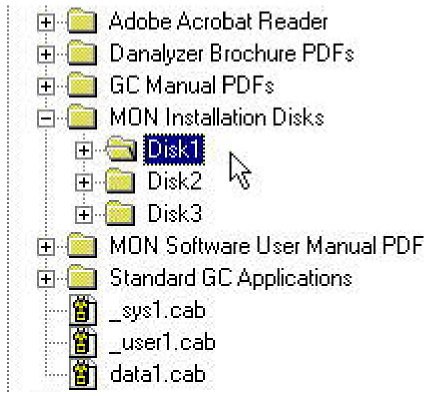
c) In the Advanced Settings pane, find the gray folder icon labeled ***Hidden Files***.

d) Click the **Show all files** radio button.

e) Click the 

button.

5. Use the Windows® Explorer® directory tree to open the ***MON2000*** Installation Files folder on your CD.



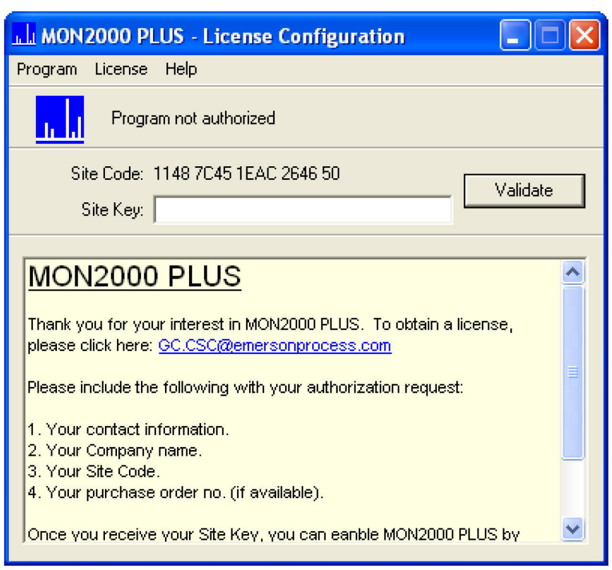
6. Place the “MON2000 Install Disk 1” in your floppy drive.
7. Open the ***Disk1*** folder on your CD.
8. Copy all files from the ***Disk1*** folder to the “MON2000 Install Disk 1” floppy.
9. Remove the “MON2000 Install Disk 1” from your floppy drive.
10. Repeat Steps Step 5 through Step 8 to copy the ***Disk2*** and ***Disk3*** folders to your “MON2000 Install Disk 2” and “MON2000 Install Disk 3” floppy disks.
11. Remove the MON2000 CD from your CD-ROM drive.

2.5 Transferring a MON2000 PLUS License

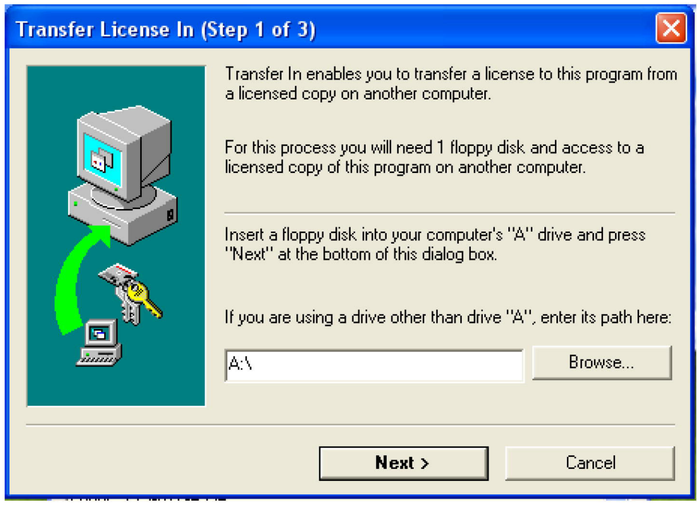
To physically transfer the license file from one computer to the other you will need a removeable storage medium such as a 3.5-inch floppy disk or a USB flash drive. Also, there must be a licensed version on MON2000 PLUS installed on the source computer and an unlicensed version of MON2000 PLUS on the targeted computer.

Procedure

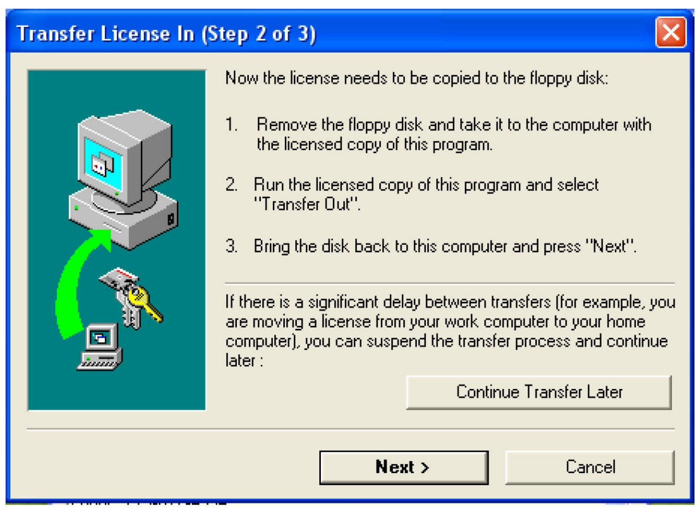
1. On the target computer, if using a floppy disk, insert it into the disk drive; if using a flash drive, insert it in to a USB slot.
2. Start MON2000 on the target computer. The *License Configuration* screen displays.



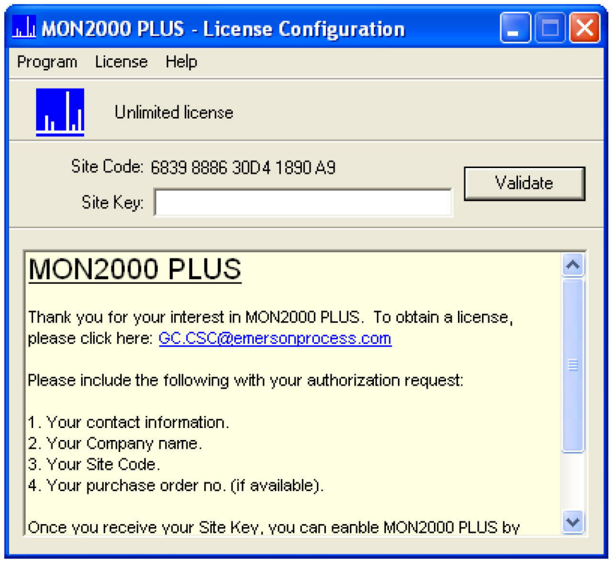
3. Select **Transfer in from another computer...** from the `License` menu. The *Transfer License In (Step 1 of 3)* screen displays.



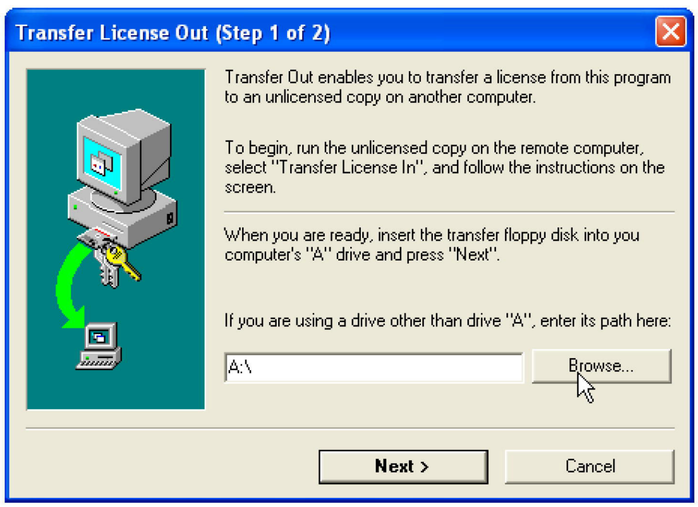
4. Click **Browse** to select a disk path to the removeable storage medium that holds the license file. Click **OK** to accept your selection.
5. Click **Next**. The *Transfer License In (Step 2 of 3)* screen displays.



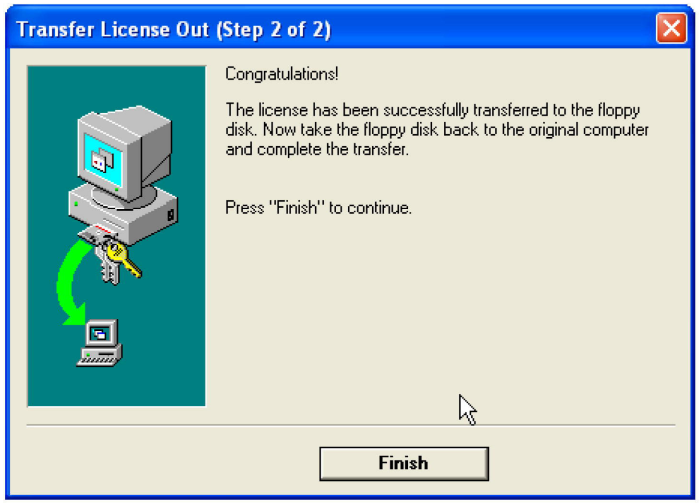
6. Remove the removeable storage medium from the targeted computer and insert it into the source computer.
7. Launch MON2000 PLUS on the source computer. When the startup screen displays, press **Enter**. The *License Configuration* screen displays with the message “Unlimited license”.



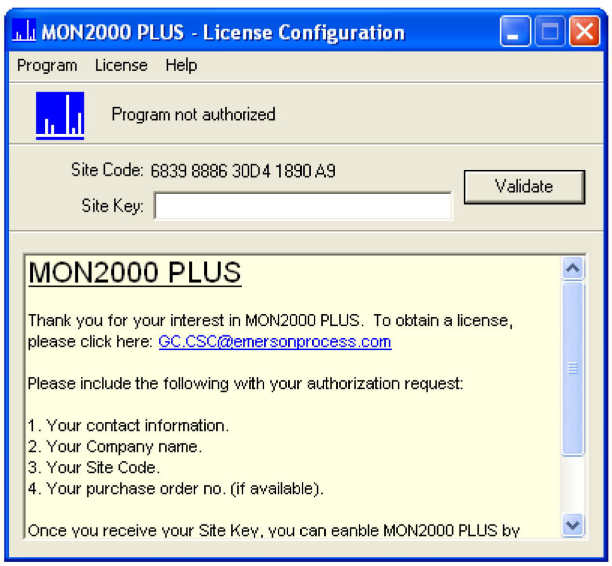
8. Select **Transfer out to another computer...** from the *License* menu of the *License Configuration* screen. The *Transfer License Out (Step 1 of 2)* screen displays.



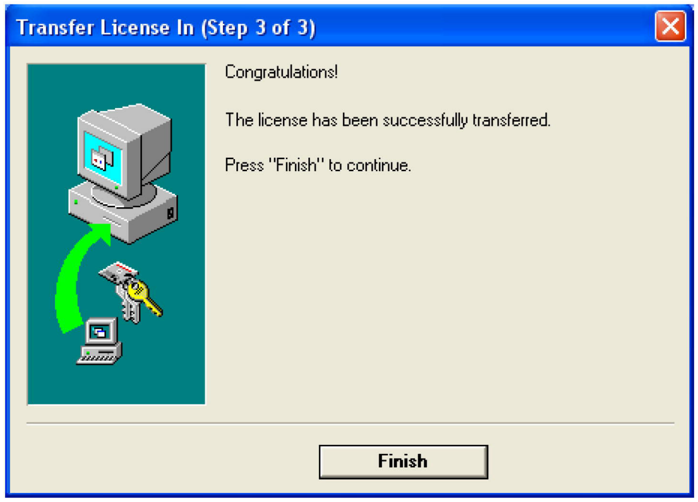
9. Click **Browse** to select a disk path to the removeable storage medium that holds the license file. Click **OK** to accept your selection.
10. Click **Next**. The *Transfer License Out (Step 2 of 2)* screen displays.



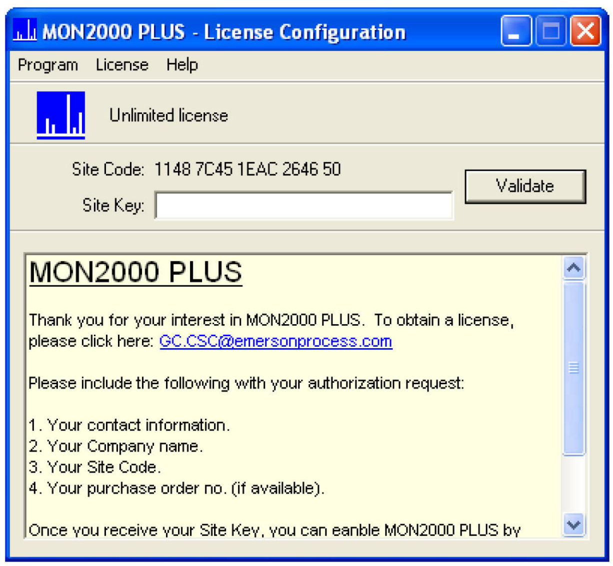
11. Click **Finish**. MON2000 PLUS on the source computer is no longer licensed.



12. Remove the removeable storage medium from the source computer and reinsert it into targeted computer.
13. On the targeted computer, click **Next** on the *Transfer License In (Step 2 of 3)* screen. The *Transfer License In (Step 3 of 3)* screen displays.



14. Click **Finish**. The *License Configuration* screen displays.



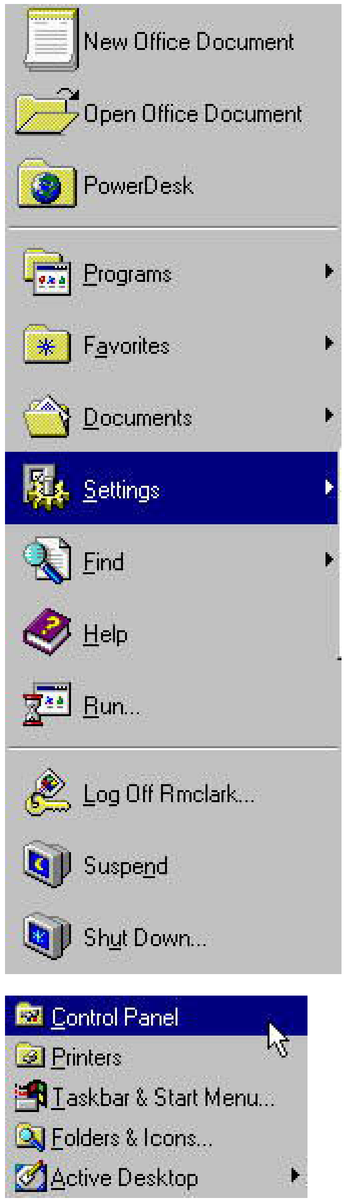
MON2000 PLUS is now licensed for unlimited use on the targeted computer.

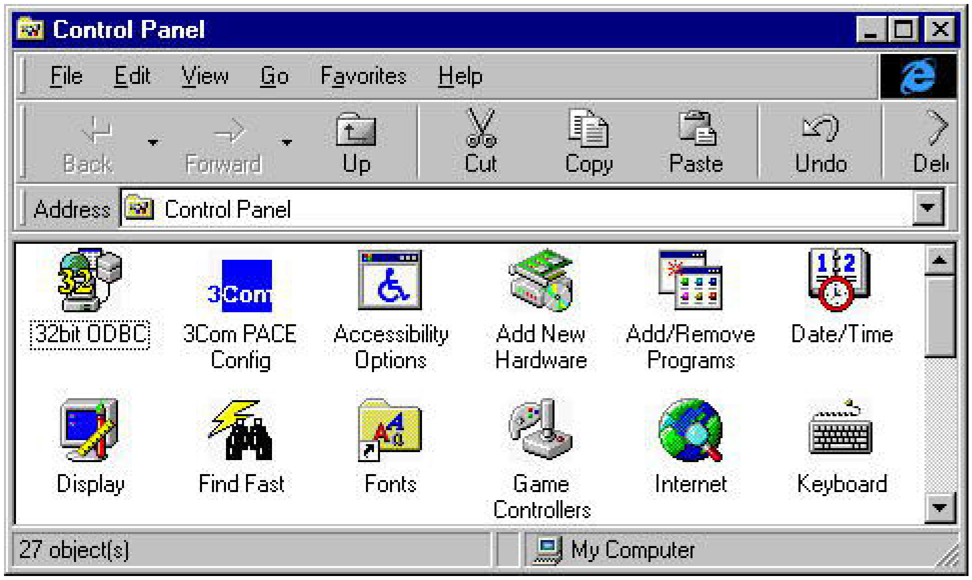
2.6 Uninstalling MON2000

To uninstall MON2000 using Windows® 95, Windows® 98, Windows® 2000 or Windows® NT,

Procedure

1. Click the  button (see the taskbar).
2. Click `Settings` and then `Control Panel`. The Control Panel dialog appears.


New Office Document
Open Office Document
PowerDesk
Programs
Favorites
Documents
Settings
Find
Help
Run...
Log Off Rmclark...
Suspend
Shut Down...
Control Panel
Printers
Taskbar & Start Menu...
Folders & Icons...
Active Desktop

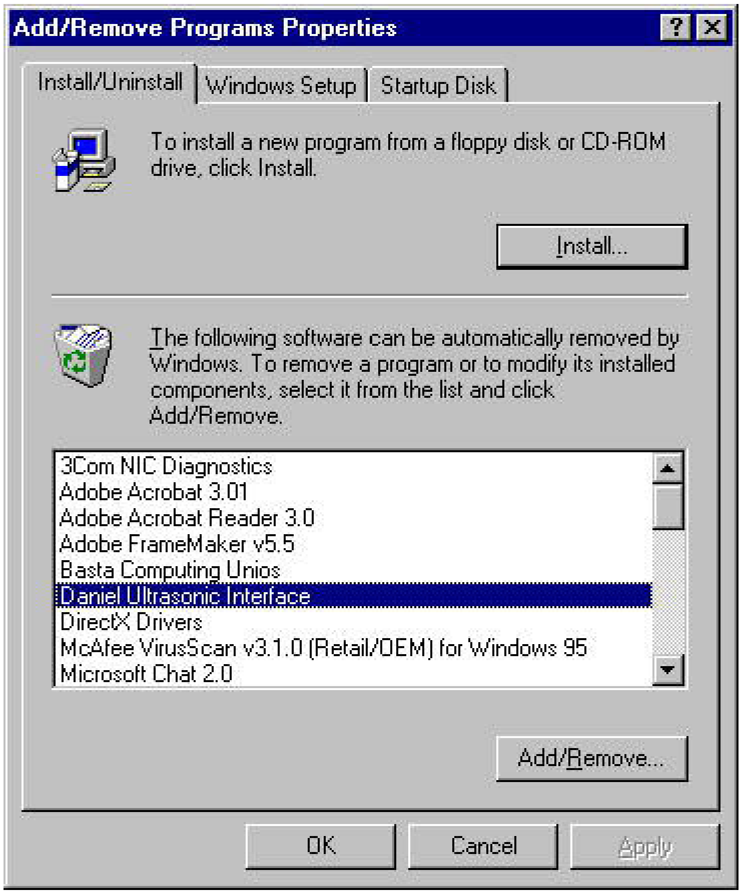


3. Double-click the `Add/Remove Programs` icon.

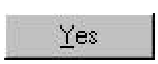
Note
If using Windows XP or later, click Start → Control Panel → Add/Remove Programs.

---

4. The Add/Remove Program Properties dialog appears.



5. Select MON2000 and click the  button.
6. Windows® displays the following confirmation dialog.

7. Click the  button to continue. Windows® deletes the program files only. Any files shared by other programs or created by the user are not deleted.

Postrequisites

Click the  button to abort and return to the Add/Remove Program Properties dialog.

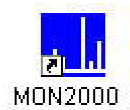
2.7 Starting MON2000

To start MON2000 after a successful installation,

Use the Windows® Start menu (**Start** → **Programs** → **MON2000** menu) by clicking the 

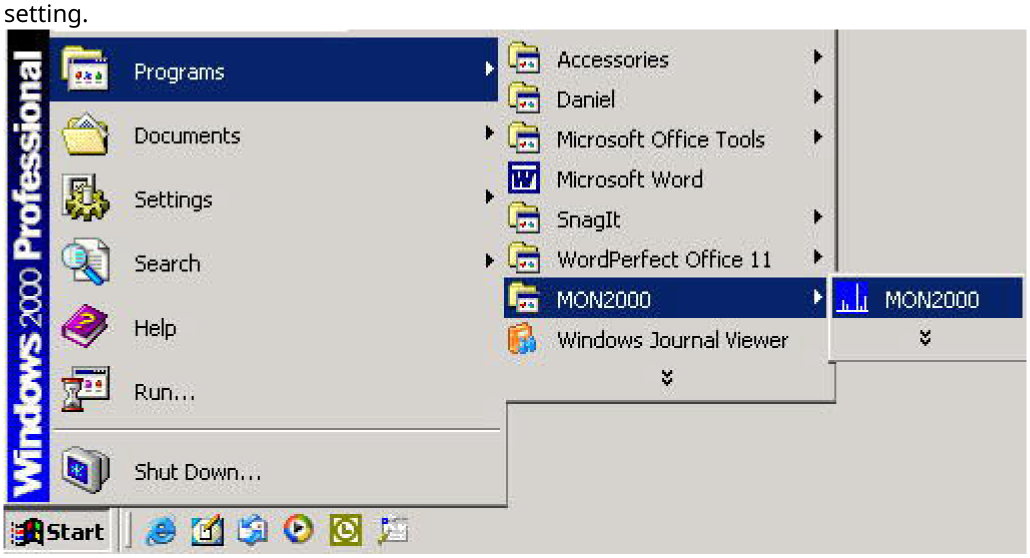
button.

Double-click the MON2000 icon automatically created on your desktop during installation.



Note
You cannot access the MON2000 functions until you are successfully logged on.

To start MON2000 directly from the executable file, use the directory you specified when installing MON2000. Note that **c:\Program Files\MON2000\MON2000** is the default setting.



2.8 Performing Your First Logon

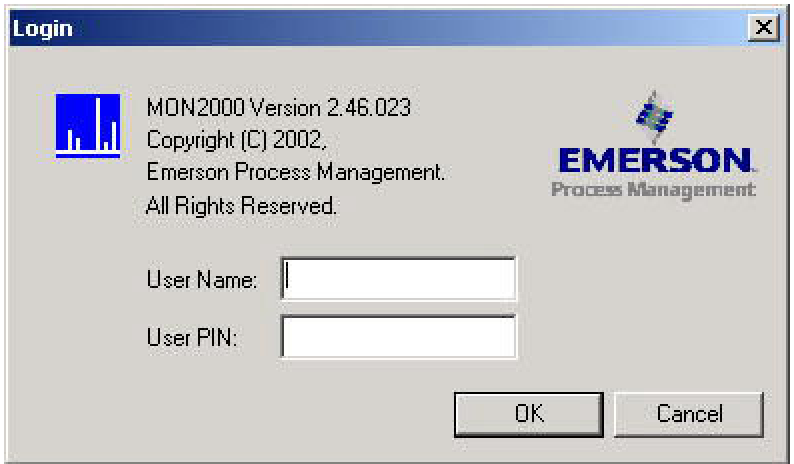
2.8.1 The Initial Logon

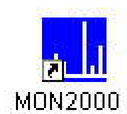
Each new GC unit is shipped with one super user named “Emerson”. After logon, ensure that this user name appears in the Users list as a super user (Configure Users).

To log on for the first time,

Procedure

1. Start the MON2000 software program by clicking the desktop icon or by using the Windows® Start menu (Starting MON2000).

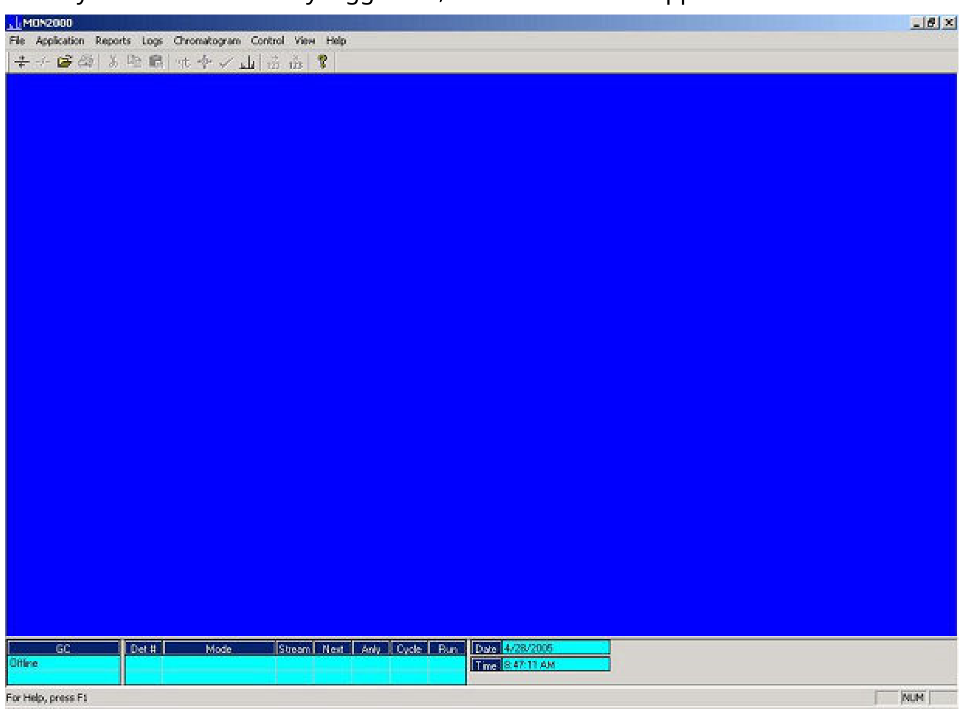




2. Click in the *User Name* data field.
3. Type **emerson**. Note that the user name is not case-sensitive.

Note
A PIN is not required for the initial logon.

4. When you have successfully logged on, the main window appears.

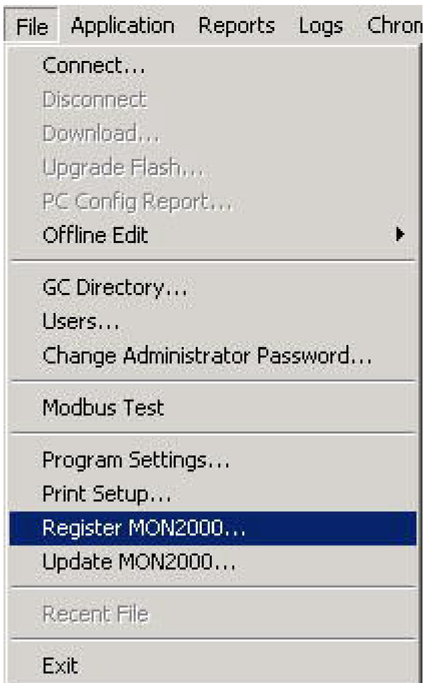


2.8.2 Registering MON2000

After your have successfully performed your initial logon (The Initial Logon), MON2000 automatically prompts you to register your copy of MON2000 software. An active Internet connection is required for registration.

Registering your MON2000 software allows you to receive information about free updates and related products. A direct link to the Emerson Internet website is provided via the **File** → **Update MON2000** menu.

You may choose to postpone registration. You can register at any time via the **File** → **Register MON2000** menu.

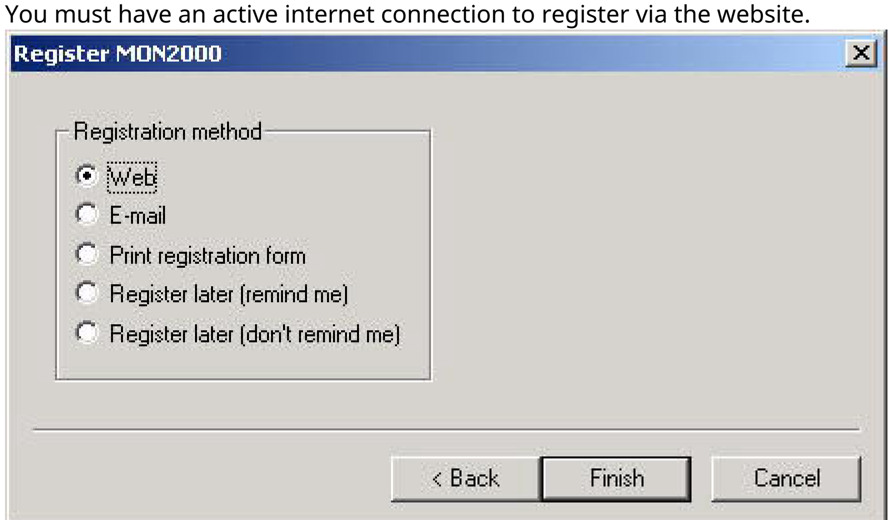


Procedure

1. Use the **File** → **Register MON2000** menu. Follow the prompts in the Register MON2000 dialog to input your name, MON2000 serial number (located inside the CD jewel case), and other relevant information.

2. Click the  button to continue.
3. Choose the desired registration method by clicking the corresponding radio button.

   Note
   You must have an active internet connection to register via the website.



4. Click the  button.

2.8.3 Update MON2000

Provided there is an active internet connection to the computer on which MON2000 is installed, clicking the **File** → **Update MON2000** submenu sends the user to the Emerson Chromatograph Controllers website:

www.emersonprocess.com/rosemount/products/GC/Controllers/Productdetail.htm.

Note
You must have an active internet connection to register via the website.

Use the **File → Update MON2000** menu to download the latest versions of MON2000and

the BOS software programs.

To download the latest versions of the software,

Procedure

1. Use the computer on which MON2000 is installed and connect to the Internet. Minimize the Internet window.
2. From MON2000, select the **File → Update MON2000** menu. This opens the Emerson Chromatograph Controllers website (https://www.emerson.com/en-us/automation/rosemount).
3. From the Emerson Chromatograph Controller website, you can download the latest MON2000 and BOS updates, view and/or download catalogs, brochures, equipment specification sheets, product manuals, drawings, application notes, and white papers. Other links to products and services are also available.

2.9 Checklist for Setting Up MON2000

To ensure optimum performance,

Procedure

1. Configure your system security (Configure Users).

   Verify that you have assigned a password to the super user, and/or created a secure system Admin account.

2. Configure how MON2000 will save your analytic and diagnostic information (Select Program Settings).
3. Establish communications between MON2000 and the GC unit (Communications and Serial Ports).

2.10 Communications

MON2000 can communicate to the GC unit locally via a serial port cable, Ethernet connection, or remotely via a modem. If performing a remote connection, ensure that you have configured the PC modem first.

To configure the communication and serial port settings for the GC unit, Serial Ports.

2.10.1 Connect to the GC Unit

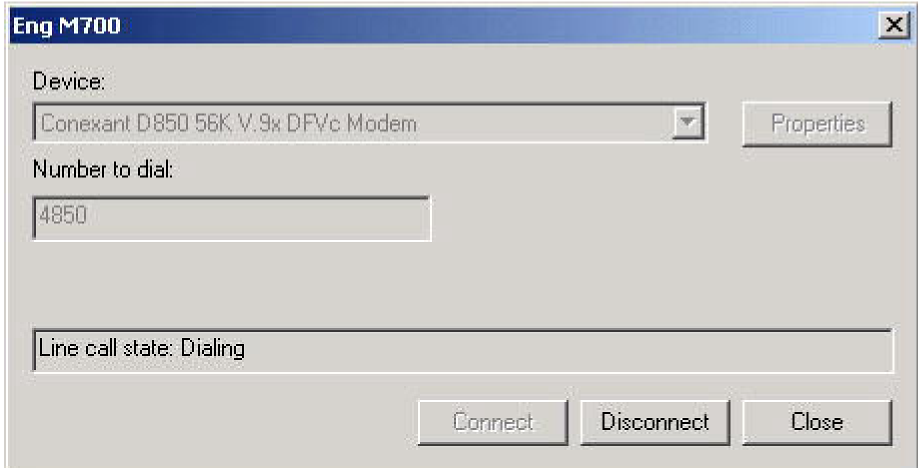
Procedure

1. Use the **File** → **Connect** menu or click the toolbar icon to access the **Select GC** for Connect menu.

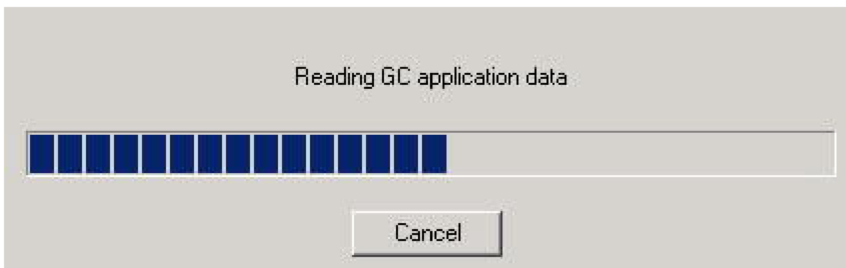
2. Double-click the desired GC unit.
3. MON2000 appears the connection status dialog while dialing the selected unit.

Note
If another user is already connected to the GC, the unit will “lock out” the second user.

Note
When a PC connection is active, the GC Controller front panel will indicate a "System Lockout". This status times out after 10 minutes.



The messages "Reading dictionary", "Reading GC Application data"' and "Logon" appears in the status bar and an information screen appears.



Once connected, the name of the GC unit displays in the lower left hand corner of the MON2000 main window.

2.10.2 Disconnect from GC Unit

Use this process to terminate an active PC connection to a GC unit.

The menu-driven procedure for disconnecting is completely optional. MON2000 intelligently and automatically disconnects when you exit MON2000 or connect to a second GC Controller.

Procedure

1. Use the **File** → **Disconnect** menu or click the toolbar -/- icon to access this function.
2. MON2000 automatically terminates all open connections.

   A Terminating communications message appears in the status bar.

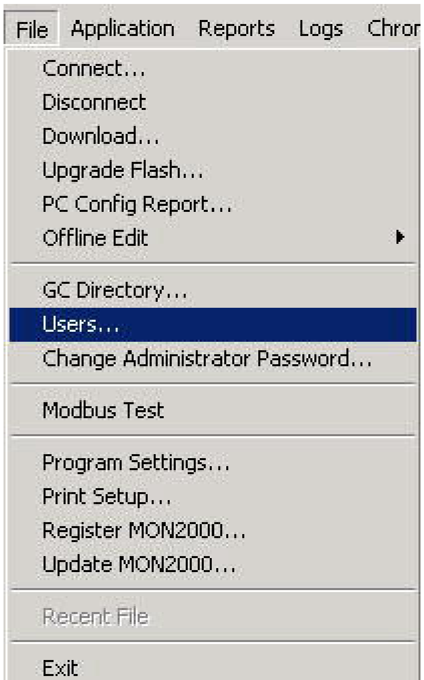
   If MON2000 does not detect an active connection to terminate, an “Invalid selection or not downloaded” message appears.

2.11 Customizing MON2000

Use the following functions to customize users, the directory of GC applications, and PC communications parameters.

2.11.1 Configure Users

Use this function to create new user accounts or edit the existing account data. An extra level of security is assigned to the **File** → **Users** submenu. The **File** → **Users** submenu can only be accessed by first entering a Password into a dialog box titled 'Enter Administrator Password'. After gaining access to the Users dialog, the operator then has the ability to create new user accounts or edit existing account data. This feature is not available to the 'Regular' and 'Read Only' user.



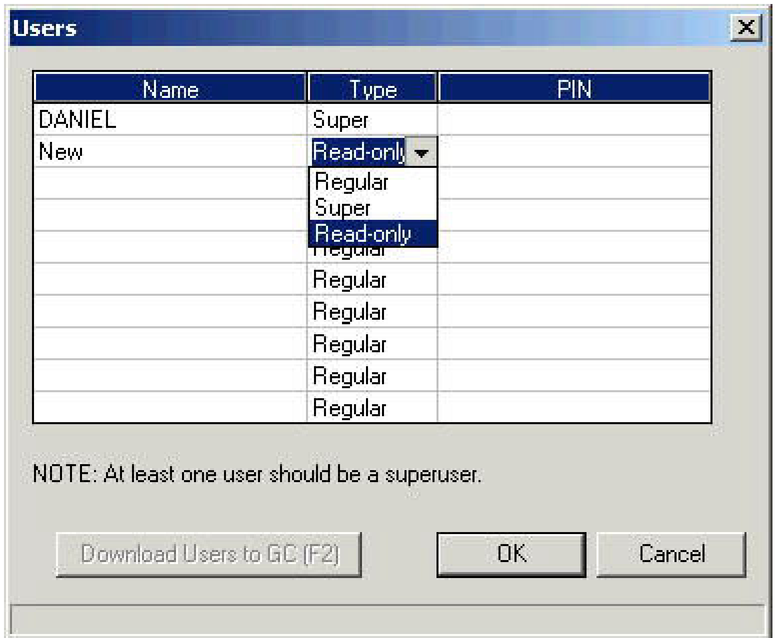
Procedure

1. Use the **File** → **Users** menu to access this function.
2. The Enter Administrator Password dialog box appears.

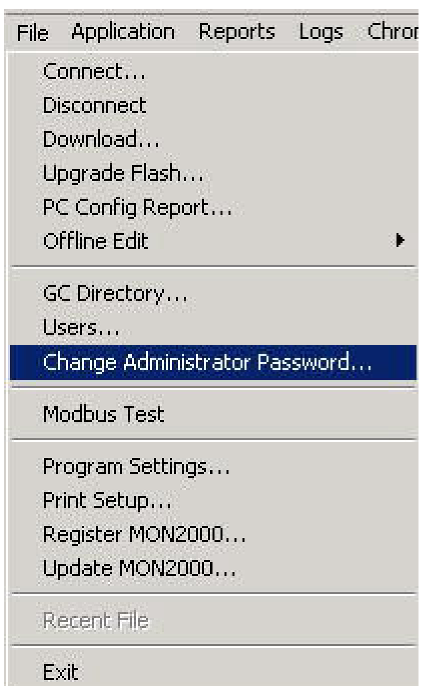
Note that the default password `admin` is not case sensitive. This password is used as a security measure to deny unauthorized users access to the MON2000 Users submenu, which allows Super users to add, edit, or change security levels.

Click the 

button. Then the Users dialog appears.



3. Use the **File** → **Change Administrator** menu to change the Administrator password.



The Change Administrator Password dialog box appears.

Insert the old password, enter the new password and confirm the change.

Then, click the OK button to apply your changes.

4. To configure a new user or edit existing user parameters,
   a) Click the appropriate ***Name*** cell and type the desired user name.

      Note that the user name is not case-sensitive but punctuation (e.g., commas or spaces) is preserved.

   b) Click the appropriate ***Type*** cell and use the provided combo box to select the desired security level. Note that there should be at least one Super user.

      Note
      Super users can write changes to the GC unit, configure MON2000, and access the Users function. Regular and Read only users can only view data.

   c) Click the appropriate ***PIN*** cell and type the desired ***PIN*** for this user. Note that the ***PIN*** is limited to 12 numeric characters.

      If no ***PIN*** is entered, the user can log on to the MON2000 software program or the GC unit (via the front panel) with the assigned user name – that is, no password will be required.

5. To write user data to the online GC unit,
   a) Click the Download Users to GC (F2) or press the F2 key.
   b) MON2000 writes the data to the GC Controller.

6. Click the OK button to apply your changes and return to the main screen.

Postrequisites

Click the Cancel button to exit and return to the main screen without applying your changes.

2.11.2 Set Up GC Directory

This function allows you to set up a directory listing of all GC units MON2000 can control for this application. From the GC Directory, you can configure the PC serial port communication parameters for a specific GC unit.

⚠ CAUTION

Do not delete any currently used applications from the GC Directory. If an entry is inadvertently deleted, you may need to reinstall the application software for that GC.

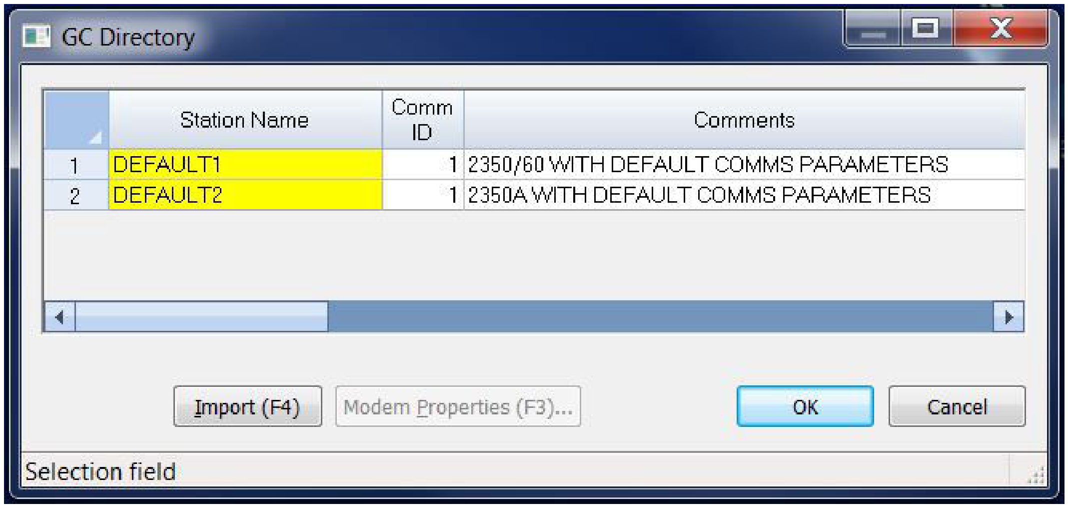
Data entered in the GC Directory is stored in the “Gcdir.dat” file (...\GC\BIN\). The Station Name is the user assigned name to a GC location. As GC applications are installed, MON2000 adds the application name to the GC Directory.

The GC unit name shown in the GC Status Bar of the MON2000 main window is entered via the System dialog (System).

To edit the GC directory,

Procedure

1. Use the **File** → **GC Directory** menu to access this function.
2. The GC Directory dialog appears.



3. MON2000 is configured with two default directories:
    - Default1: parameters are set for 9600 baud rate
    - Default2: parameters are set for 19200 baud rate.
4. Click the appropriate ***Com ID*** cell and type the Modbus communication identification number (set by DIP switch positions on the GC Controller system interface board) for the GC unit.

    To successfully connect to the GC unit, the COM IDs specified via the **File → GC Directory** and the **Application → Serial Ports** dialogs must match. See Serial Ports Configuration for more information.
5. Click the ***Comments*** cell to enter any helpful information regarding a particular GC unit, such as location or purpose.
6. Use the dynamic pull-down menus to select the desired ***PC Port***, ***Baud Rate***, ***Data Bits***, ***Stop Bits***, ***Parity***, and ***Handshaking*** settings.

    Note
    The following parameters support an auto-detect setting: Baud Rate, Data Bits, Stop Bits, Parity, Protocol. Set any of these parameters to "?" (autodetect) and MON2000 will conform to the settings used by the GC unit.
7. Use the provided cells to input ***RTS On Delay***, ***RTS Off Delay***, and ***Extra Delay*** values.

    The ***Extra Delay*** field accepts numerical values (0 to 9000 milliseconds) for additional time to be added to the current communication timeout delay.
8. Use the ***Protocol*** pull-down menu to select the desired Modbus communications protocol.
9. If you plan to connect remotely to the GC unit via a modem or Ethernet connection, use the ***Connection Type (Direct/Remote)*** pull-down menu for a "Direct Connect" option or a previously configured modem.

2.11.3 Dial-up Connection

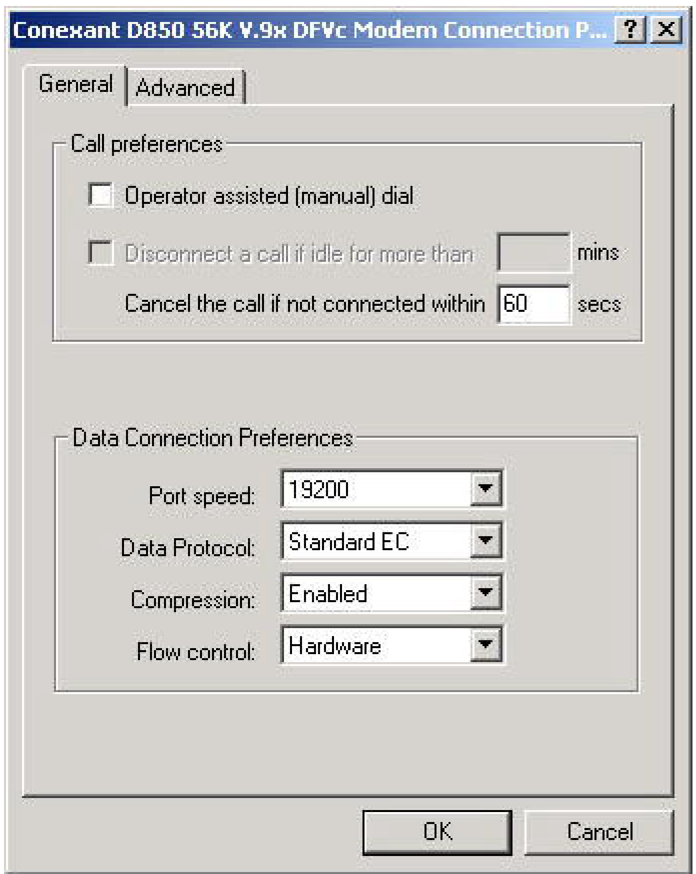
Use this command to run the Dial-up dialog to configure the GC Controller modem. The default properties from the Windows Control Panel are used so you must ensure that the modem connects at the GC Controller's configured baud rate. It may be necessary to enter a modem initialization string.

Note
The Direct Connect option allows you to connect from the PC to the GC Controller via a serial port, per its default settings. If you select a modem, the modem property dialog appears, allowing you to change its attributes.

To configure the modem and make a connection,

Procedure

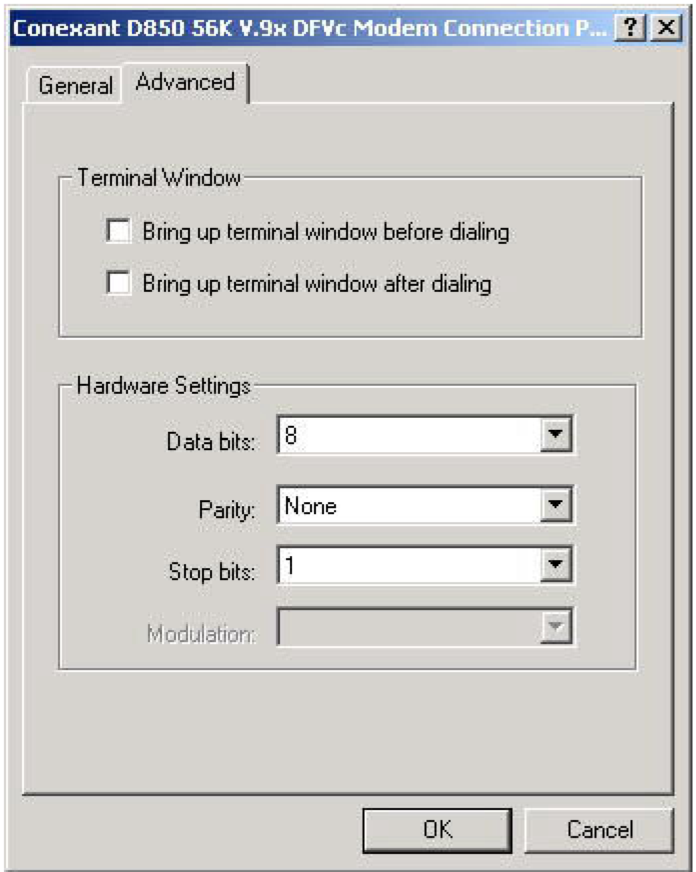
1. Use the **File → GC Directory** menu, and the GC Directory appears.
2. Click the **Station Name** data field and click the **Modem Properties** button or press the **F2** button.
3. The modem properties dialog opens.



The General Data default settings are:

Port Speed	19200
Data Protocol	Disabled
Compression	Disabled
Flow Control	None

4. Click the Advanced tab to configure the Hardware settings.



The Advanced Data default settings are:

Data Bits	8
Parity	None
Stop Bits	1

5. Click the  button to apply your changes, or click the  button to discard the changes and return to the GC Directory dialog.
6. Next, from the ***GC Directory*** dialog, scroll over to configure the following parameters:

Note
The Baud Rate, Data Bits, and Stop Bits parameters were configured above.

Heading	Pull-down Menu Selection
PC Port	COM1, COM2,COM3
Handshaking	None
RTS On Delay	0
RTS On Delay	0
Extra Delay	0 (See #unique_35/unique_35_Connect_42_Note)

Heading	Pull-down Menu Selection
Connection Device (Direct/Remote)	Communications Port (COM1) Intel(R) Active Management Technology - SOL (COM3) Bluetooth Device (Personal Area Network) Intel(R) Dual Band Wireless-AC 7260 Intel(R) Ethernet Connection I217-LM
TCP Port	Allows configuration of the IP port for Modbus TCP connections. Can be any port value between 502 to 599.
Telephone	Complete number (Area Code) (XXX-XXXX)
Server Name	XXX.XX.XX.XXX (10 digits)
Retries • Modem • IP Address	5 3
IC Multiplier	10

Note
The Extra Delay is enabled for Ethernet connections. The default value is “0” and the default 30 seconds timeout is used. If the value is changed to greater than “0”, the value is used as the timeout. The entered value is multiplied by 10 inside MON2000, therefore the maximum timeout is 100,000 ms or 100 seconds (ex: If timeout value needs to be 15 seconds, the user should enter 1,500).

7. Click the 

button to accept the changes. While connecting, MON2000 dials the number, attempts to connect via the selected modem and displays progress messages. A message box appears when a connection has been made or if the attempt to connect fails.

   Once a connection has been established and while MON2000 remains connected via the modem, the **Connect** button is disabled and the **Disconnect** button is enabled.

   If the connection fails at any time, MON2000 displays a message in the GC Status bar that it has been disconnected. You can end the connection from the **File → Disconnect** menu, by clicking the disconnect icon on the MON2000 toolbar, or by exiting MON2000.

Note
If you are using the Modbus RTU protocol, the values for baud rate, data bits, stop bits, and parity must match the settings you configured in the Modem Properties dialog. These values are required to correctly calculate character timing.

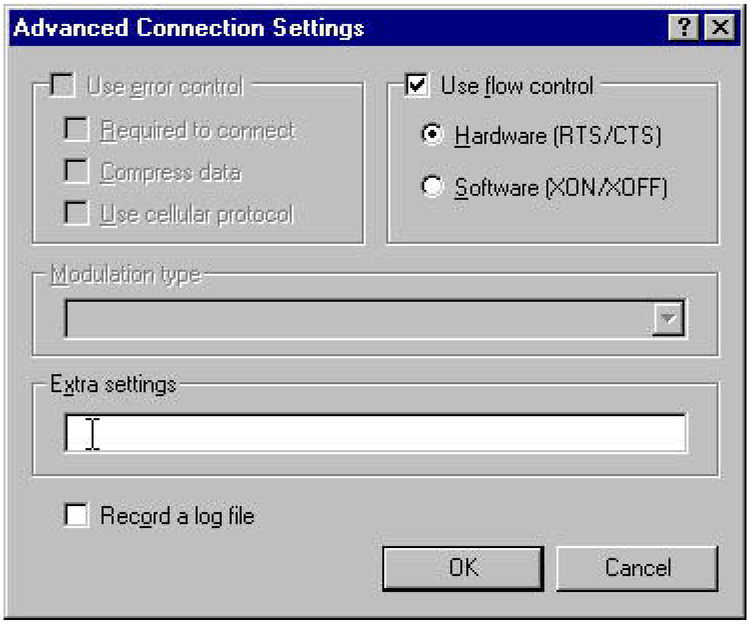
When you start MON2000 after the parameters are established, you can connect to the GC via the **File → Connect** menu or by clicking the **Connection** icon on the MON2000 toolbar.

2.11.4 Modem Initialization Strings/Setup

This section provides “examples” of modem initialization strings and setups that have been tested and proven operable. This string of text characters, known as 'AT commands', has special meaning to the PC modem and is used by the modem for every telephone connection made to a selected GC unit.

To edit or enter a modem initialization string, use the 

button and use the **Control Panel → Modems → General → Properties → Connection → Advanced** to access the ***Advanced Modem Connection Settings*** dialog. Enter the modem initialization string in the Extra Settings field.



By default, MON2000 provides a modem initialization string that serves the purpose for most Hayes-compatible modems. Therefore, in most cases, you need not enter a different string.

However, for some modems, you may want to consult the following pages which document initialization strings and modem setups that have been field-tested.

Note

The default initialization string that MON2000 provides is sent to the PC modem first. Then the custom initialization string you provide is sent. In this manner, MON2000 sets the modem parameters that it requires, while you can customize the modem's operation to respond to special conditions.

Black Box - Modem 325

During development of the GC Controller, a Black Box Modem 325 was used to test modem communications with the GC unit. For that test and that modem, the modem initialization was set as follows:

\N0\C0\Q0 (where 0 = zero)

Interpretation of the AT commands for that particular modem was as follows:

- \N0 = normal mode; no error control; data is buffered (versus ‘direct mode,’ ‘reliable mode, ’or ‘auto reliable mode’)
- \C0 = disable auto reliable buffer (versus ‘buffer data for 4 seconds or 200 characters’)
- \Q0 = disable flow control (versus ‘enable XON/XOFF flow control,’ ‘enable unilateral CTS flow control,’ or ‘enable bilateral CTS/RTS flow control’)

U.S. Robotics Sportster

The following setup for U.S. Robotics Sportster 28.8 Kbps external FAX-modems was verified at the GC assembly and checkout lab:

- At the GC Controller, the modem DIP switches were set to 5 and 8 UP, the rest DOWN.
- At the PC, the modem DIP switches were set to 2, 4, 6, and 7 UP, the rest DOWN.

With these switch settings, initialization string &F was required. See Table 2-1 for further explanation of these switch settings and the parameters they control.

Table 2-1: Switch setting

Switch	Function	At GC	At PC
1	UP (off) – Normal DTR; computer must provide DTR signal for modem to accept commands.		
	DOWN (on) – Modem ignores DTR.	✓	✓
2	UP (off) – Verbal (word) results.		✓
	DOWN (on) – Numeric results.	✓	
3	UP (off) – Suppress result codes.		
	DOWN (on) – Enable result codes.	✓	✓
4	UP (off) – Display keyboard commands.		✓
	DOWN (on) – Suppress echo.	✓	
5	UP (off) – Modem answers on first ring or higher.	✓	
	DOWN (on) – Disable auto answer.		✓
6	UP (off) – Modem sends carrier detect (CD) signal on connect, and drops CD on disconnect.		✓
	DOWN (on) – CD always on.	✓	
7	UP (off) – For power-on and ATZ reset, the Y or Y1 configuration is used from user-defined nonvolatile memory (NVRAM).		✓
	DOWN (on) – For power-on and ATZ reset, the generic template, &F0, is used from read only memory (ROM).	✓	
8	UP (off) – Disable AT command set recognition.	✓	
	DOWN (on) – Enable AT command set recognition.		✓

GVC/MaxTech 28.8 Kbps Modem

The following setup for GVC 28.8 Kbps external Voice/Data/FAX modems was verified at Canada. At the GC Controller:

Note
To make these settings for the modem at the GC Controller, you will need to use a terminal program (such as ProComm or other commercial modem software) to input the “AT” commands to the modem before connecting it to the GC Controller.

AT&F5	Factory default with v.42bis flow control disabled (must be first).
ATB8	9600 baud

Or

ATB11	19200 baud

AT&D0	Modem ignores DTR (not necessary if using a cable that incorporates the DTR signal from the Controller).
ATM0	Turn OFF speaker.
ATS0=n	n is number of rings for auto answer (e.g., ATS0=1, ATS0=2, etc.).
AT&C0	Force carrier detect high
AT%C0	Turn OFF compression. **Note** If compression is turned ON with AT%C1, or OFF with AT%C0, then the modem at other end should match.
AT&W0	Write to stored profile “0” (zero).
AT&Y0	Use stored profile “0” (zero) when turned on.

At the PC, use &F5%C1M0 which indicates a factory default with v.42bis flow control disabled / compression ON / speaker OFF.

2.12 2350 to 2350A Retrofit Instructions

The 2350A GC Controller CPU assembly has been designed to include all digital I/O and COM3 and COM4 serial ports. This eliminates the requirement (and additional cost) for an I/O assembly or DSPI/O assembly.

In addition, BOS is now resident in the DiskOnChip, instead of an EPROM set. The DiskOnChip provides additional expanded memory for archiving data, instead of having to purchase a memory expansion board assembly. The BOS file in the DiskOnChip may be upgraded in the field through MON2000.

Optional boards may be plugged directly into the PC/104 Bus (connectors J19 and J20) on the CPU board assembly. The COM4A board provides four additional serial ports (COM5 through COM8). A modem board and/or Ethernet board may be also be plugged directly into the PC/104 Bus for additional communications requirements.

The PC/104 Bus is designed to allow any combination of option boards to be installed in any order, with the exception of the CSA approved Radicom modem board which must be the top board in the assembly.

Note
If you are using the CSA approved Radicom modem; ensure that it is the top card in the card cage assembly. The connection configuration of the Radicom modem requires installation at the top of the assembly.

2.13 Conversion Process

Use the following process to retrofit a 2350 GC Controller to a 2350A GC Controller.

Procedure

1. At the GC Controller site, remove the Controller enclosure's front panel.

   ⚠ WARNING

   Before removing the unit cover from the GC Controller, make certain the power supply switch is OFF and the AC power cord is disconnected. Observe all safety precautions when you are working in a hazardous environment. Failure to observe all safety precautions could result in serious injury or death.

   a) For the explosion-proof Controller, the front panel is secured by 16 screws. Remove those screws first.

   b) Then carefully lower the front panel on its bottom hinges. The front panel is heavy, so make sure it does not drop and cause damage.

   c) For the rack mount Controller, the rear of the enclosure is open; it allows access for most field wiring procedures without removing the enclosure.

2. Locate the GC Controller's Terminal Board for Field Wiring (TB). The TB is attached to the GC Controller's card cage assembly, facing the enclosure's front panel. (In the rack mount Controller, the TB faces outward toward the rear of the enclosure.)
3. Loosen the six screws that secure the TB. Then unplug the TB from its connections at the back, top of the board.

4. Lower the TB down and out of the way, held in place by its ground straps at the bottom of the board. This exposes the Card Cage Assembly.
5. Loosen the four screws that secure the Card Cage Assembly to the chassis. Then remove the Card Cage Assembly away from its chassis mount so that it is easy to work on.
6. Locate the System Interface and Driver board. It is mounted to the top of the Card Cage Assembly.
7. Remove all cables connected to the System Interface Board (P/N 3-2350-005, P/N 3-2350-022, or P/N 3-2350-023).
8. Remove the I/O48 Board assembly (drawing P/N BE-12973) and cables from the top slot of the Cage Card Assembly. This board is not used on the 2350A GC Controller.
9. Remove the CPU Board assembly (P/N CE-19281) and cables from the second slot of the card cage assembly. This board is not used on the 2350A GC Controller.
10. Remove the DSPI/O board assembly (drawing P/N CE-12976) and cables from the third slot of the card cage assembly. This board is not used on the 2350A GC Controller.
11. Remove any other optional boards, such as memory expansion boards and associated cables. These parts are not used on the 2350A GC Controller.
12. Leave the Analog Board assembly (drawing P/N BE-18044) with attached cable in the card cage. This board is used on the 2350A basic configuration.
13. Change the fuse in the in-line fuse holder from 1 amp to the 2.5 amp, Slo-Blo fuse provided. The fuse is located in the cable (P/N 2-3-2350-069) between the power supply and the System Interface Board.
14. Ensure that DIP Switches 6, 7, and 8 of S1 are all in the "OFF" position. If the 2350A is powered up with S8 in the OFF position, it will delete the current application (commonly called a "Cold Start").
15. To inspect or change the GC Controller's COM ID setup at the GC Controller site, locate the DIP switch as described in the following steps.

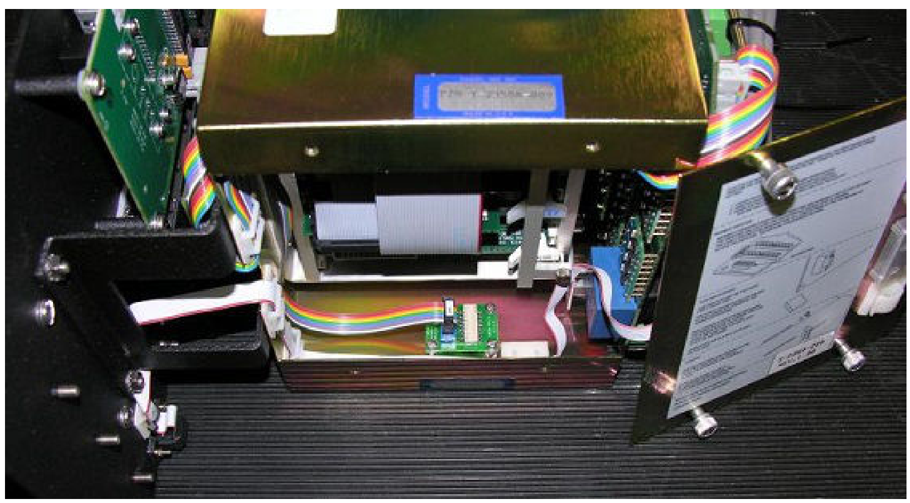
⚠ WARNING

Before removing the unit cover from the GC Controller, make certain the power supply switch is OFF and the AC power cord is disconnected. Observe all safety precautions when you are working in a hazardous environment. Failure to observe all safety precautions could result in serious injury or death.

16. For the explosion-proof Controller, the front panel is secured by 16 screws. Remove those screws first.
    a) Then carefully lower the front panel on its bottom hinges. The front panel is heavy, so make sure it does not drop and cause damage. The DIP switch is located on the lower left side of the front panel (see Figure 2-1).

Figure 2-1: Front panel

17. For rack mount and panel mount Controllers, use a flat head screw driver to remove the access panel on the right side of the card cage assembly.



18. Inspect or change the DIP switch settings as necessary.
    a) Table 2-2 as a guide.
    b) Make sure you record in the GC Controller's maintenance records any changes you make to the switch settings.
19. Switches "1" through "5" form a 5-bit binary number for setting the Modbus slave address (also known as COM ID or Device ID.)
20. Switch number "1" is the least significant bit, and switch number "5" is the most significant bit.

    Switch to ON = 1

    Switch to OFF = 0
21. Switch "6" is a spare for future use. Switches "7" and "8" are set as needed for the presence of an optional LOI (Local Operator Interface) connected via COM8

When the COM4A Board is installed. If the COM4A Board is not installed, the LOI is connected via COM4.

Table 2-2: Dip Switch Settings Switch Positions

COM ID	1	2	3	4	5
1	ON	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF
RAM CLEAR					
Dip Switch Setting Positions					
Clears RAM when unit is powered down					8 ON
Keeps RAM data when unit is powered down					OFF

2.14 Basic 2350A Configuration

At this point, install, if any, all mounting hardware and optional PC/104 boards onto the 2350A CPU Board.

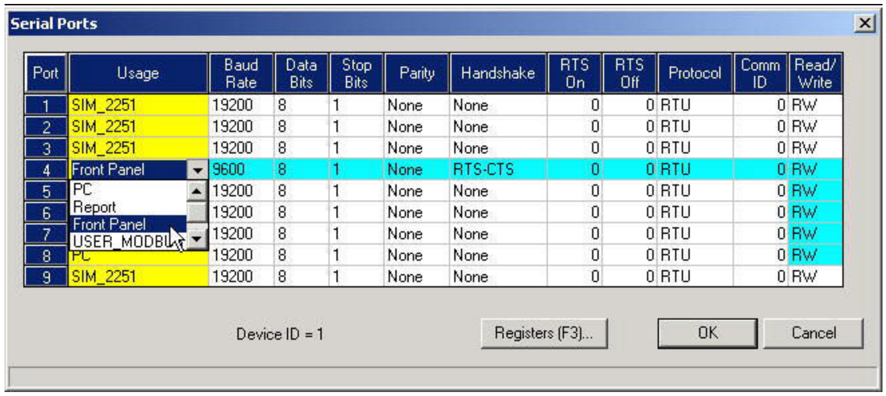
Procedure

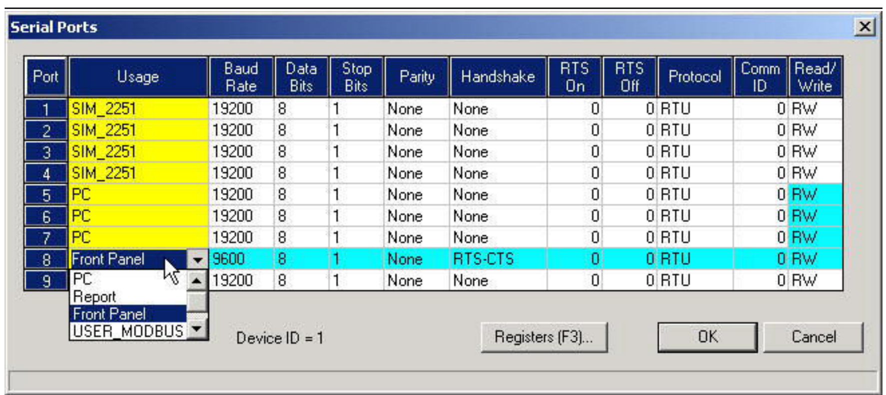
1. Install the 2350A CPU (P/N 3-2350-090) into slot 3 of the card cage assembly.
2. Install cables on the CPU Board in the following sequence:
   a) Digital I/O cable (P/N 3-2350-081) from CPU J7 to the System Interface Board J2.
   b) Digital I/O cable (P/N 3-2350-080) from CPU J4 to the System Interface Board J3.
   c) COM1, COM2, and the printer cable (P/N 3-2350-083) from CPU J1 to the System Interface Board J4, J9, and J11.
   d) COM3 and COM4 can be configured two different ways. To configure a system WITHOUT a keyboard and display, connect cable (P/N 3-2350-084) from CPU J6 to the System Interface Board J8 and J10. This provides access to COM3 on J10 and COM4 on J11 of the Field Termination board. The serial port setup in the MON2000 Software for COM4 must be selected as a PC port.
   e) For a system WITH a keyboard and display, connect cable (P/N 3-2350-087) from CPU J6 to the System Interface J8 and J12. This provides access to COM3 on J10 and COM4 is dedicated for use as a serial interface to the keyboard and display. COM4 will not be available at J11 of the Field Termination board. The serial port setup in the MON2000 Software for COM4 must be selected as Front Panel (see Figure g). If all four serial ports are required for communications on a system with keyboard and display, an optional COM4A

Board must be installed and a COM7 and COM8 cable (P/N 3-2350-086) connected (see Figure g). The serial port setup in the MON2000 Software for COM8 must be configured as Front Panel. See Figure G-4b.

f) Reinstall the Analog cable to J6 on the System Interface Board.

g) Place the "Unit Updated to 2350A" label, included with the upgrade kit, on the instruction decal located on the inside, right wall of the explosion-proof units or on the card cage of the rack or panel mount units.





2.15 2350A Options

The following board configurations are optional for the Model 500 GC with 2350A Controller.

2.15.1 The COM4A Board

Procedure

1. To add four additional communications ports at the GC Controller site, remove the Controller enclosure's front panel.

⚠ WARNING

Before removing the unit cover from the GC Controller, make certain the power supply switch is OFF and the AC power cord is disconnected. Observe all safety precautions when you are working in a hazardous environment. Failure to observe all safety precautions could result in serious injury or death.

a) For the explosion-proof Controller, the front panel is secured by 16 screws. Remove those screws first.

b) Then carefully lower the front panel on its bottom hinges. The front panel is heavy, so make sure it does not drop and cause damage.

c) For the rack mount Controller, the rear of the enclosure is open; it allows access for most field wiring procedures without removing the enclosure.

2. Locate the GC Controller's Terminal Board for Field Wiring (TB). The TB is attached to the GC Controller's Card Cage Assembly, facing the enclosure's front panel. (In the rack mount Controller, the TB faces outward toward the rear of the enclosure.)
3. Loosen the six screws that secure the TB. Then unplug the TB from its connections at the back, top of the board.
4. Lower the TB down and out of the way, held in place by its ground straps at the bottom of the board. This exposes the Card Cage Assembly.
5. Loosen the four screws that secure the Card Cage Assembly to the chassis. Then remove the Card Cage Assembly away from its chassis mount so that it is easy to work on.
6. Locate the System Interface and Driver board. It is mounted to the top of the Card Cage Assembly.

    a) Disconnect the Analog cable from J6 on the System Interface Board, then disconnect all CPU cables from the System Interface Board.

    b) Remove the CPU assembly and install the COM4A Board, with associated mounting hardware to J19 and J20 PC/104 Bus connector on the CPU assembly.

    c) Connect COM5 (P22) and COM6 (P23) on the Field Termination board via cable (P/N 3-2350-085) to J6 on COM4A.

    d) Connect COM7 (P24) on the Field Termination board and COM8 via cable (P/N 3-2350-086) to J3 on COM4A.

    e) Install the CPU assembly into the third slot of card cage. Connect the CPU cables as detailed in Removing a Chromatogram from View Basic 2350A Configuration.

    f) Install the DB9 connector from COM5 to P22 on the Field Termination board with jackpost assemblies.

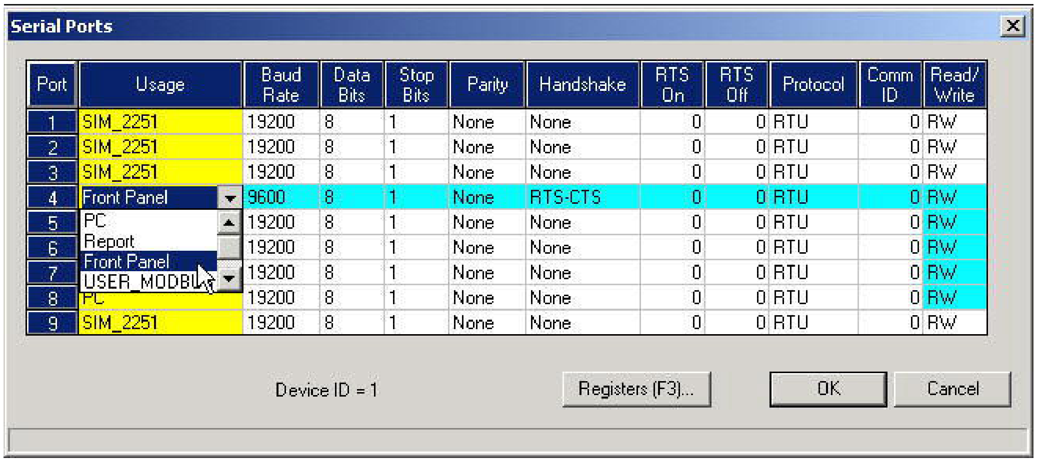
    g) Install the DB9 connector from COM6 to P23 on the Field Termination board with jackpost assemblies.

    h) Install the DB9 connector from COM7 to P24 on the Field Termination board with jackpost assemblies.

    i) Install the ten position connector from COM8 to J12 on the System Interface Board.

    j) Connect the Analog cable to J6 on the System Interface Board.

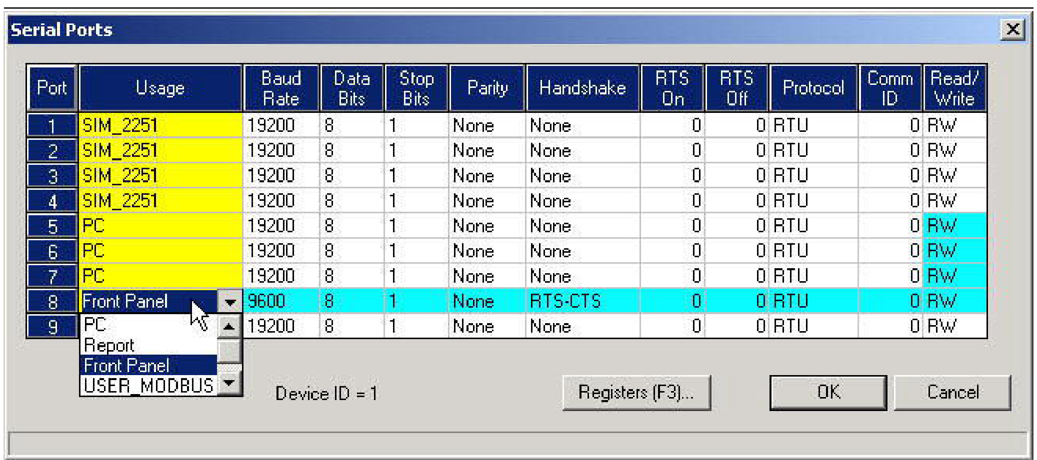
With COM4A Boards installed, Serial Port 8 is usually assigned via **MON2000 Application** → **Serial Ports** menu. Select ***Front Panel*** from the Usage pull-down menu (see Figure and Figure).



Serial Ports

Port	Usage	Baud Rate	Data Bits	Stop Bits	Parity	Handshake	RTS On	RTS Off	Protocol	Comm ID	Read/ Write
1	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
2	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
3	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
4	Front Panel	9600	8	1	None	RTS-CTS	0	0	RTU	0	RW
5	PC	19200	8	1	None	None	0	0	RTU	0	RW
6	Report	19200	8	1	None	None	0	0	RTU	0	RW
7	Front Panel USER_MODBUS	19200	8	1	None	None	0	0	RTU	0	RW
8	PC	19200	8	1	None	None	0	0	RTU	0	RW
9	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW

Device ID = 1 | Registers (F3)... | OK | Cancel



Serial Ports

Port	Usage	Baud Rate	Data Bits	Stop Bits	Parity	Handshake	RTS On	RTS Off	Protocol	Comm ID	Read/ Write
1	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
2	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
3	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
4	SIM_2251	19200	8	1	None	None	0	0	RTU	0	RW
5	PC	19200	8	1	None	None	0	0	RTU	0	RW
6	PC	19200	8	1	None	None	0	0	RTU	0	RW
7	PC	19200	8	1	None	None	0	0	RTU	0	RW
8	Front Panel	9600	8	1	None	RTS-CTS	0	0	RTU	0	RW
9	PC	19200	8	1	None	None	0	0	RTU	0	RW

2.15.2 2350A Modem Installation

To install the Internal Modem for the 2350A GC Controller, follow these steps:

Procedure

1. To add a modem, at the GC Controller site, remove the Controller enclosure's front panel.
    a) For the explosion-proof Controller, the front panel is secured by 16 screws. Remove those screws first.
    b) Then carefully lower the front panel on its bottom hinges. The front panel is heavy, so make sure it does not drop and cause damage.
    c) For the rack mount Controller, the rear of the enclosure is open; it allows access for most field wiring procedures without removing the enclosure.
2. Locate the GC Controller's Terminal Board for Field Wiring (TB). The TB is attached to the GC Controller's Card Cage Assembly, facing the enclosure's front panel. (In the rack mount Controller, the TB faces outward toward the rear of the enclosure.)

3. Loosen the six screws that secure the TB. Then unplug the TB from its connections at the back, top of the board.
4. Lower the TB down and out of the way, held in place by its ground straps at the bottom of the board. This exposes the Card Cage Assembly.
5. Loosen the four screws that secure the Card Cage Assembly to the chassis. Then remove the Card Cage Assembly away from its chassis mount so that it is easy to work on.
6. Locate the System Interface and Driver board. It is mounted to the top of the Card Cage Assembly.
   a) Disconnect the Analog cable from J6 on the System Interface Board, then disconnect all CPU cables from the System Interface Board.
   b) Remove the CPU assembly and install the COM4A Board, with associated mounting hardware to J19 and J20 PC/104 Bus connector on the CPU assembly.

   Note
   If an option board is already plugged into the PC/104 bus on the CPU, the modem and mounting hardware will be installed into the PC/104 connector on the option board.

   c) Plug one end of the modem extension cable (P/N 3-2350-075) into J1 of the modem assembly. The in-line jack on the remaining end of the modem extension cable attaches to the lower left inside wall of the card cage shield (after the CPU assembly is reinstalled and all cables reconnected to the System Interface board). No software setup is required for this board.
7. To use an existing Modem (1414):
   a) For operation with the 2350A CPU, set the Standard 1414 Modem jumpers per the following table:

Jumper	Pin
J4/J5	Open
J6	3-5, 4-6

Jumper	Pin
J7	7-8
J9	Open

b) On the 2350A WinSystems CPU, set J21, pin 13-14.

2.15.3 2350A Ethernet Installation

To add an ethernet assembly:

Procedure

1. To add an ethernet card at the GC Controller site, remove the Controller enclosure's front panel.
    a) For the explosion-proof Controller, the front panel is secured by 16 screws. Remove those screws first.

    b) Then carefully lower the front panel on its bottom hinges. The front panel is heavy, so make sure it does not drop and cause damage.

    c) For the rack mount Controller, the rear of the enclosure is open; it allows access for most field wiring procedures without removing the enclosure.

    d) Locate the GC Controller's Terminal Board for Field Wiring (TB). The TB is attached to the GC Controller's Card Cage Assembly, facing the enclosure's front panel. (In the rack mount Controller, the TB faces outward toward the rear of the enclosure.)

2. Loosen the six screws that secure the TB. Then unplug the TB from its connections at the back, top of the board.
3. Lower the TB down and out of the way, held in place by its ground straps at the bottom of the board. This exposes the Card Cage Assembly.
4. Loosen the four screws that secure the Card Cage Assembly to the chassis. Then remove the Card Cage Assembly away from its chassis mount so that it is easy to work on.
5. Locate the System Interface and Driver board. It is mounted to the top of the Card Cage Assembly.
    a) Disconnect the Analog cable from J6 on the System Interface Board, then disconnect all CPU cables from the System Interface Board.

    b) Remove the CPU assembly and install the COM4A Board, with associated mounting hardware to J19 and J20 PC/104 Bus connector on the CPU assembly.

    Note
    If an option board is already plugged into the PC/104 bus on the CPU, the ethernet card and mounting hardware will be installed into the PC/104 connector on the option board.

    Note
    If you are using the CSA approved Radicom modem; ensure that it is the top card in the card cage assembly. The connection configuration of the Radicom modem requires installation at the top of the assembly.

c) Plug one end of the Ethernet extension cable (P/N 3-2350-088) into J5 of the Ethernet assembly.

6. The in-line jack on the remaining end of the Ethernet extension cable attaches to the lower left inside wall of the card cage shield, after the CPU assembly is reinstalled and all cables reconnected to the System Interface board (see Table 2-6 and Table 2-7 below).

   No software setup is required for this board.

Connection	Ribbon Cable
J5 and J6	Analog I/O
J8	Com3
J10	Com4
J4	Printer
J11	Com2
J2 and J3	Digital I/O
J12	Front Panel and Keyboard (if installed)

Connection	Ribbon Cable
J1	Com1, Com2, and Printer
J4 and J7	Digital I/O
J6	Com3 and Com4

If the 2350A BOS version is v1.84 or later, ensure that J6 Jumper on pins 13-14 of J1 has been removed.

(Figure 2-2 and Figure 2-3).

7. If a modem is installed, remove the phone cord.
8. Install the Ethernet card and set the jumpers as shown below.

Figure 2-2: Ethernet Jumper Configuration BOS v1.82 and Earlier

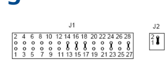
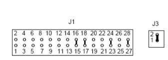


Figure 2-3: Ethernet Jumper Configuration BOS v1.84 and Later



2.15.4 Ethernet TCP/IP Settings

If you plan to connect via an Ethernet connection, use the following instructions.

To configure the Ethernet TCP/IP settings for the 2350A GC Controller:

Procedure

1. Obtain the IP Address, Subnet Mask, and Gateway addresses (numbers) for the Target 2350A GC Controller from your supervisor or Information Technology Department.

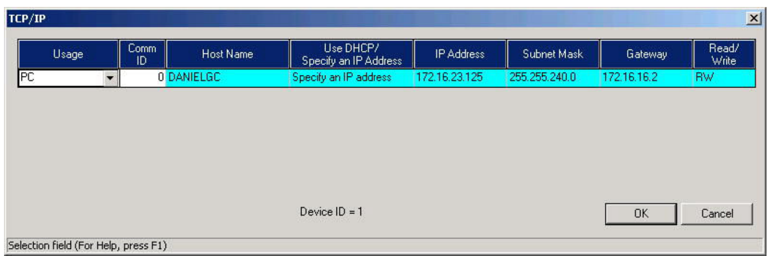
Note

If the controller has never been configured for Ethernet communications, logon to the Model 500 GC using either the Direct Connect option, or connect remotely via a Modem.

---

2. Use the **Application** → **TCP/IP** menu to access this function.

3. The TCP/IP dialog appears.



4. Go to the Use DHCP/Specify an ***IP Address*** field and select ***Specify an IP Address***.
5. In the ***IP Address*** field, enter the IP Address (number) obtained from your Supervisor or the Information Technology Department.
6. In the ***Subnet Mask*** field, enter the subnet mask address (number) obtained from your Supervisor or the Information Technology Department.
7. In the ***Gateway Address*** field, enter the ***Gateway Address*** (number) obtained from your Supervisor or the Information Technology Department.
8. Click the  button to apply all changes.
9. Disconnect from the controller, using the toolbar icon or by using the **File** → **Disconnect** menu.

2.15.5 MON2000 TCP/IP Settings

To configure the Ethernet TCP/IP settings for the MON2000,

Procedure

1. From the **File** menu, select ***GC Directory***.

2. Press Insert on the keyboard to add a row to the ***GC Directory*** table.
3. Select the ***Ethernet*** option from the **Connection Device** drop-down menu.
4. Enter the GC's IP Address into the ***Server Name/IP Address*** field.
5. Set the number of retries to three.

   Click the OK button to apply your changes.

2.16 Connect via GC External Modem

Note
Ensure you have a pre-existing PC connection to the GC unit before installing the external modem. If the GC unit is already on location, do this via another remote operator connection, or, onsite, via use of a portable PC and serial cable. Ideally, configure the GC unit and install the external modem prior to placement at the remote location.

Note
You cannot set the Serial Ports parameters from the GC unit front panel.)

2.16.1 Hardware Setup

Procedure

1. Halt any ongoing analysis runs.

   Use the **Control** → **Halt** menu to access this function.

2. Disconnect AC power from the GC Controller.

⚠ WARNING

Before removing the unit cover from the GC Controller, make certain the power supply switch is OFF and the AC power cord is disconnected. Observe all safety precautions when you are working in a hazardous environment. Failure to observe all safety precautions could result in serious injury or death.

3. For the explosion-proof Controller, remove the cover from the GC Controller housing to expose the GC Controller Terminal Board for field wiring.

   For the rack mount Controller, the rear of the enclosure is open; it allows access for most field wiring procedures without removing the enclosure.

4. Connect a custom-made serial line cable (for RS-232 serial transmission) from the serial port of the external modem to an available serial port on the GC Controller Terminal Board for field wiring.

   Note
   Special hardware modifications may be needed when operating an external GC modem from the GC serial ports 3 or 4 (COM3 or COM4), as follows:

   DE-20782 (see drawing addendum of Model 500 Gas Chromatograph System Hardware Reference Manual).

   Transient protection modules M7 and/or M4, located on the back side of the GC Controller Terminal Board for field wiring, may need replacement with the transient protection modules for RS-232 signals (P/N 3-2350-027). Note that M4 serves COM3 and M7 serves COM4.

   a) Make note of the serial port number you choose for connection. You will need this information later to make appropriate software settings.

   b) Use an RS-232 serial cable no longer than 50 feet. Longer distances may result in spurious loss or corruption of transmitted data.

   c) See Serial Ports, for details of GC Controller serial port connectivity (i.e., port locations, pinouts, connector types, gender, cabling, etc.).

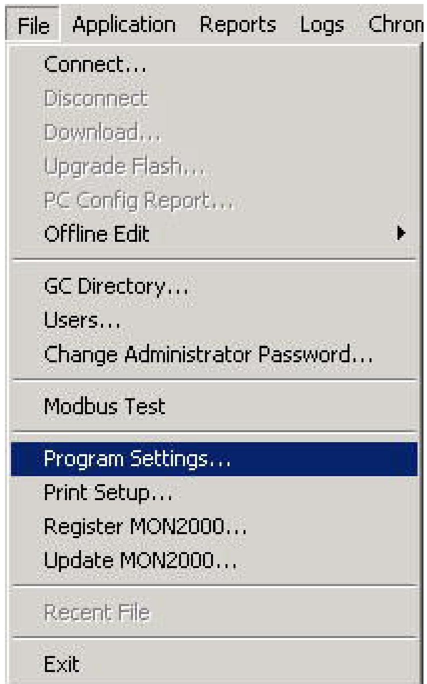
5. Connect a telephone line (from wall phone jack, if available) to the phone jack for the external modem.
6. Set external modem for Auto Answer (see external modem user manual).

2.16.2 Select Program Settings

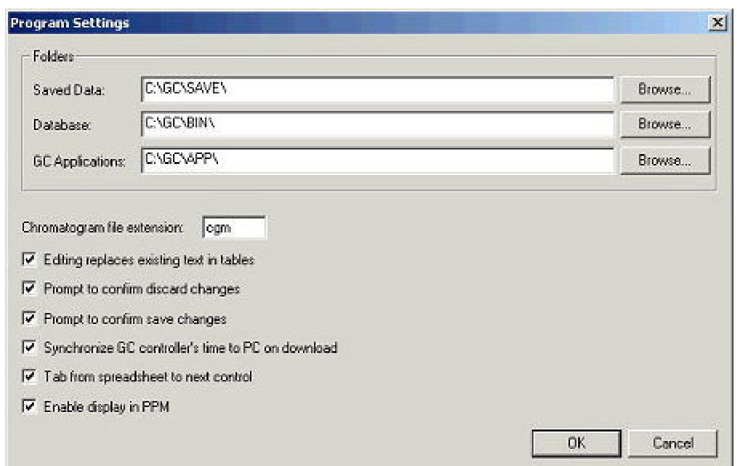
This function allows you to configure where database, GC applications, and Modbus Test program files are stored.

Procedure

1. Use the **FileProgram Settings** menu to access this function.



2. The Program Settings dialog appears.



3. To use a Chromatogram file extension other than the default (e.g. .**CGM**) or to select the location of saved data, GC database, and GC application files,
   a) click in the Chromatogram file extension data field and type the desired file extension
   b) click in the appropriate data field and type the desired directory,

      Or

   c) click the 
 button and use the directory tree to select the desired location

4. Use the provided check boxes to turn the following settings on/off. Note that the default settings are ON.

Setting	Function
Editing replaces existing text in tables	If enabled, replaces selected table cell entry with user input. If disabled, appends user input to end of the selected table cell entry.
Prompt to confirm discard changes	Display confirmation dialog before exiting a dialog that contains changed data.
Prompt to confirm save changes	Display confirmation dialog before saving changed data.
Synchronize GC Controller's time to PC on download, etc.	Program the GC Controller clock to match the PC clock upon download.
Tab from spreadsheet to next control	Move from field to field and button to button (rather than from cell to cell within a spreadsheet or tabular display).
Enable display in PPM	If enabled, percentages less than 0.99% are displayed in PPM (parts per million) rather than as a percentage.

5. Click the **OK** button to apply your changes and return to the main screen.

   Click the **Cancel** button to exit and return to the main screen without applying your changes.

2.16.3 Generate PC Config Report

This function allows you to generate or print out a report of the currently active GC application control settings. See PC Config Report for a sample print-out of a PC Config Report.

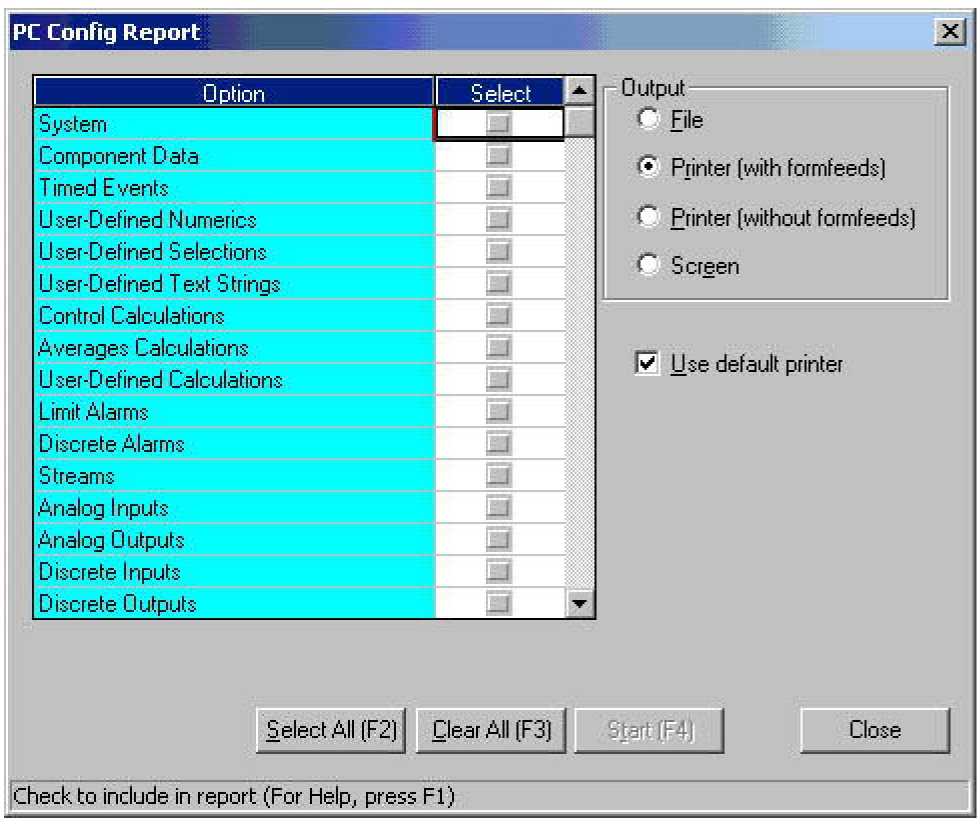
Note
Output data for the PC Config Report depends on the GC Controller and its application.

To view a PC Config Report already saved to disk, see View Report from File.

Procedure

1. Use the **File** → **PC Config Report** menu to access this function. The PC Config Report dialog appears.

2. Click the check boxes (see ***Select*** column) to choose the data you want included in the configuration report.



Click the Select All (F2) button or press the F2 key to select all options.

Click the Clear All (F3) button or press F3 to deselect (i.e., clear) all checked options.

3. Use the ***Output*** radio buttons to either save the report to disk, print the report with or without form feeds, or display the report via the report viewer (see Report Display).

   The ***File*** option will open the Save As dialog, with CONFIG.TXT as the default file name.

   The ***Printer*** (with form feeds) option will print the report, with form feeds, to your configured printer (see Configuring Your Printer).

   Note
   If you want to use the standard Windows® Print dialog to select a printer, deselect the Use default printer option.

   The ***Printer*** (without form feeds) option will print the report, without form feeds, to your configured printer (see Configuring Your Printer).

   The ***Screen*** option will launch the report viewer (see Report Display).

4. Click Start (F4) the button or press the F4 key to generate your customized PC Config Report.

   Note
   If you are online with the GC Controller, a PC Config Report that includes all options can require up to 20 minutes to generate and save. Printing a full report can take longer.

   If you press the ESC key, MON2000 will stop after the current option is completed.

A progress bar appears, indicating the completion status.

2.17 Downloading an Application

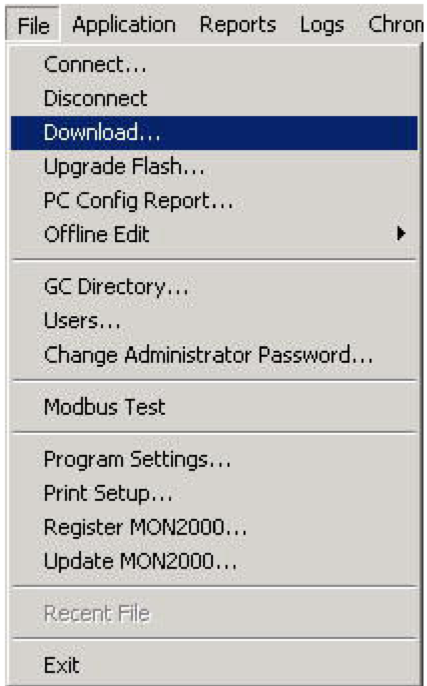
This function allows the MON2000 operator to download applications to GC Controllers. GC applications with the .APP extension can only be down loaded to 2350A GC Controllers and Model 700 units. The Download feature is NOT available if the keylock switch is closed.

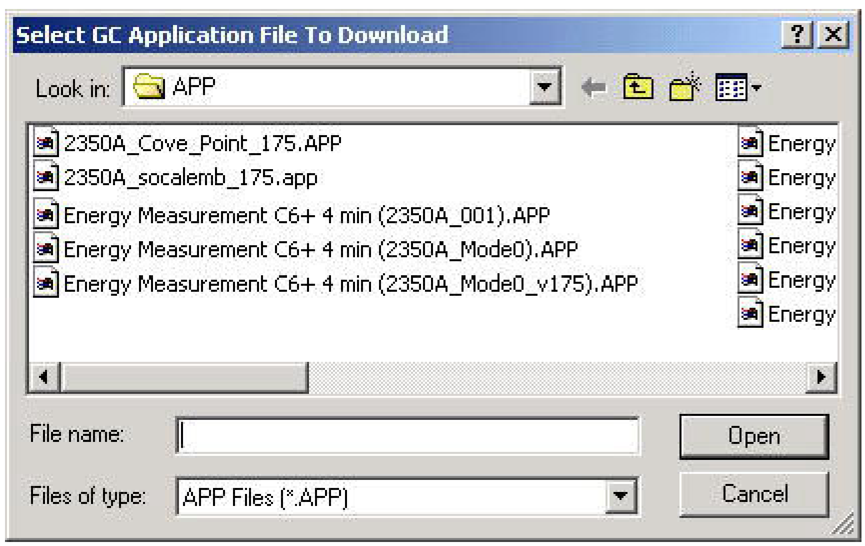
At the end of the download process, MON2000 displays the Set GC Time dialog, which allows you to accept or change the GC Controller's date and time.

Only download an application when performing an initial startup, downloading a new GC application, or after the GC unit has been out of service. You must first connect to the GC to use the Download function.

Procedure

1. Use the **File** → **Download** menu to access the ***Select GC Application File To Download*** dialog.





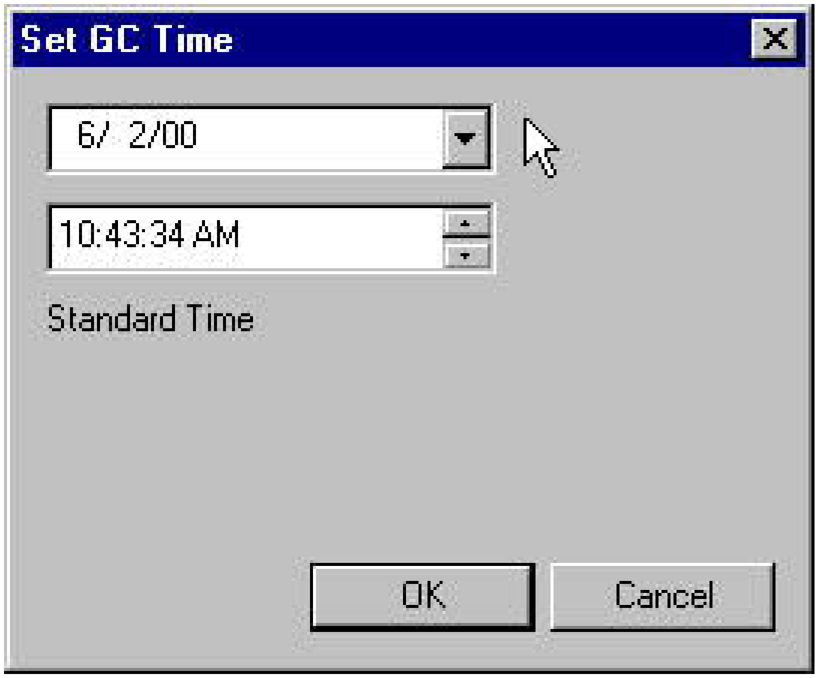
2. Click the desired .app file. The file name appears in the ***File name*** data field.

Note
GC application files contain all control settings and application program functions (see "Application Functions") specific to a particular GC Controller. Application files (.app files) are normally stored in the \GC\APP directory.

3. Click the  button to download the selected application file to the connected GC unit.

   Click the  button to exit and return to the main window.

4. MON2000 reads the time at the GC Controller and the Set Time dialog appears appears for you to edit or accept (see Set GC Time for more information).

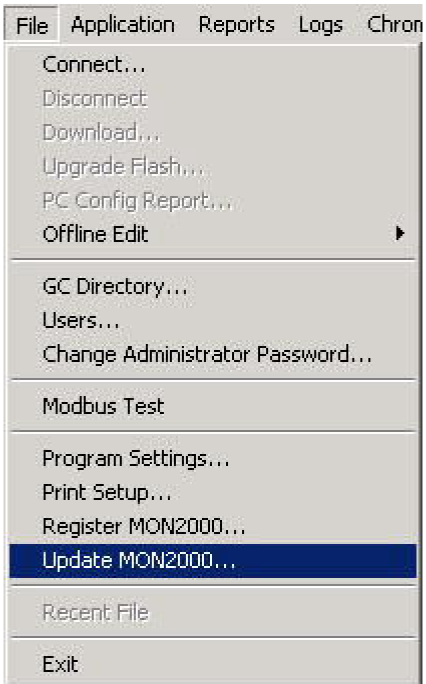


5. A progress bar appears, indicating the completion status. See the able below for a listing of the automatically enabled function keys.

Key	Function	Description
F1	Help	Access context-sensitive online help.
F2	Start Auto Sequence	Initialize the Auto-Sequencing function. This function is also available via the **Control** → **Auto Sequence** menu.
F3	Halt	Stop a function at the end of the current cycle. This function is also available via the **Control** → **Halt** menu.
F5	Edit TEVs	Display the Timed Event Tables. This function is also available via the **Application** → **Timed Events** menu.
F6	Edit CDTs	Display the Component Data Tables. This function is also available via the **Application** → **Component Data** menu.
F7	View Current CGM	Display chromatogram of the stream currently being analyzed. This function is also available via the ***Chromatogram*** menu.
F8	View Last CGM	Display chromatogram stored in the GC unit. This function is also available via the ***Chromatogram*** menu.

2.18 Upgrading Flash

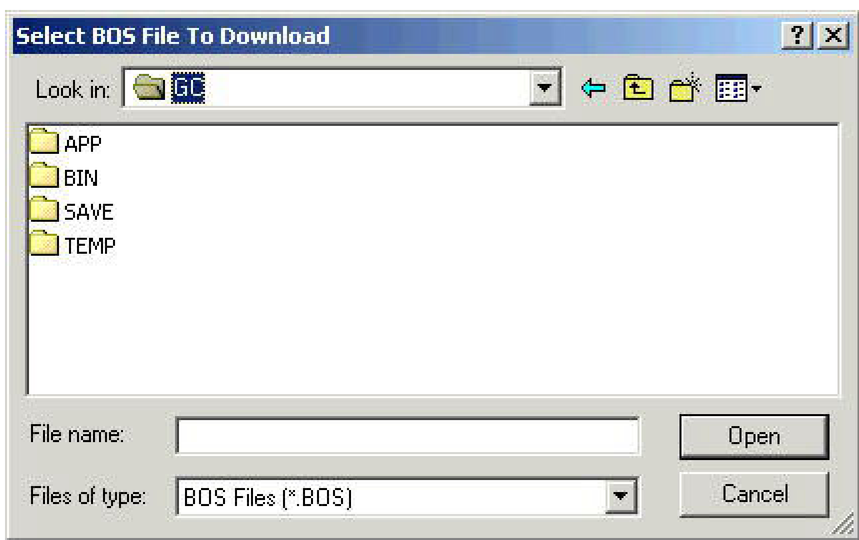
Use this function to download a BOS file to a connected GC Controller.



Only download a BOS file when upgrading the GC firmware or after the GC unit has been out of service. You must first connect to the GC to use the Upgrade Flash function.

Procedure

1. Use the **File → Upgrade Flash** menu to access the ***Select BOS File To Download*** dialog.



2. Click the desired BOS file. The file name appears in the ***File name*** data field.
3. Click the  button to download the selected BOS file to the connected GC unit.

Click the 

button to exit and return to the main window.

2.19 Offline Edit of GC Application

Use this function to edit a GC application file that is saved on disk or has been downloaded (and is currently on, or being used by, the GC unit).

When selecting Offline Edit, you can choose either:

- File Selection – Allows you to edit a GC application file stored on disk.
- Upload Application – Allows you to upload the current GC application data from the GC Controller and save to file for future editing.
- Upload BOS - Allows you to upload the current BOS (i.e., firmware) file from the GC Controller to save for future download.

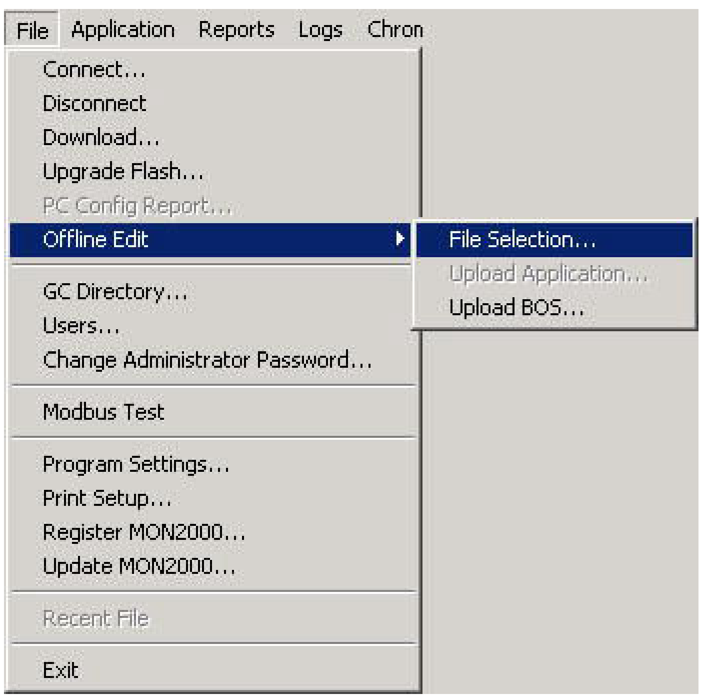
See the following sections for detailed instructions.

2.19.1 File Selection

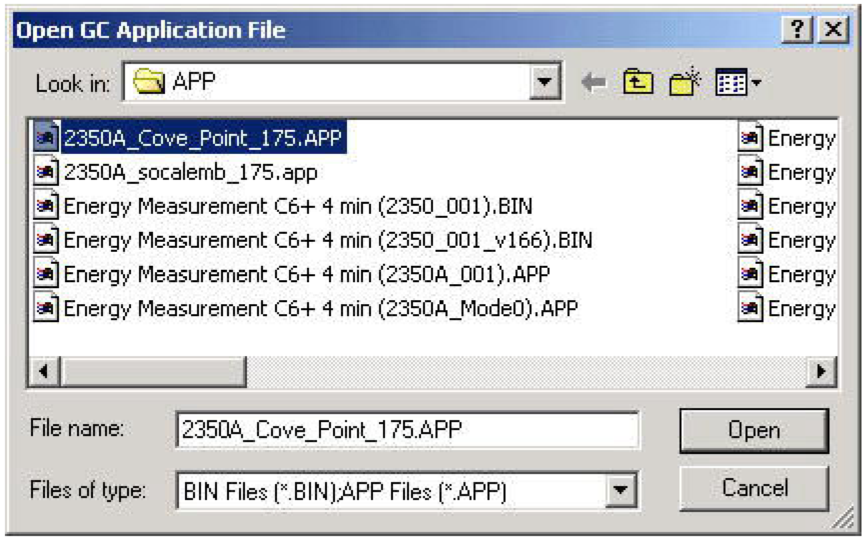
This function allows you to edit a GC application file stored on disk.

Procedure

1. Use the **File** → **Offline Edit** → **File Selection** menu to access this function.



The ***Open GC Application File*** dialog appears.



Using the directory tree, select the desired application file.

Note
The GC application files (.APP) are normally stored in the \GC\App directory.

---

2. Click the 

 button.
3. Edit this file by using the MON2000 Application functions (see Application Functions for more information).

   Note that the application file name is displayed in the GC status dialog and the File Edit mode (i.e., Offline Edit) is displayed in main screen titlebar.

When you have finished editing this file, you can download it to the GC Controller (Downloading an Application) or save for future use.

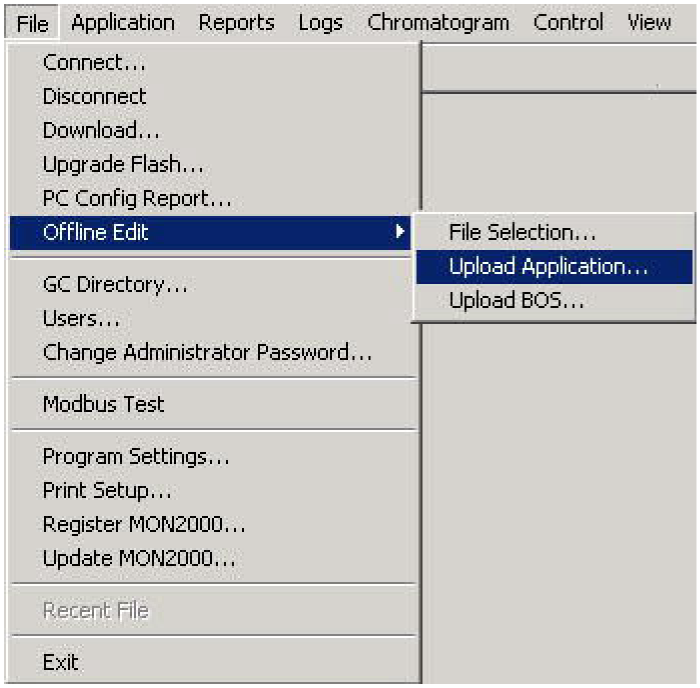
2.19.2 Upload Application

This function allows you to upload the application from an online GC Controller to a disk file and edit that file.

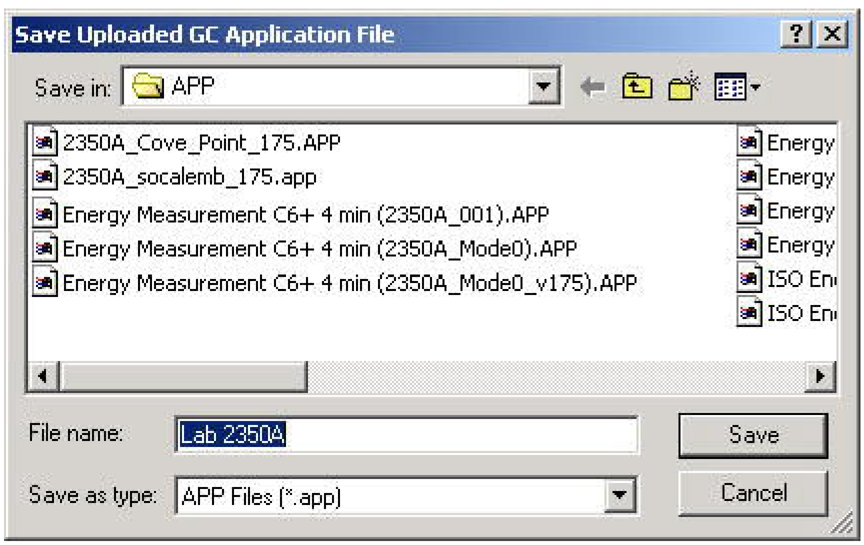
When connected to the GC, this function allows you to upload the current GC application data from the GC Controller and save to file for future editing. When the application upload is complete the connection will be terminated (i.e., disconnected).

Procedure

1. Establish a connection to the GC.
2. Use the **File** → **Offline Edit** → **Upload Application** menu to access this function.

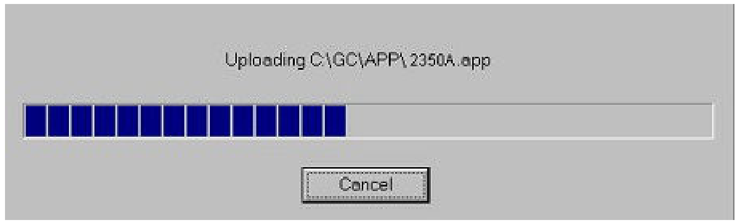


3. The ***Save Uploaded GC Application File*** menu appears.

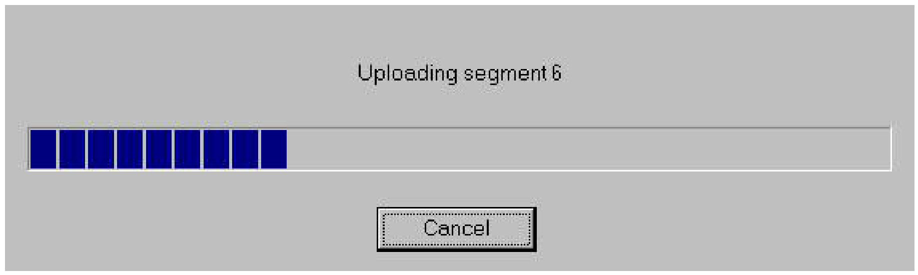


Use this dialog to choose the directory and file name or create a special file name for this particular application upload. Click the button.

4. MON2000 displays the message “Uploading C:\GC\APP\2350A.app” in the progress status bar.



MON2000 continues with the upload process and displays the message, “Uploading Segment 1 (through segment 15)” in the status bar and a progress bar appears.



Once all of the segments are uploaded and the application file (.app) has been saved, MON2000prompts you to save the parameters file.

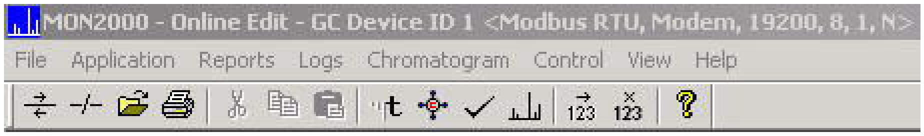
5. The Save Parameter File dialog appears.

Use this dialog to choose the directory location and file name or create your own parameter file name. Click the button to continue.

6. MON2000 saves the parameter data to the selected directory. When the upload is complete, your connection to the GC unit is automatically terminated.
7. You are now viewing the uploaded application file off-line.

You can edit this application by using the MON2000 Application functions (see Application Functions for more information).

Note that the application file name is displayed in the GC status dialog and the File Edit mode is displayed in the main screen titlebar.



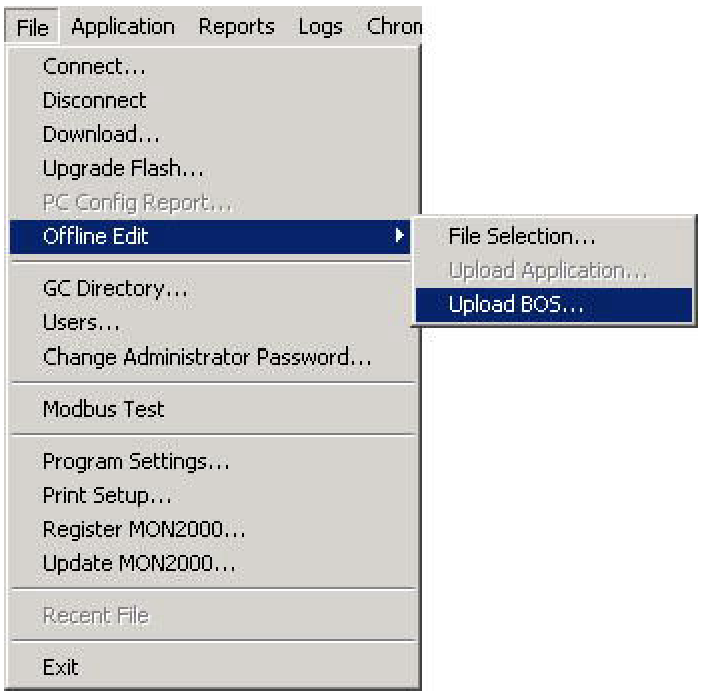
When you have finished editing this file, you can download it to the GC Controller (Downloading an Application) or save for future use.

2.19.3 Upload BOS

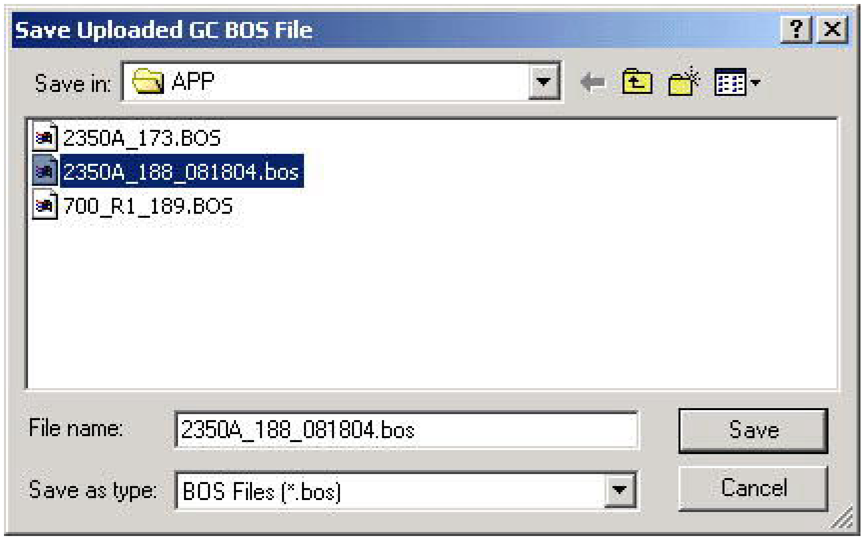
When connected to the GC, this function allows you to upload the current BOS (i.e., firmware) file from the GC Controller to save for future download (Upgrading Flash).

Procedure

1. Use the **File** → **Offline Edit** → **Upload BOS** menu to access this function.



2. The ***Save Uploaded GC BOS File*** dialog appears.



Note
By default, GC BOS files are stored in C:\GC\APP folder.

3. Use this dialog to choose the directory location and file name or create a file name for this particular upload. Click the Save button to continue.

Note
MON2000 will not perform a BOS upload during an analysis run. You must halt the analysis first (see "Halt") or wait until the GC is idle.

The message:

"Uploading C:\GC\APP\2350A.bos" appears in the status bar and a progress bar appears.

4. MON2000 begins to upload the BOS to the selected file. When the upload is complete, normal MON2000 operations resume.

Note
A BOS upload usually takes 10 minutes to complete.

3 Getting Started

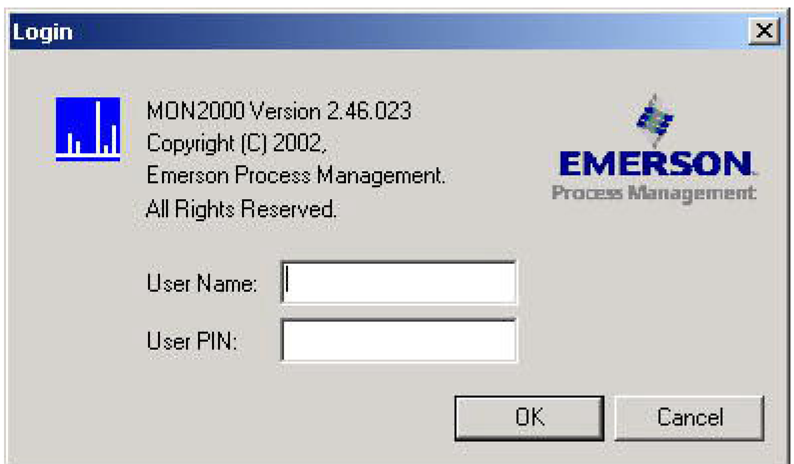
This section shows you how to get started with the MON2000 software, covering such functions as logging on, navigation, and configuring your PC printer for MON2000.

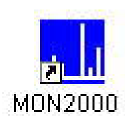
3.1 Logging On

To log on,

Procedure

1. Start the MON2000 software program by clicking the desktop icon or using the Windows® Start menu (Starting MON2000).

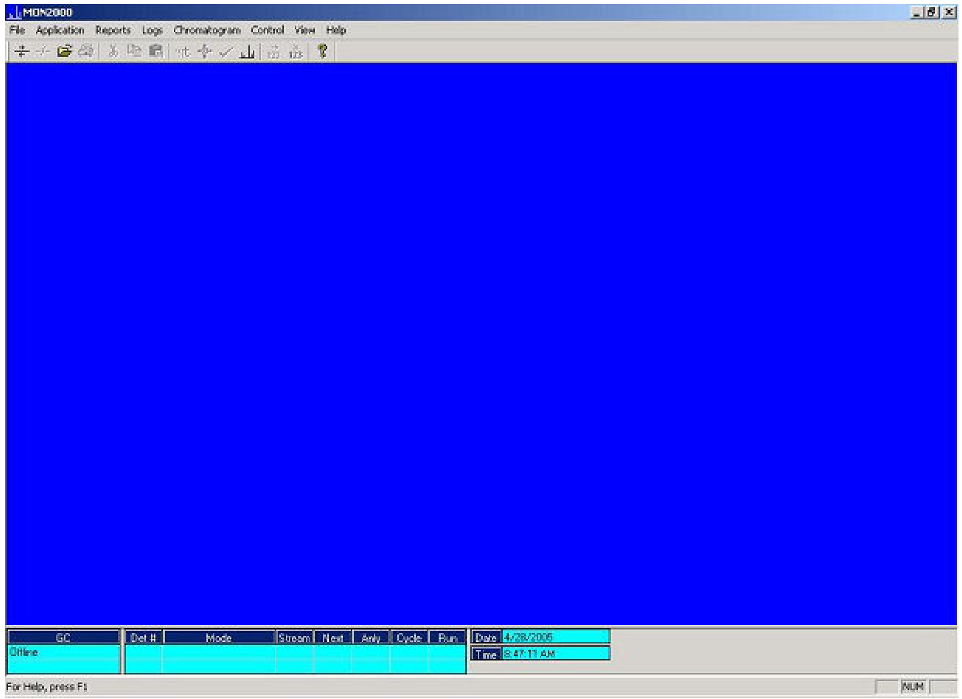




2. Click the User Name data field and type your assigned user name (up to 12 characters). Note that the user name is not case-sensitive and can include characters such as "*", "-", ".", etc.
3. If required, click the ***User PIN*** data field and type your assigned PIN.

Note
If you enter an incorrect user name or user PIN, a error message appears. Click OK to exit and return to the Logon dialog.

4. When you have successfully logged on, the MON2000 main window appears.



3.2 Logging Off

To log off:

Note
Ensure that you exit the MON2000 program and shut down Windows before powering off the PC.

Procedure

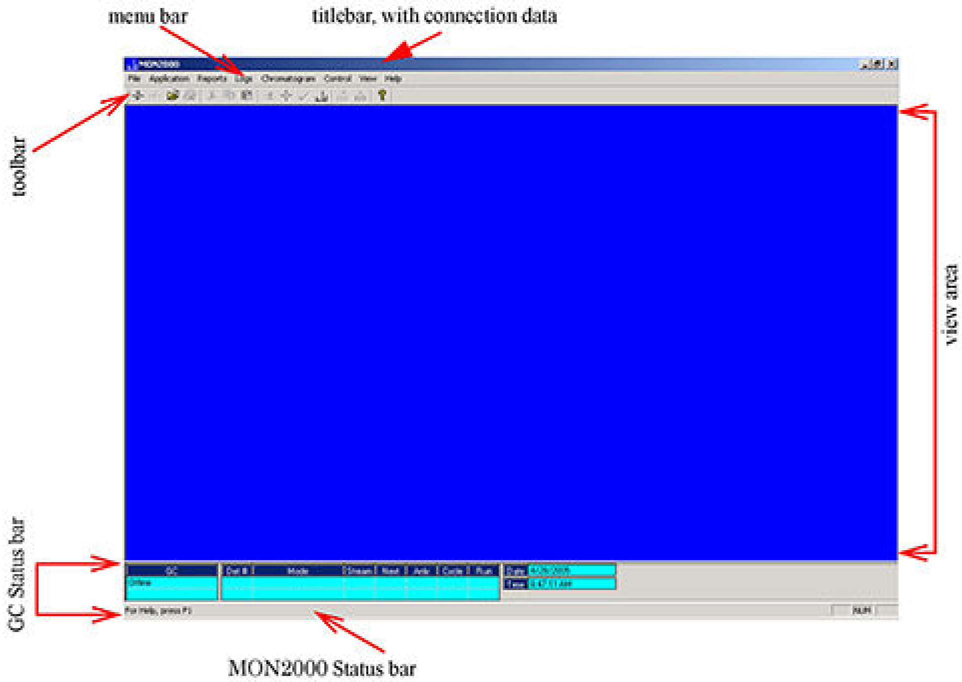
1. Disconnect from the GC unit (Disconnect from GC Unit).
2. Exit the MON2000 program by
   - using the **File** → **Exit** menu
   - pressing the ESC key
   - clicking the ☒ button

3.3 MON2000 User Interface

Use the following sections to familiarize yourself with the MON2000 user interface.

3.3.1 Main Window

The MON2000 main window typically looks like this:



Use the available menus, icons (see toolbar area and ToolTips), and function keys (Keyboard Shortcuts) to access the desired functions.

3.3.2 GC Status Bar

The status bar appears across the bottom of the application window. To display or hide the status bar, click the Status Bar command using the **View** menu (ALT + V, G).

Access this menu command from the **View** menu (ALT+ V, S) to display and hide the GC Status Bar, which displays the following:

- GC - name of the GC currently online
- Alarm status (Unacknowledged)
- Detector number
- Mode (e.g., analysis; Calibration mode or Analysis mode)
- Streams - number current streams
- Next - next stream number to run)
- Anly - analysis cycle
- Run - run time
- Date - current date is displayed
- Time - current time is displayed

The left area of the status bar describes actions of menu items as you use the mouse pointer over the menu selection. This area similarly shows messages that describe the actions of toolbar buttons as you press and hold them. After viewing the description of the toolbar button command and you do not wish execute the command, move the mouse pointer away from the toolbar command, then release the mouse button.

The right areas of the status bar indicate which of the following keys are activated:

Indicator	Description
CAP	the Caps Lock key is ON.
NUM	the Num Lock key is ON
SCRL	the Scroll Lock key is ON

Note

Your connection status is also displayed in the titlebar.

If “Online Edit” appears, then MON2000 is connected to the GC and is recognizing the existing application.

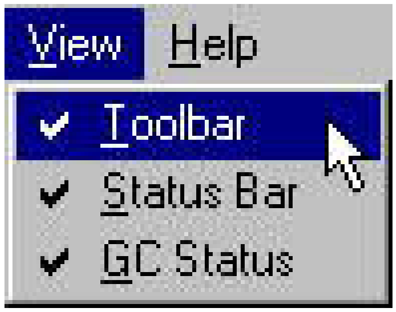
If “Connected” appears, then MON2000 is connected to the GC but does not recognize the existing application.

The GC Status bar consists of:

Item	Description
GC	GC unit to which MON2000 is currently connected A status flag indicates an active alarm, an unacknowledged alarm, or the File Edit mode (offline editing).
Det #	Detector monitoring the alarm status of the currently connected GC A GC unit can have up to 2 detectors.
Mode	Mode of the Detector Typical modes are: • Idle • Auto Cal • Auto Base • Auto Anly • FCal
Stream	Current stream being analyzed
Next	Next sample stream to be analyzed
Anly	Analysis time
Cycle	Total cycle time (seconds), selected before starting another analysis
Run	Time (seconds) elapsed since current cycle began
Date/Time	Date and time, per PC clock

3.3.3 View Menu

Use the **View** menu to toggle (i.e., switch ON or OFF) which main window component you wish to view. Main Window for an identification and definition of each component.

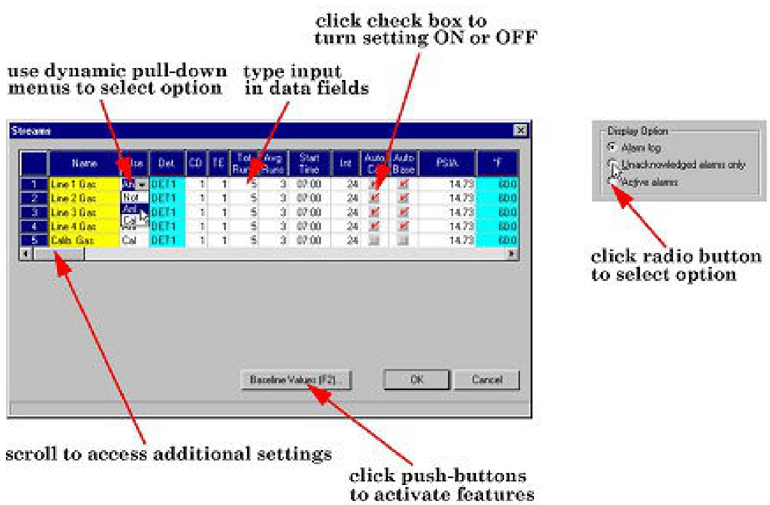


3.3.4 ToolTips

To view a ToolTip, move the mouse cursor to the Toolbar icon you want identified. MON2000 displays the ToolTip for five seconds.

3.3.5 Data Entry and Function Features

Use the data boxes, buttons, check boxes, and toggles to input data or to choose options and activate features.



3.4 Shortcut to Save or Print Data

From any active dialog, right-click the displayed data to access this menu.

Choose the **Save Sheet** option to save data to disk or the **Print Sheet** option to queue data to your PC printer. MON2000 prints the report to your configured printer (Configuring Your Printer).

Note
Microsoft Internet Explorer 5.0 (or later) is required to view a spreadsheet file saved in HTML format.

3.5 Keyboard Shortcuts

MON2000 supports keystrokes as well as a standard PC mouse interface. Use a mouse to perform point-and-click operations.

Refer to the following table for common keyboard shortcuts. See Table 3-1 for function keys that can be used after an application has been downloaded to the GC Controller.

Table 3-1: Function keys

Keystroke	Action
ARROW keys	Move cursor: • left or right in a data field • up or down in a menu or combo box • up or down (column), left or right (row) through displayed data entries
DELETE	• Delete the character after cursor. • Delete selected rows from a table or return row values to the default settings.
ENTER	• Add a blank item or row to selected table. • Activate the default control element (e.g., the OK button) in current window.
ESC	Exit application or active window without saving data.
F1	Access context-sensitive help topic.
INSERT	• Toggle between insert and type-over mode in selected cell. • Insert a new row above the highlighted row.
SHIFT+TAB	Move to previous control element (e.g., button) or data field in window; see TAB description.
SPACE	Toggle settings (via radio buttons or check boxes).
TAB	Move to next control element (e.g., button) in window; use **File → Program Settings** (Select Program Settings) to use TAB key to move to next data field.

Function Key	Action
F2	Start Auto Sequence **Note** These keystrokes are available from the main menu only. Function key definitions will change per the active dialog/function. Starts the Auto-Sequencing function (see Auto Sequence).
F3	Halt Halts the GC program (e.g., an analysis run) at the end of the current cycle (see Halt).

Function Key	Action
F5	Edit TEVs Displays the Timed Event Table (TEV) per specified stream (see Timed Events).
F6	Edit CDTs Displays the Component Data Table (CDT) per specified stream (see Component Data).
F7	View Current CGM Displays the chromatogram for the sample stream being analyzed (see Chromatogram Viewer Function).
F8	View Last GC CGM Displays any chromatogram stored in the GC Controller (see Chromatogram Viewer Function).

3.6 Procedures Guide

Use the following table to look up the related manual section and menu (and keystroke) for a given procedure.

Task or Data Item	Section(s)	Menu [Keystroke]
24-Hour Average, component(s) measured	Averages	**Application → Calculations → Averages**
alarms, related components	Sort Retention Time Limit Alarms Discrete Alarms Discrete Outputs	**Application → Component Data** [F6] **Application → Limit Alarms** **Application → Discrete Alarms** **Application → Discrete Outputs**
alarms, stream number(s) programmed	Limit Alarms	**Application → Limit Alarms**
Analysis Report (on/off)	GC Printer Control MON2000 Printer Control	**Reports → GC Printer Control** **Reports → MON2000 Printer Control**
analysis time	Timed Events	**Application → Timed Events [F5]**
auto-calibration (on/off)	Streams	**Application → Streams**
Auto-Calibration Interval	Streams	**Application → Streams**
Auto-Calibration Start Time	Streams	**Application → Streams**
autocal time	Streams	**Application → Streams**
Baseline	Streams	**Application → Streams, Baseline Values [F2]**
base pressure used for calculations	Streams	**Application → Streams**
BTU-dry (on/off)	Control	**Application → Calculations → Control**
calibration concentration	Component Data	**Application → Component Data [F6]**
calibration cycle time	Timed Events	**Application → Timed Events [F5]**
calibration runs, number averaged	Streams	**Application → Streams**

Task or Data Item	Section(s)	Menu [Keystroke]
calibration runs, number of	Streams	**Application → Streams**
calibration stream number	Streams	**Application → Streams**
communications baud rate, at GC	Serial Ports	**Application → Serial Ports**
communications baud rate, at PC	Dial-up Connection	**File → (COM ID)**
component code and name	Component Data	**Application → Component Data [F6]**
component full scale (for output)	System Analog Outputs	**Application → System** (CGM Analog Output Config and Baseline Offset) **Application → Analog Outputs**
component(s) programmed for input	Analog Inputs Discrete Inputs	**Application → Analog Inputs** **Application → Discrete Inputs**
component(s) programmed for output	Limit Alarms Discrete Alarms Analog Outputs Discrete Outputs	**Application → Limit Alarms** **Application → Discrete Alarms** **Application → Analog Outputs** **Application → Discrete Outputs**
component, retention time	Component Data	**Application → Component Data [F6]**
component zero (for output)	Analog Outputs	**Application → Analog Outputs**
Compressibility (on/off)	Control	**Application → Calculations → Control**
current date	GC Time	**Control → GC Time**
current time	GC Time	**Control → GC Time**
cycle time	Timed Events	**Application → Timed Events [F5]** >
delete alarms	Limit Alarms Alarm Log	**Application → Limit Alarms** **Log → Alarm Log**
delete component from component list	Component Data	**Application → Component Data** [F6], [DELETE]
delete inhibit, integration, peak width	Timed Events	**Application → Timed Events [F5]**
delete output(s)	Limit Alarms Discrete Alarms Analog Outputs Discrete Outputs	**Application → Limit Alarms** **Application → Discrete Alarms** **Application → Analog Outputs** **Application → Discrete Outputs**
edit numeric value	Numeric	**Application → User Defined → Numeric**
edit select values	Selection	**Application → User Defined → Selection**
edit text strings	Text Strings	**Application → User Defined → Text Strings**
existing alarm(s)	Alarm Log	**Log → Alarm Log**
full-scale value (for input)	Analog Inputs	**Application → Analog Inputs**
GPM liquid equivalent (on/off)	Control	**Application → Calculations → Control**
height or area measurement method	Component Data	**Application → Component Data [F6]**
High Alarm	Limit Alarms	**Application → Limit Alarms**
(Analyzer) I.D.	Set Up GC Directory System	**File → GC Directory** **Application → System**

Task or Data Item	Section(s)	Menu [Keystroke]
inhibit on-off times	Timed Events	**Application → Timed Events [F5]**
input(s) being used	Analog Inputs Discrete Inputs	**Application → Analog Inputs** **Application → Discrete Inputs**
integration on-off times	Timed Events	**Application → Timed Events [F5]**
Low Alarm	Limit Alarms	**Application → Limit Alarms**
Mole percent (on/off)	Control	**Application → Calculations → Control**
Normalization (on/off)	Control	**Application → Calculations → Control**
outputs being used	Limit Alarms Discrete Alarms Analog Outputs Discrete Outputs	**Application → Limit Alarms** **Application → Discrete Alarms** **Application → Analog Outputs** **Application → Discrete Outputs**
Peak Width, on time	Timed Events	**Application → Timed Events [F5]**
Ratio (on/off)	User Defined	**Application → Calculations → User Defined**
Ratio Denominator	User Defined	**Application → Calculations → User Defined**
Ratio, stream number(s)	User Defined	**Application → Calculations → User Defined**
Relative Density (on/off)	Control	**Application → Calculations → Control**
Response Factor	Component Data	**Application → Component Data [F6]**
Response Factor, percent deviation	Component Data	**Application → Component Data [F6]**
Retention Time, percent deviation	Component Data	**Application → Component Data [F6]**
Rolling Average (on/off)	Averages	**Application → Calculations → Averages**
Rolling Average, component for	Averages	**Application → Calculations → Averages**
Rolling Average, number of analyses	Averages	**Application → Calculations → Averages**
Rolling Average, stream number(s)	Averages	**Application → Calculations → Averages**
Spectrum Gain	Timed Events	**Application → Timed Events [F5]**
stream number(s) (for output)	Limit Alarms Discrete Alarms Analog Outputs Discrete Outputs	**Application → Limit Alarms** **Application → Discrete Alarms** **Application → Analog Outputs** **Application → Discrete Outputs**
stream sequences skipped, number	System Streams	**Application → System** **Application → Streams**
streams analyzed, number	System Streams	**Application → System** **Application → Streams**
streams analyzed, sequence	System Streams	**Application → System** **Application → Streams**
Valve on/off times	Timed Events	**Application → Timed Events** [F5]
Weight Percent (on/off)	Control	**Application → Calculations → Control**
Wobbe value (on/off)	Control	**Application → Calculations → Control**

Task or Data Item	Section(s)	Menu [Keystroke]
Zero value (for input)	Analog Inputs	**Application → Analog Inputs**

3.7 Keylock Switch Control

If your GC unit has the keylock control enabled, you will not be able to write changes or new data to the GC Controller. The following error dialog will display.

To see which Modbus registers are affected by the keylock control, view the Communications section of the PC Config Report via the Report Viewer (see PC Config Report for instructions and an example).

When closed ('on'), the GC keylock switch protects many of the GC Controller's parameters from being changed using MON2000.

Most of the dialog boxes in the Application’s menu allows you to view data but does not allow you to save changes when the keylock switch is closed. Several items in the Reports and Control menus are unavailable when the keylock switch is closed. The Users dialog cannot be downloaded to the GC Controller when the keylock switch is closed. A GC application cannot be downloaded to the GC Controller when the keylock switch is closed.

Note
The keylock switch affects only online operations, i.e. those that are performed while connected to a GC Controller.

Since most of the GC Controller's parameters are protected by the keylock switch, it is easiest to list the operations that are available when the keylock switch is closed. The following operations are available when the keylock switch is closed:

The stream sequences can be changed in the System dialog box. (GC applications version 1.7 and above.)

- Automatic calibration in the Analog Outputs dialog box
- Report display
- GC report request (GC applications version 1.7 and above)
- MON2000 printer control (GC applications version 1.7 and above)
- View archive data
- Trend data
- Maintenance Log editing (GC applications version 1.7 and above)
- Alarms (except clear/ack all active alarms)

- Event log
- Chromatogram viewer (including forced calibration using archived chromatograms)
- Start Auto-Sequencing
- Start single stream
- Halt analysis
- Start calibration
- View and set GC time (GC applications version 1.7 and above)

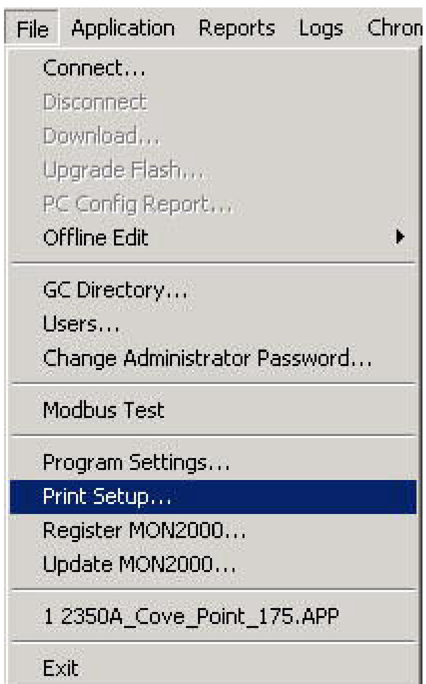
3.8 Configuring Your Printer

Use this function to configure the settings for the printer connected to your PC. This configuration will apply to any print job queued from MON2000.

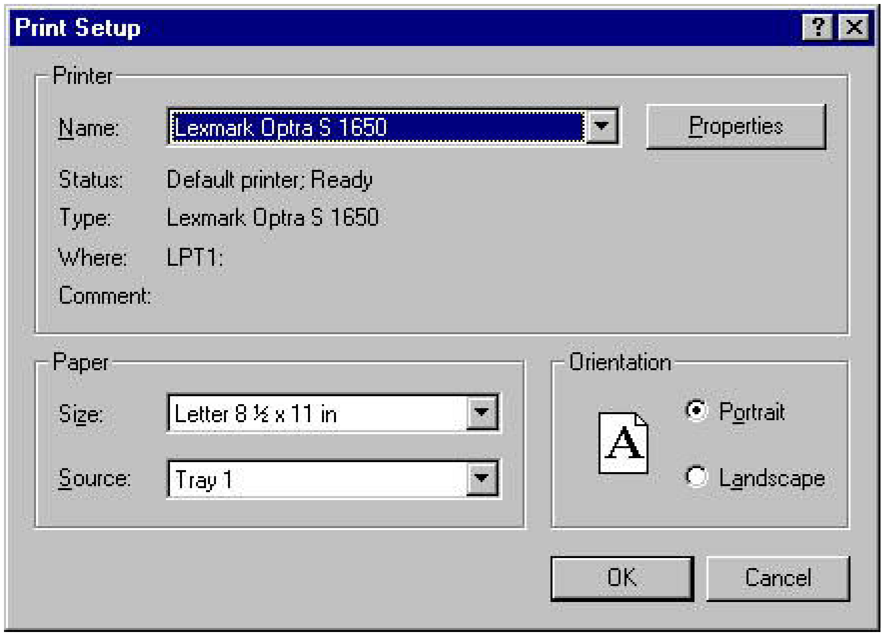
The settings available depend on the printer type. Refer to the manufacture's user manual for more information.

Procedure

1. Use the **File** → **Print Setup** menu to access this function.



2. The ***Printer Setup*** dialog appears.



3. Use the provided data fields, radio buttons, check and combo boxes to select the desired settings.

Note
Your configuration will be cleared (i.e., the settings will return to the default values) when you exit MON2000.

Click the Properties button to configure more advanced settings.

Refer to the printer operator manual for more information.

4. Click the OK button to queue the printer.

Click the Cancel button to abort and return to the main window.

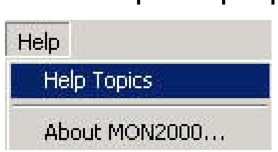
3.9 Using Online Help

Currently, the online help feature contains all user information and instructions for each MON2000 function as well as the MON2000 system.

To access the MON2000 Application Help file,

Procedure

1. Press the F1 key at any time to view help topics that discuss the currently active dialog or function.
2. Use the **Help** → **Help Topics** menu to view the help contents dialog.



Use the scroll bars and arrows to display more of a topic. You can also resize and/or move the topic dialog for better viewing convenience.

When applicable, a topic will contain links to other related topics, notes, and helpful popups. Use these links as you need.

3.10 Operating Modes for MON2000

MON2000 supports four different operating modes. Each mode allows the GC to analyze data from a given number of detectors, streams, and methods. See Table 3-2 for more information.

Table 3-2: Operating modes

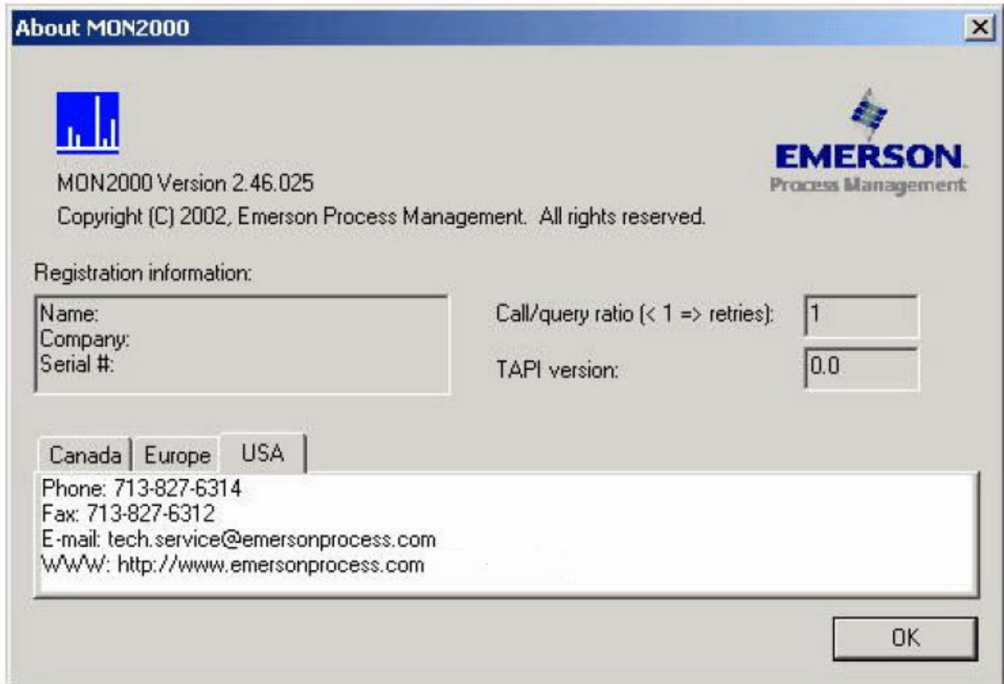
Mode ID number	Detectors supported	Streams supported	Methods supported
0	1	1	1
1	2	1	1
2	2	2	2
3	2	1	2

3.11 About MON2000

To verify information such as the software version number, copyright date, and the call/query ratio.

Procedure

1. Use the **Help** → **About MON2000** menu to access this dialog.
2. MON2000 appears the About MON2000 dialog.



The ***Call/Query Ratio*** estimates the quality of your serial communications. If this ratio is less than or equal to 0.5, then the connection is problematic. The maximum value of 1 indicates a good connection.

The ***TAPI version*** represents the Telephony API software ***MON2000*** accesses for dial-up (i.e., remote) communications.

3. Click the  button to exit and return to the main window.

4 Control Functions

The options in the Control pull-down menu allow you to initiate various operating modes of the gas chromatograph (GC) unit.

4.1 Auto Sequence

Use this function to start continuous GC analysis runs that follow a predefined stream sequence. At the initial startup, the current stream (in the stream sequence) is the first stream analyzed. See Streams for detailed instructions on configuring the predefined sequence.

Procedure

1. Use the **Control** → **Auto Sequence**menu or press the F2 key to access this function.
2. The ***Start Auto Sequence*** dialog appears.

3. Click the **Purge** check box to set the purging option. Note that the default setting is ON.

   Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

4. Click the 

 button to continue.

Click the 

button to abort and return to the main window.

5. The Auto Sequence GC Analysis begins (if you selected the Purge Stream option, MON2000 performs this 60-second task first).

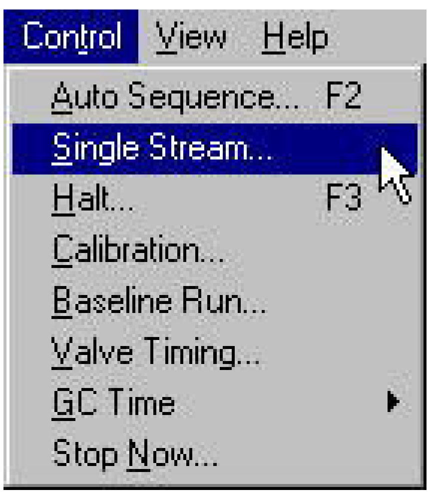
Note
Use the Report Display option in the Reports menu to view the results of the Auto Sequence function.

Use the status bar to monitor the progress of this function.

To change the operating parameters, such as the Timed Event Tables (TEVs) and Component Data Tables (CDTs), Application Functions for information about Application functions.

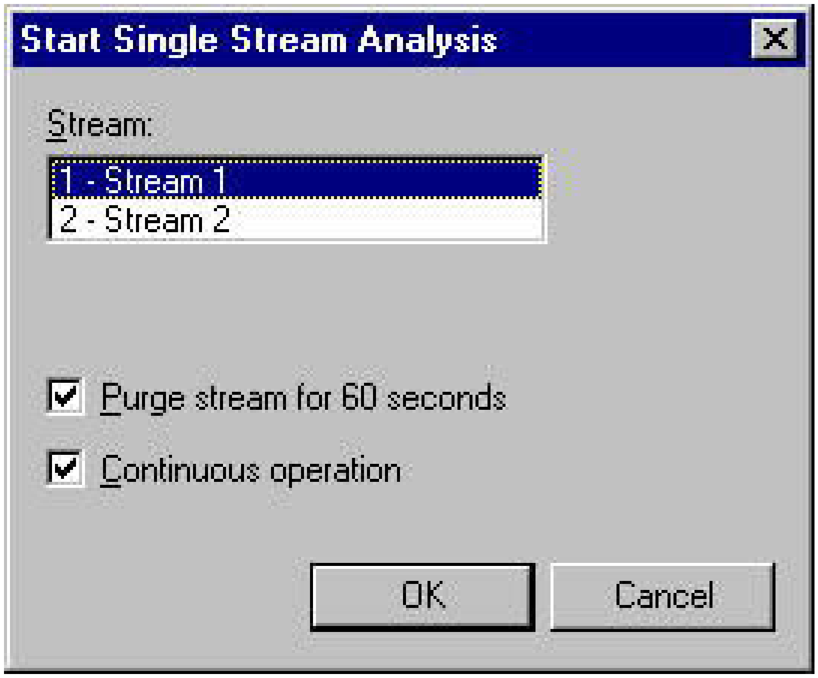
4.2 Single Stream

Use this function to start continuous GC analysis run(s) on a single stream.



Procedure

1. Use the **Control → Single Stream** menu to access this function.
2. The ***Start Single Stream Analysis*** dialog appears.



3. Select the desired stream from the Stream menu.
4. Click the **Purge** check box to set the purging option. Note that the default setting is ON.

   Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

5. Click the **Continuous operation** check box to perform repetitive analysis runs. Note that the default setting is ON.

   Deselect this option if you want to perform only one analysis run.

6. Click the  button to accept your selections and continue.

   Click the  button to abort and return to the main window.

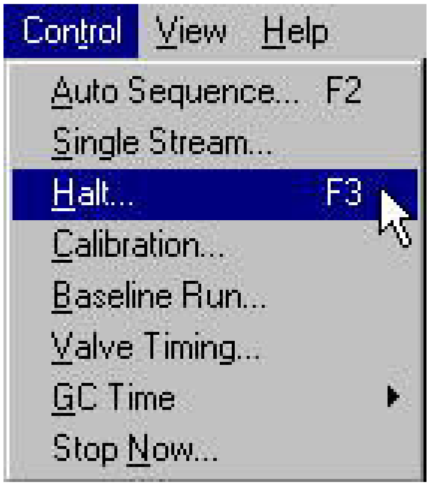
7. The Single Stream GC Analysis begins (if you selected the Purge Stream option, MON2000 performs this 60-second task first).

   Note
   Use the Report Display option in the Reports menu to view the results of the Single Stream function.

   Use the status bar to monitor the progress of this function.

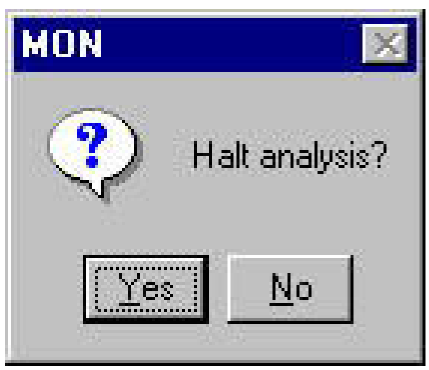
4.3 Halt

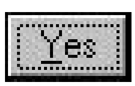
Use this function to stop the current operation mode at the end of the run in progress.

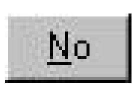


Procedure

1. Use the **Control** → **Halt** menu or press the F3 key to access this function.
2. MON2000 prompts you to confirm your selection.



Click the  button to proceed.

Click the  button to abort and return to the main window.

3. After the current run finishes, the function stops and “Idle” appears in the status bar.

4.4 Calibration

Use this function to calibrate the GC unit.

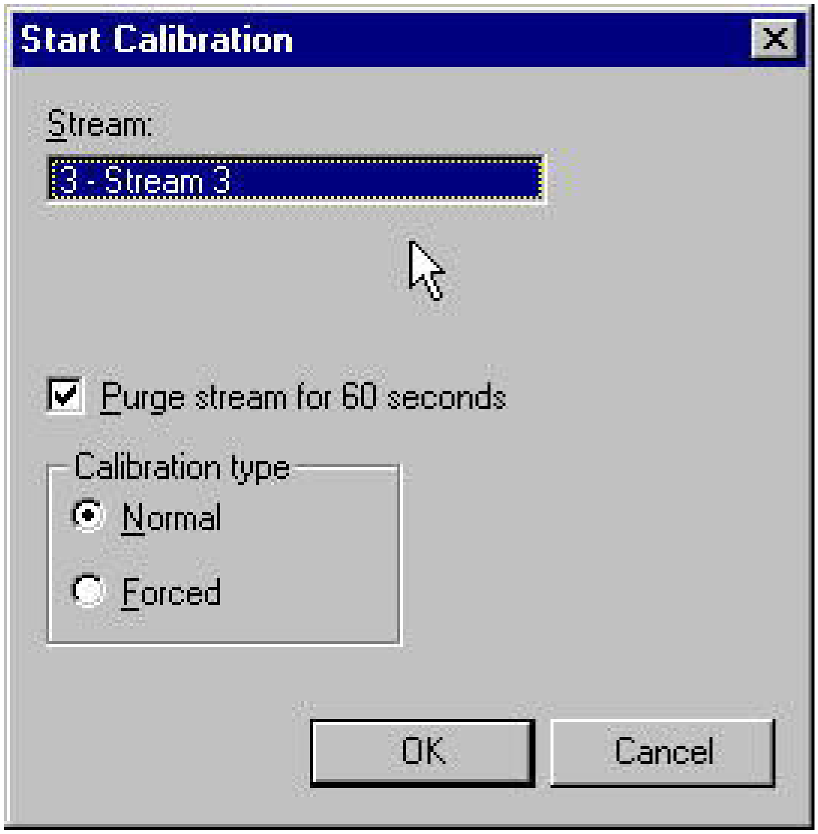
Calibration runs are determined by the CDT and Streams settings. See Component Data and Streams for detailed instructions on how to edit these settings.

Procedure

1. Use the **Control** → **Calibration** menu to access this function.

   Note
   If the GC unit is in Auto Sequence mode, calibration will not start until 2 or more analysis runs have been completed. This delay is required to complete the current analysis and the analysis of the stream currently purging through the valve.

2. The ***Start Calibration*** dialog appears.



MON2000 displays the stream to be used for the calibration.

To select which stream is used for calibration, see Streams.

3. Click the **Purge** check box to set the purging option. Note that the default setting is ON.

Note
See Report Display to select report parameters.

Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

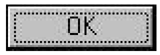
4. Select the desired calibration type.
   a) Click the **Manual** radio button to perform a manual calibration.

   Note
   For either choice, only VAR (variable) components on the CDT are updated. See Component Data for details.

   The CDT for the selected stream(s) will not be updated with raw data that are outside the acceptable deviations (as listed on the CDT). For more information, see Component Data.

   b) Click the **Forced** radio button to perform a manual calibration.

The CDT for the selected stream(s) will be updated with raw data that are outside the acceptable deviations (as listed on the CDT). For more information, see Component Data.

5. Click the 

button to accept your selections and continue.

   Click the 

button to abort and return to the main window.

6. The Calibration begins.

   Note
   Use the Report Display option in the Reports menu to view the results of the Calibration function.

   Use the status bar to monitor the progress of this function.

4.5 Baseline Run

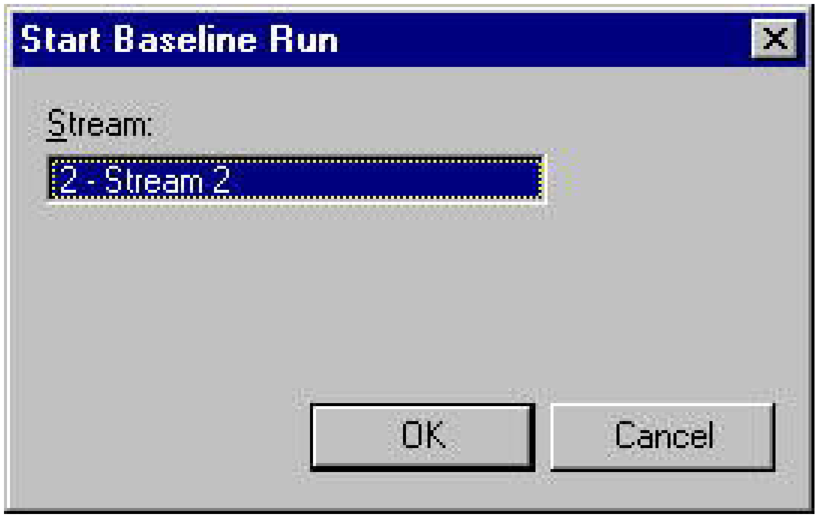
Use this function to initiate a single GC baseline run, to assess chromatogram peakscaused by the GC valve action alone. A baseline run is a calibration-like run during which no calibration or sample gas is injected (i.e., the valve is not fired).

Procedure

1. Use the **Control** → **Baseline Run** menu to access this function.

   Note
   If the GC unit is in Auto Sequence mode, MON2000 prompts that the continuous analysis must be stopped. Halt the analysis (Halt) and wait for an Idle status. Then continue initiating the baseline run.

2. The Start Baseline Run dialog appears.



MON2000 displays the stream to be used for the baseline run.

To select which stream is used for the baseline calibration, see Streams.

3. Click the OK button to continue.

   Click the Cancel button to abort and return to the main window.

   Use the status bar to monitor the progress of this function. Use the Report Display option in the Reports menu to view the results of the Baseline Run function?

Det #	Mode
1	Baseline

4.6 Auto BTU Start Up and Valve Timing

The ***Auto BTU Start Up*** process, which takes about an hour to complete, automatically performs the following sequence of tasks:

Procedure

1. Sets the timing for each valve.
2. Matches all the component peaks.
3. Adjusts the timed events based on peak integration times.
4. Runs a calibration.
5. Checks the range and order of response factors.
6. Adjusts the retention time deviations to avoid peak overlapping.

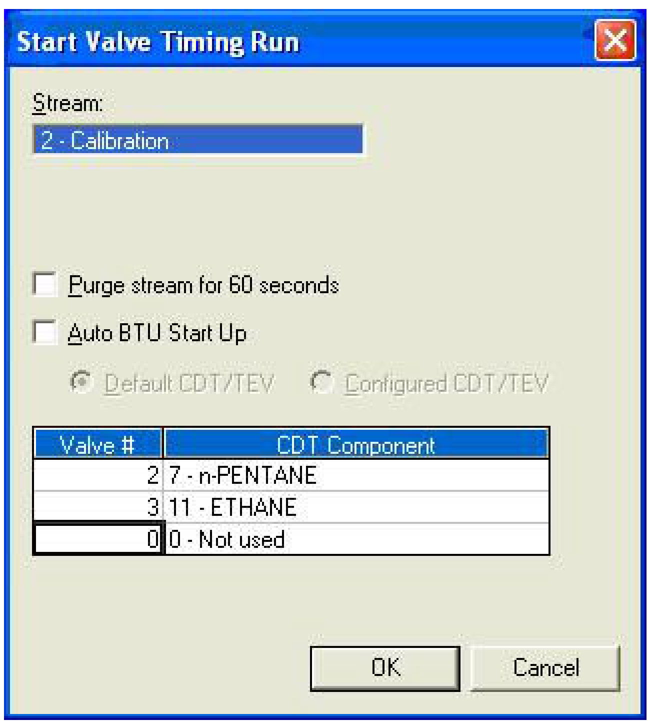
   You can also initiate a valve timing run, which is the first step of the Auto BTU Start Up process, independently of that process. See Starting a Valve Timing Run for more information.

4.6.1 Initiating an Auto BTU Start Up Run

To launch the Auto BTU Start Up process, do the following:

Procedure

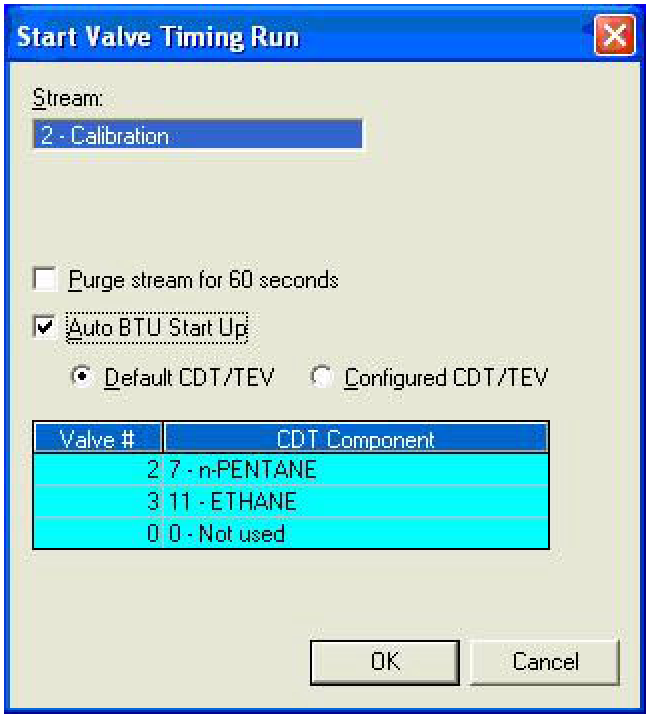
1. If the GC is currently performing an analysis, select **Halt** from the **Control** menu to put the GC in Idle mode after the current analysis run.
2. Select ***Valve Timing*** from the **Control** menu. The Valve Timing window displays.



MON2000 displays in the ***Stream*** field the calibration stream(s) to be used for the Auto BTU Start Up run.

3. Select the ***Auto BTU Start Up*** checkbox.

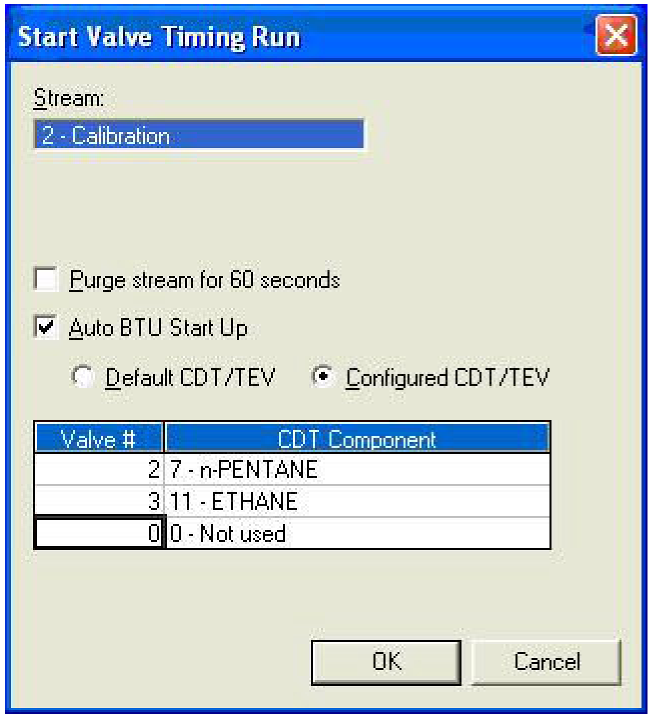
4. To use the default Component Data and Timed Event tables, select the Default CDT/TEV checkbox.



Note
It is strongly recommended that you use the Default CDT/TEV.

When the Default CDT/TEV checkbox is selected, the Valve # and CDT Component fields are read-only.

5. To use the GC's existing CDT/TEV tables, select the Configured CDT/TEV checkbox.



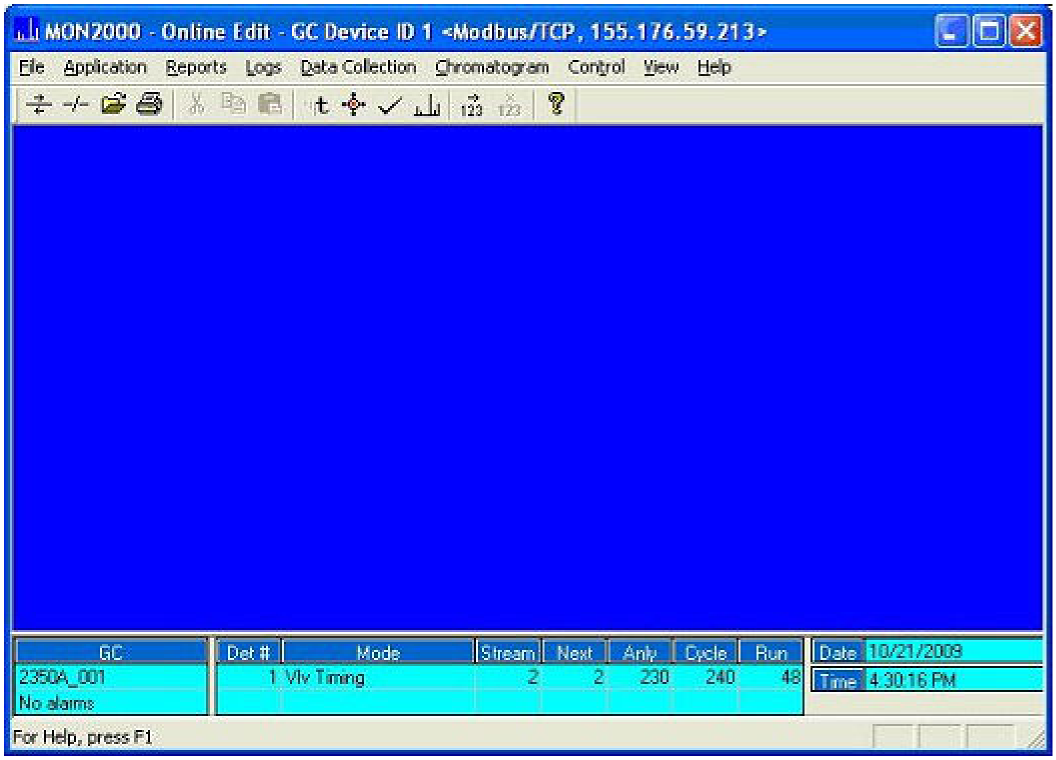
You can enter a valve number in the Valve # field and select the component number from the drop-down list of the CDT Component field in the table below the checkboxes. The list of components are from the CDT of the corresponding calibration stream.

Note
neo-Pentane is not available in the CDT Component drop-down list.

6. To allow sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis, click the **Purge stream for 60 seconds** check box.

Note
It is strongly recommended that you check the **Purge stream for 60 seconds** check box.

7. Click ***OK*** to begin the Auto BTU Start Up process. When the process starts, the GC Status window indicates that the GC is in ***Vlv Timing*** mode.



If the Auto BTU Start Up run fails, an alarm will be triggered and displayed in the Alarm Log.

The following six potential system alarms can be triggered during the Auto BTU Start Up process:

- Valve Timing 1 Failure: Triggered if the timing for valve 1 cannot be determined after a ten second change of VALVE OFF time.
- Valve Timing 2 Failure: Triggered if the timing for valve 2 cannot be determined after a ten second change of VALVE OFF time.
- Valve Timing 3 Failure: Triggered if the timing for valve 3 cannot be determined after a ten second change of VALVE OFF time.
- Auto BTU RT Failure - Missing Peaks: Triggered if not all the peaks are found after running the calibration stream to match all component peaks.
- Auto BTU Response Factor Failure: Triggered if all of the response factors are not within +/- 50% of the default values after the calibration runs.
- Auto BTU Calib Failure - RF Order: Triggered if the response factors are not in the proper order after the calibration runs.

Note

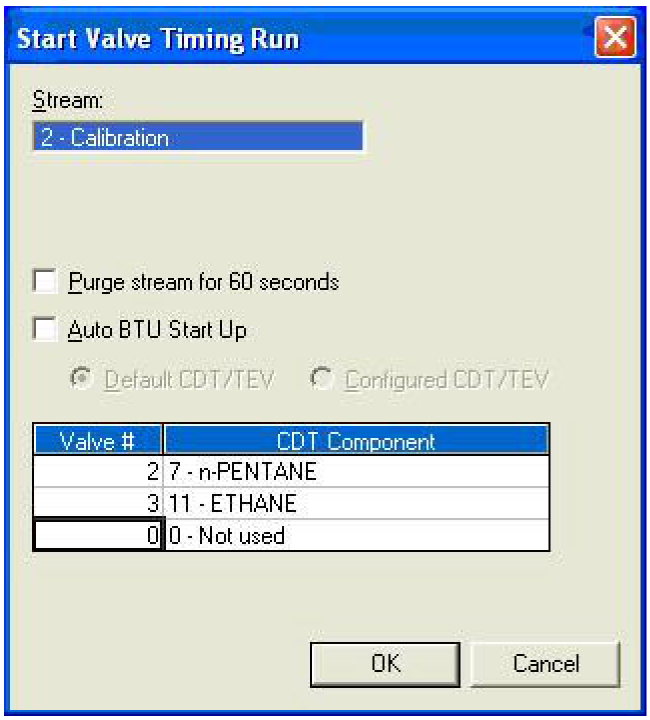
A triggered alarm will be posted in the Alarm Log. See Alarm Log for detailed instructions on reading Alarm Logs.

4.6.2 Starting a Valve Timing Run

Note
If the GC is in Auto Sequence mode, halt the analysis (Halt) and then return to the Valve Timing window.

Procedure

1. Select **Valve Timing** from the **Control** menu. The Start Valve Timing Run dialog appears.
2. If the Auto BTU Start Up checkbox is selected, uncheck it. The valve timing feature is now enabled.



3. MON2000 displays in the ***Stream*** field the calibration stream(s) to be used for the valve timing run.
4. To allow sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis, click the **Purge stream for 60 seconds** check box..
5. You can enter a valve number in the Valve # field and select the component number from the drop-down list of the CDT Component field in the table below the checkboxes. The list of components are from the CDT of the corresponding calibration stream.
6. Click the  button to accept your selections and to continue.

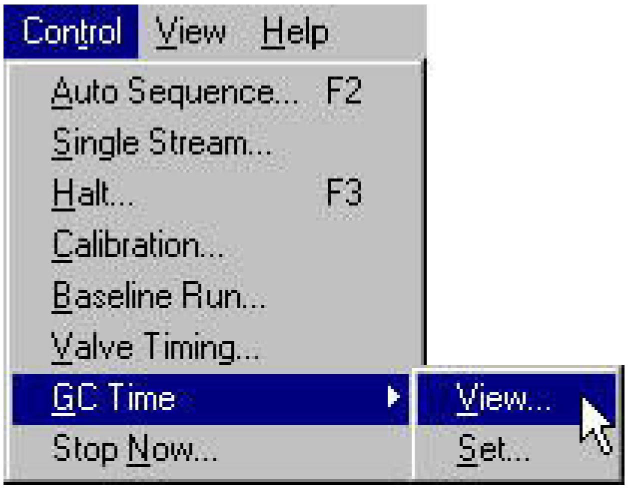
   Click the  button to abort and return to the main window.
7. The Valve Timing run begins.

   If no change was made to a valve's timing, the following message will be posted in the Alarm Log: "Valve Timing **N** Failure", where **N** is the ID number for the valve.

see Alarm Log for detailed instructions on reading Alarm Logs. If all valves are successfully optimized, no messages will be recorded.

4.7 GC Time

Use the GC Time function to view and, if necessary, set the system date and time used by the GC Controller.



4.7.1 View GC Time

To view the system date and time used by the GC, do the following:

Procedure

1. Use the **Control** → **GC Time** → **View** menu to select the View option.
2. The following MON2000 dialog appears.

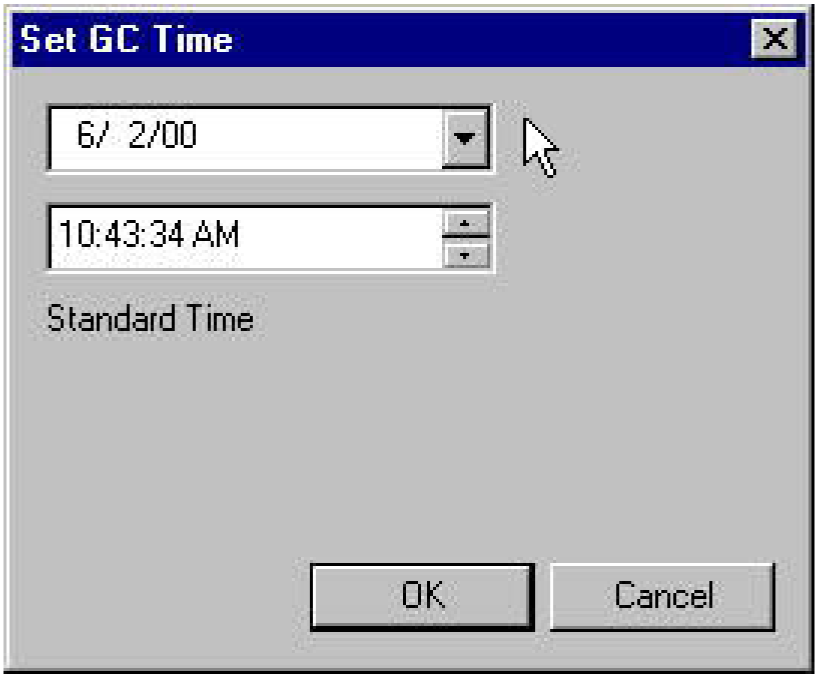
3. Click the  button to exit this dialog and return to the main window.

4.7.2 Set GC Time

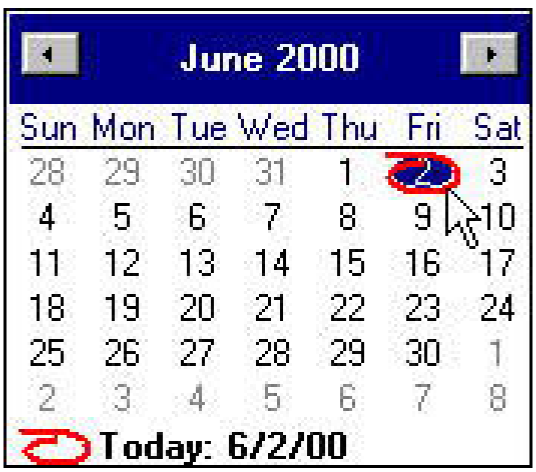
To set the system date and time used by the GC,

Procedure

1. Use the **Control** → **GC Time** → **Set** menu to select the Set option.
2. The Set GC Time dialog appears MON2000 indicates whether the GC Controller is on daylight saving or standard time, which depends on the configured system parameters.



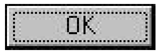
3. Use the provided pull-down arrow to access an interactive calendar.



   a) Click the left/right arrows to view the previous or future months.
   b) Click the desired day for the date. Note that a blue oval appears on the selected day.

4. Select which part of the time (hour, minute, or seconds) you wish to change.

   Use the provided scroll arrows to increase or decrease the highlighted value.

5. Click the  button or press the enter key to write the selected date/time to the GC Controller.

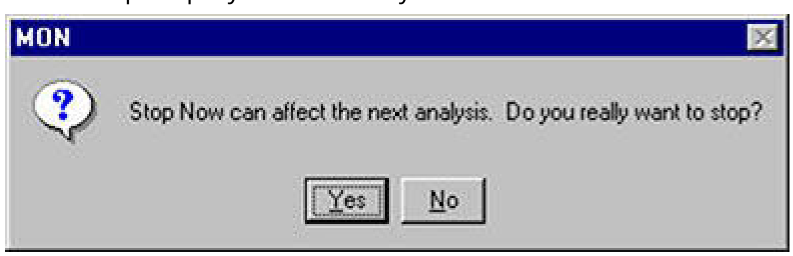
   Click the  button to abort and return to the main window.

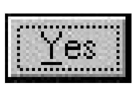
4.8 Stop Now

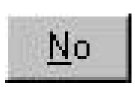
Use this function to ***immediately*** stop all analysis runs.

Procedure

1. Use the **Control** → **Stop Now** menu to access this function.
2. MON2000 prompts you to confirm your selection.

   Click the  button to proceed.

   Click the  button to abort and return to the main window.

   Note
   This function forces the system to the Idle mode. If Stop Now is performed while an analysis is in progress, the components will continue to elute from the columns per the Idle mode. All resultant data will be lost. Do not perform a Stop Now unless absolutely necessary. Whenever possible, use the Halt function.

3. Any GC function in progress is stopped. The Mode field in the status bar displays 'Idle'.

Det #	Mode
1	Idle

5 Application Functions

The options in the Application pull-down menu allow you to manipulate or edit the control settings that exist for particular gas chromatograph (GC) application functions. You can edit an application while online with the GC Controller or when using the Offline Edit function (Offline Edit of GC Application for information on Offline Edit; Downloading an Application to download an application first).

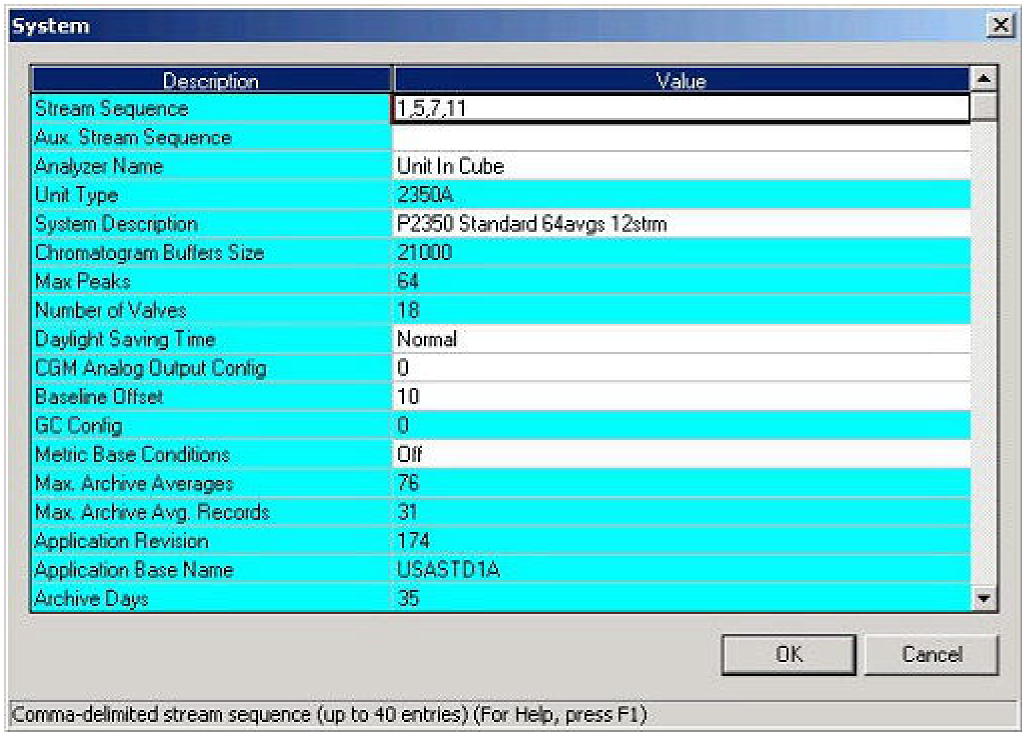
5.1 System

Use this function to define or edit the GC stream sequence, unit name, and system description. You can also use this function to activate Metric Base Condition for calculations based on metric units.

The System dialog also includes a series of non-editable fields for reference or trouble shooting. See Table 5-1 for a summary of the items provided by the System dialog, along with the related functions and editing status.

Procedure

1. Use the *Application* > *System* menu to access this function.
2. The System dialog appears.



Click and edit any value presented in the white cells.

Note that the *Daylight Savings Time* option, when set to “Override,” will make the GC Controller ignore the time change from Standard to Daylight Savings (i.e., Standard Time will remain).

3. Click the 

 button to accept your changes and return to the main window.

   Click the 

 button to abort and return to the main window.

Table 5-1: List of items

Item	Function	Edit
Stream Sequence	Defines the order of stream analysis for Detector 1.	✓
Stream Sequence 2	Defines the order of stream analysis for Detector 2; only available with selected hardware. Note that this item is not available in all GC applications.	✓
Aux. Stream Sequence	Defines the auxiliary order of stream analysis for Detector 1. Can be used to run an alternative stream sequence when a Discrete Input is set (Discrete Inputs for detailed instructions). Note that this item is not available in all GC applications.	

Table 5-1: List of items *(continued)*

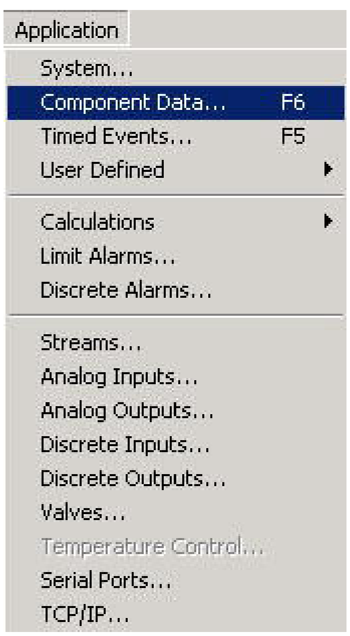
Item	Function	Edit
Aux. Stream Sequence 2	Additional alternative stream sequence provided for second detector in dual detector applications. Auxiliary order of stream analysis for Detector 2. Can be used to run an alternative stream sequence when a Discrete Input is set (Discrete Inputs for detailed instructions). Note that this item is not available in all GC applications.	✓
Analyzer Name	Defines the GC unit name that appears in the status bar of the main window when connected to the GC Controller. Can contain up to 12 characters.	✓
Unit Type	Identifies GC unit type (i.e., model number).	
System Description	A field to record miscellaneous reference information to further identify the system. Can contain up to 28 characters.	✓
Chromatogram Buffer Size	Provides number of bytes used to store a chromatogram.	
Max Peaks	Provides maximum number of peaks (application-specific).	
Number of Valves	Identifies number of chromatographic valves (application-specific).	
Daylight Savings Time	Allows the GC Controller to adjust automatically for DST. “Normal” enables automatic DST adjustment (United States). “Override” disables automatic DST adjustment.	✓
CGM Analog Output	Displays chromatogram trace signals for strip chart generation from Detectors 1 and/or 2, trace 1 only. Identifies the analog output number. If this field is set to 0, then no analog output will produce the CGM signal. **Note** When assigning a CGM Analog Output, also check the Analog Outputs dialog (Analog Outputs). A CGM Analog Output setting that uses a previously assigned analog output number will produce erratic CGM trace output, possibly with incorrect scaling. **Note** Do not assign this item analog output number 1 if the connected GC unit supports bargraph output (Changing the Bargraph for details).	✓
CGM Baseline Offset	A fixed offset (percent of full scale) added to the CGM analog output to allow the user to conveniently position the chromatogram on a strip chart recorder. Displays chromatogram trace signals for strip chart generation from Detectors 1 and/or 2. Identifies the baseline offset.	✓
CFG Baseline Number	Identifies the Standard GC Application software from which this GC application or configuration was developed (i.e., the number of the standard configuration file that was used to generate the current application).	

Table 5-1: List of items *(continued)*

Item	Function	Edit
Metric Base Condition	Enables (metric) or disables (off) whether MON2000 displays the GC Control Calculation in metric units. Control for details.	✓
Max Archive Averages	maximum number of averages (1-254)	✓
Max Archive Avg. Records	maximum number of archive records per average without an extended memory card (1-128)	✓
Application Revision	(non-edit) - revision level of the current application	
Application Base Name	(non-edit) - base name of the application	
Archive Days	(non-edit) – maximum number of days that archive records are kept (1-400)	✓
BOS Revision	(non-edit) – revision level of the BOS	

5.2 Component Data

Use this function to view and/or edit the Component Data Tables (CDTs) for a given GC application.



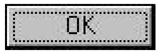
Procedure

1. Use the *Application* > *Component Data* menu or press the F6 key to access this function.
2. The Component Data Table window opens, displaying a tabbed pane for each available stream.

Note
The number of available CDTs depends on the GC unit configuration.

The standard GC application contains 4 CDTs. MON2000 can operate GC applications with up to 5 CDTs.

To assign a CDT to a stream, Streams.

3. Click the 

button to accept your selection. The Component Data Table dialog appears.

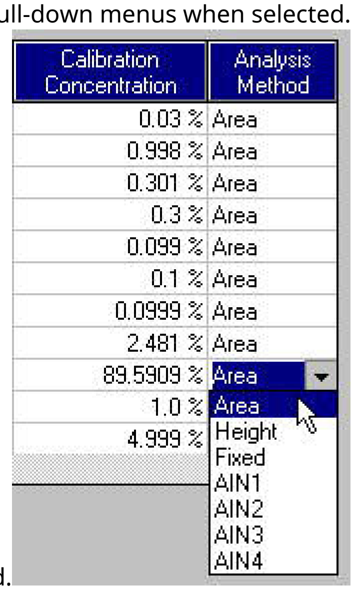
   Click the 

button to abort and return to the main window.

4. View or edit data. Double-click a given table cell or use one of the edit function buttons to make your changes.

   Note
   To add a new component, move the cursor to the last table cell (last row, last column) and press ENTER.

   Some table cells will change into pull-down menus when selected. Choose your data from the pull-down menu provided.



   Note that a red component name indicates a standard component. A black component name indicates that this component has been edited or defined by the user.

   For more information on the editing functions available, Select Standard Component(s) through View Raw Data.

   For descriptions of the standard data presented in a CDT, see Table 1-2.

5. Click the 

button to accept your changes and return to the main window.

   Click the 

button to abort and return to the main window.

Item	Function	Edit
#	Component number An index number that acts as an identification label when used in other menus/dialogs (e.g., Limit Alarms, Analog Outputs). Up to 20 components can be defined per data table.	

Item	Function	Edit
Component	Names assigned to the various components displayed Components can be selected from the standard list, by pressing the F2 key (see Select Standard Component(s)), or entered by the user. Up to 15 characters can be used for the component name.	✓
Usr/Std	Whether the component data is standard or user-defined If the component was added by the Select Standard Component function (see Select Standard Component(s)) and no changes were made to the component data, STD displays. If the component was added manually by the user or modified, USR displays.	
Det ID	Component detector number	✓
Ret Time	Time in seconds that apex of the component peak will appear Range = 0 to 6000 seconds **⚠ CAUTION** Ensure that the component retention times do not exceed the analysis time, as defined by the TEV Table (Timed Events). MON2000 does not automatically prevent the user from defining excessive component retention times.	✓
Resp Factor	Equal to the raw data of component peak divided by component concentration The maximum value is 1.0E+38.	✓
Fxd/Var	Whether a component response factor is fixed or variable A fixed response factor will not be updated during calibration.	✓
Calib Conc	Component concentration in calibration gas To enter a PPM, type “Xp”; e.g., “4.0p” will appear as “4.0 ppm”. Values above 90 PPM are converted to percentages.	✓
Anly Meth	Used to determine component raw data value Use the pull-down menu to select either area, height, fixed, or the appropriate analog input (used with auxiliary analyzer).	✓
RT % Dev.	Maximum acceptable percentage of deviation of the new retention time from the current retention time	✓
RT Secs Dev	Maximum acceptable deviation time, in seconds, of the new retention time from the current retention time	✓
RT Upd Meth	Determines when component retention time will be updated Select Analysis to update after each run. Select Calib to update only during final calibration run.	✓
Resp Factor %	Maximum acceptable percent deviation between the new response factor and the current response factor	✓
Gross Dry BTU	Gross energy content per cubic foot (ft^3), assuming no water is present.	✓
Net Dry BTU	Net energy content per cubic foot, assuming no water is present.	✓
HV Sup MJ/m^3	Gross heating value in megajoules per cubic meter.	✓
HV Inf MJ/m^3	Net heating value in megajoules per cubic meter.	✓
HV Sup MJ/kg	Gross heating value in megajoules per kilogram.	✓

Item	Function	Edit
HV Inf MJ/kg	Net heating value in megajoules per kilogram.	✓
Gals/1000 SCF	Liquid equivalent volume in gallons/1000ft^3.	✓
Reid Vapor	The component's vapor pressure in pounds per square inch(psia) at 100.0 °F	✓
LBs/Gallon	Liquid density for the component at base conditions.	✓
Rel Dens Gas	The relative density of the gas phase for the component at base conditions.	✓
Rel Dens Liquid	The relative density of the liquid phase for the component at base conditions.	✓
Mole Weight	The molecular weight of the component, which is used to calculate the weight percent of each component in the sample.	✓
AGA 8 Component	The name of the component according to the American Gas Association, which is used in the AGA 8 compressibility calculation.	✓
Carbon Weight	The molecular weight of the carbon atoms in the component.	✓
Gross Dry BTU per lb	Gross energy content per pound, assuming no water is present.	✓
Mult-level Calib 'a'	Third-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to Multi-Level.	✓
Mult-level Calib 'b'	Second-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to Multi-Level.	✓
Mult-level Calib 'c'	First-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to Multi-Level.	✓
Mult-level Calib 'd'	Zero-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to Multi-Level.	✓
Ref Component	The component not found in the calibration gas but in the sample gas for indirect calibration. If 'none', normal (direct) calibration is used. Not editable unless the calibration type is set to Relative.	✓
Rel Resp Fact	A fixed multiple of the response factor of the component found in the sample gas for indirect calibration. Not editable unless the calibration type is set to Relative.	✓

⚠ CAUTION

An asterisk (*) in the column heading indicates a column that contains standard component values. If any of these values is modified, the corresponding component becomes non-standard (i.e., user-defined). It is not recommended that you edit a standard component value.

5.2.1 Select Standard Component(s)

To select standard component(s) to be used by the displayed CDT,

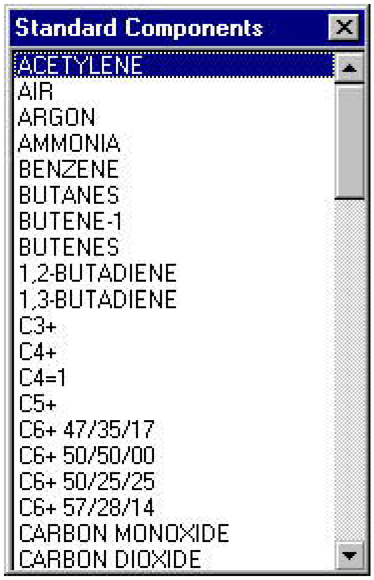
Procedure

1. Select the *Component* cell where you want the new component.

Note
To add a new row to the CDT, click the last cell in the last row and press the ENTER key.

---

2. Click the  button or press the F2 key to access the Standard Components menu.
3. The Standard Components menu appears

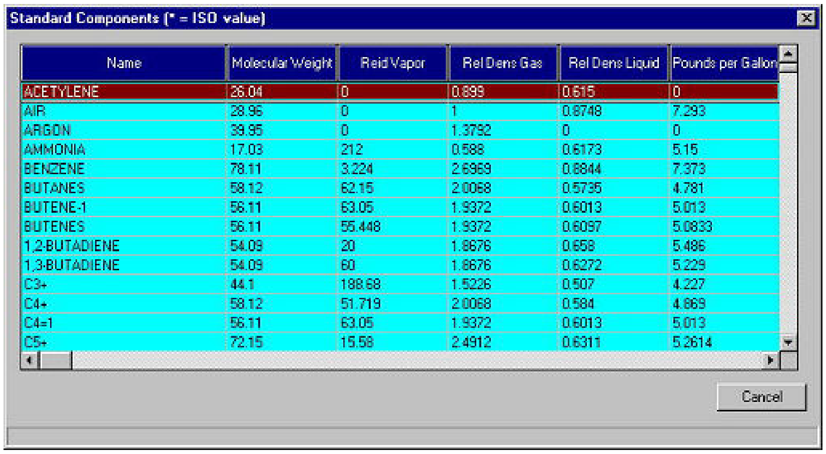


4. Double-click the selected component to add it to the CDT. The component is automatically inserted into the selected table cell.

   Click the ✕ button or press the ESC key to abort and return to the Component Data Table dialog.

5.2.2 Select Standard Values

To read the values for the standard components, click the  button or press the F3 key to access the Standard Components dialog.


Standard Components (* = ISO value)

Name	Molecular Weight	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Pounds per Gallon
ACETYLENE	26.04	0	0.899	0.615	0
AIR	28.96	0	1	0.8748	7.293
ARGON	39.95	0	1.3792	0	0
AMMONIA	17.03	212	0.588	0.6173	5.15
BENZENE	78.11	3.224	2.6969	0.8844	7.373
BUTANES	58.12	62.15	2.0068	0.5735	4.781
BUTENE-1	56.11	63.05	1.9372	0.6013	5.013
BUTENES	56.11	55.448	1.9372	0.6097	5.0833
1,2-BUTADIENE	54.09	20	1.8676	0.658	5.486
1,3-BUTADIENE	54.09	60	1.8676	0.6272	5.229
C3+	44.1	188.68	1.5226	0.507	4.227
C4+	58.12	51.719	2.0068	0.584	4.869
C4=1	56.11	63.05	1.9372	0.6013	5.013
C5+	72.15	15.58	2.4912	0.6311	5.2614

Cancel

Click the Cancel button to return to the CDT.

5.2.3 Update Standard Component(s)

Click the Update STD (F5) or press the F5 key to upgrade the Standard Components list of this CDT to match the MON2000 Standard Component menu.

Note

Typically, this function should only be performed when MON2000 is upgraded. User-defined components are not affected by this update.

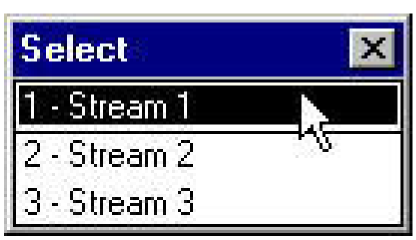
Note that this function updates the standard component list for the current CDT. MON2000 displays a confirmation dialog when a standard component is changed.

5.2.4 View Raw Data

To view the raw data for the displayed CDT,

Procedure

1. Select the desired row from the currently displayed CDT.
2. Click the Raw Data (F4)... button or press the F4 key to access the Raw Data dialog.
3. The Stream Selection dialog appears. Double-click the desired stream or click the ✕ button to exit. Only the streams associated with this CDT will display in the list menu.

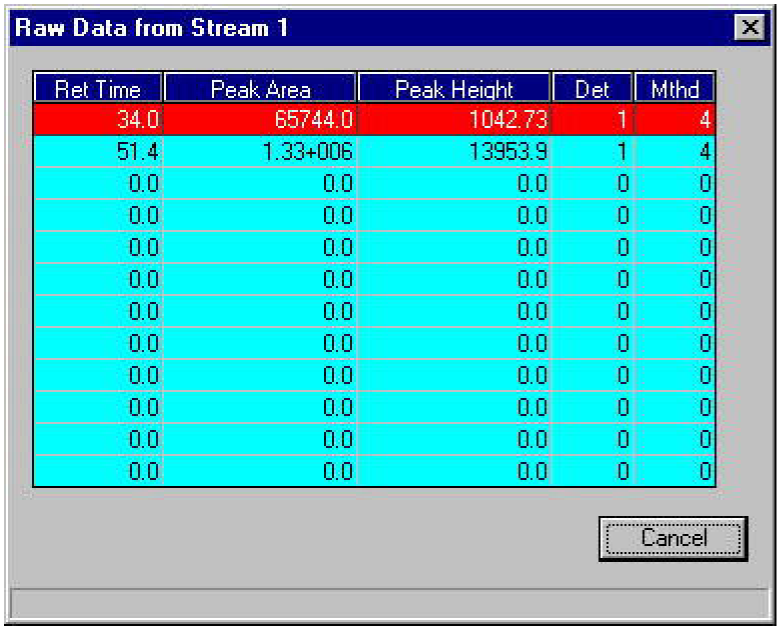


Note

When first displayed during a session, the Select Stream dialog highlights the stream that has the most recent raw data. Thereafter, the previously selected stream is highlighted.

---

4. The Raw Data dialog appears, listing the peak raw data from the last run of the stream represented by the CDT.



5. The MON2000 operator can now copy the Retention Time from the Raw Data screen to the CDT as follows:
   a) Before pulling up the Raw Data screen, click Component #1 of the CDT.
   b) Click the Raw Data button or press the (F4) key to access the Raw Data screen.
   c) Press the ENTER key to copy the Retention Time (the next component's RT is automatically targeted by MON2000). Then, press the DOWN ARROW key to advance to the next 'Raw Data' value.
   d) Repeat Step (c) until all Retention Times have been copied to the CDT.

6. Click the button to clear the Raw Data screen.

   Following is an example of a Raw Data Table.

Description	Method
Baseline Resolved	1
Fused	2
Last of Fused Group **Note** Some methods are a combination of the above types, e.g. 103 is LAST OF FUSED GROUP (3) and INHIBIT ON (100).	3
Tangent Skimmed	4

Description	Method
Resolved Rider Peak	5
Fused Rider	6
Last of Fused Rider	7
Tailing Peak	8
Forward Horizontal	20
Backward Horizontal	40
Baseline Forced at Valley	60
Inhibit On	100
Forced Integrate On	200
Forced Integrate End	300
Plateau Detect	400
Summation	500

5.2.5 Sort Retention Time

To sort the components listed in the displayed CDT by their retention times,

Note
MON2000 sorts components by the corresponding detector number first, then by the Retention Time.

Procedure

1. Click the  button or press the F6 key to access this function.
2. MON2000 automatically sorts the components.

   Note
   Sorting the CDT components by retention time may affect one or more of the following: Analog Outputs, Averages, Bargraphs, Limit Alarms, and User Defined Calculations

5.3 Timed Events

Use this function to view and/or edit the GC Timed Events Tables (TEVs) assigned to and used by particular gas streams.

Timed Events Description

Note
Editing TEVs from CGM Viewer for details about editing from the *Chromatogram > Chromatogram Viewer* menu.

- Analysis Time - Input total analysis time. LIMITS: 0.0 to 6000.0 seconds
- Cycle Time - Input total cycle time. LIMITS: 0.0 to 6000.0 seconds

---

Note
The Cycle Time must be at least 10 seconds greater than the Analysis Time.

- Off During Baseline (per sample valve) - toggle check boxes to select which valve(s) remain off during a baseline run

Valve Events

- Type - use the pull-down menu to select between valve number (Valve #), discrete output channel number (DO #), and stream switch (Strm Sw); additional selections SSO1, SSO2, Bleed1, Bleed2, Block1 and Block2 are available for the Model 700 GC applications
- Valve/DO # (for valves and discrete outputs only) - input the valve number or discrete output channel number. Use the provided combo box to select valve number by name
- State (for all types except for stream switch) - use the pull-down menu to toggle ON\OFF
- Time - input the time that the event is to occur. LIMITS: 0.0 to 6000.0 seconds

Integration Events

- Type - use the pull-down menu to select between Inhibit, Integrate, Auto Zero, Slope Sensitivity, Peak Width, Single Baseline, FID Gain, Summation, or Fused Override
- Value - For peak width or slope sensitivity, input the number of points to be used. LIMITS: Peak Width and Slope Sensitivity, 1 to 99
- For FID gain, use the pull-down menu to toggle Low\High.
- For Single Baseline, use the pull-down menu to toggle OFF\BGN (Beginning)\END.
- Except for AutoZero, for all others use the pull-down menu to toggle ON\OFF. Auto Zero does not have 'Value' field.
- Det - enter the appropriate detector number that the event will effect. Valid range is '1' or '2'
- Time - input the time that the event is to occur. LIMITS: 0.0 to 6000.0 seconds

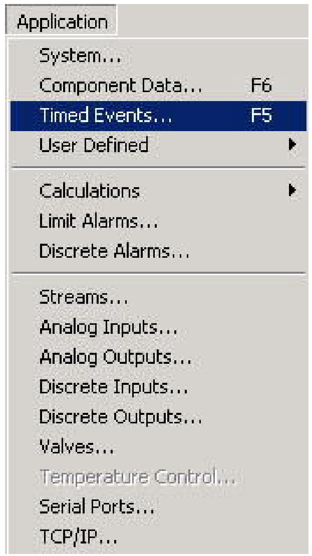
Spectrum Gain Events

- Detector # - use the pull-down menu to select between detectors #1 and #2
- Gain - input the gain value for that detector. LIMITS: 0 to 24
- Time - input the time that the event is to occur. LIMITS: 0.0 to 6000.0 seconds

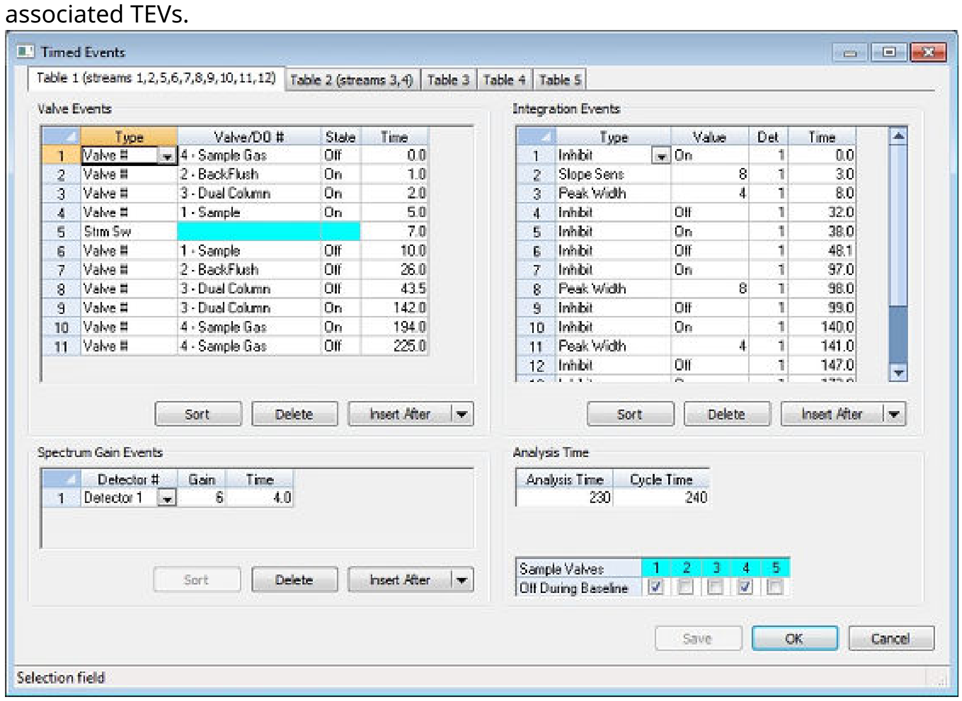
To access the Timed events feature,

Procedure

1. Use the Application > Timed Events menu or press the F5 key to access this function.



2. The Timed Event window opens. Each available stream has its own tabbed pane with associated TEVs.



Choose the desired TEV.

Note

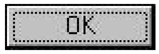
The number of available TEVs depends on the GC unit configuration.

The standard GC application contains four TEVs. MON2000 can operate GC Applications with up to five TEVs.

To assign a TEV to a stream, use the Streams function (Streams).

Note

Chromatogram Functions for editing TEVs from CGM Viewer.

3. Click the 

button to accept your selection.

   The Timed Events Table dialog appears.

   Click the 

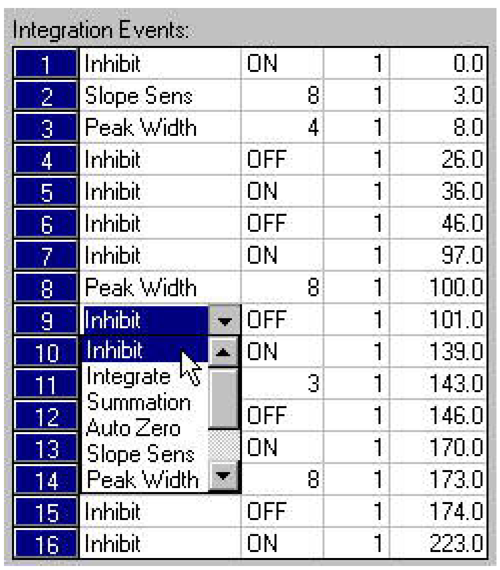
button to abort and MON2000 returns you to the main window.

4. View or edit data.

   Note
   To add a new timed event, move the cursor to the last table cell (last row, last column) and press the ENTER key.

   Use the check boxes to toggle the listed sample valves ON or OFF.

   Double-click a given table cell or use one of the edit function buttons to make your changes. Some table cells will change into pull-down menus when selected. Choose your data from the pull-down menu provided.


Integration Events:

1	Inhibit	ON	1	0.0
2	Slope Sens	8	1	3.0
3	Peak Width	4	1	8.0
4	Inhibit	OFF	1	26.0
5	Inhibit	ON	1	36.0
6	Inhibit	OFF	1	46.0
7	Inhibit	ON	1	97.0
8	Peak Width	8	1	100.0
9	Inhibit	OFF	1	101.0
10	Inhibit	ON	1	139.0
11	Integrate	3	1	143.0
12	Summation	OFF	1	146.0
13	Auto Zero	ON	1	170.0
14	Slope Sens	8	1	173.0
15	Inhibit	OFF	1	174.0
16	Inhibit	ON	1	223.0

5. To sort data based on time, click the 

button for the corresponding table.

6. Click the 

button to accept your changes and return to the main window.

   Note
   If you configure duplicate TEVs (i.e., 2 or more TEVs contain the same parameter settings), an error dialog will display but your data will be saved.

   Click the 

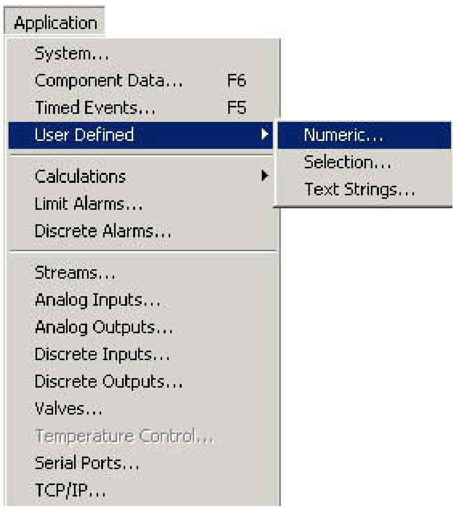
button to abort and return to the main window.

5.4 User Defined

The user-defined functions allow you to edit a user-defined operator entry for an application-specific variable. These variables may be used in reports, calculations, and/or for controlling the GC operations; however, user-defined variables are not used by all applications.

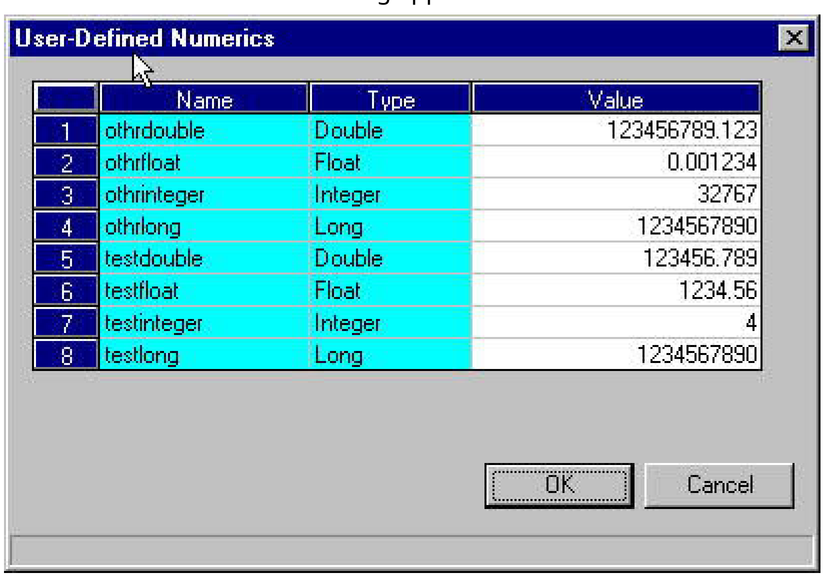
5.4.1 Numeric

Use this function to edit values for defined initialized variables. The User Defined Numerics dialog defines the names, types, and values for all application-specific numeric variables.

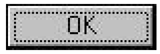


Procedure

1. Use the *Application* > *User Defined* > *Numerics* menu to access this function.
2. The User-Defined Numerics dialog appears.



Double-click the desired Value cell and type the new number.

3. Click the 

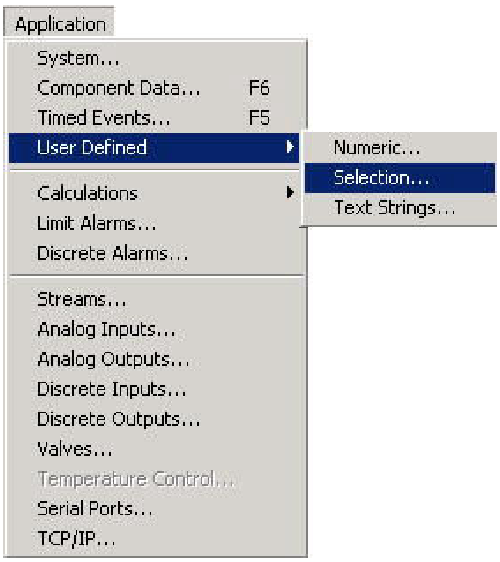
button to accept your changes and return to the main window.

   Click the 

button to abort and return to the main window.

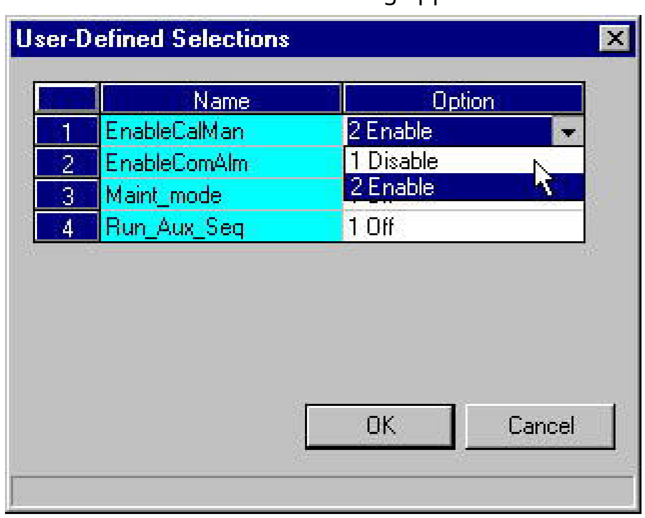
5.4.2 Selection

Use this function to edit values for defined selection variables. The User Defined Selections dialog defines the names and values for all application-specific selection variables.

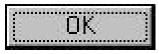


Procedure

1. Use the *Application* > *User Defined* > *Selection* menu to access this function.
2. The User-Defined Selections dialog appears



Double-click the desired Option cell and use the provided pull-down menu to select the new setting.

3. Click the 

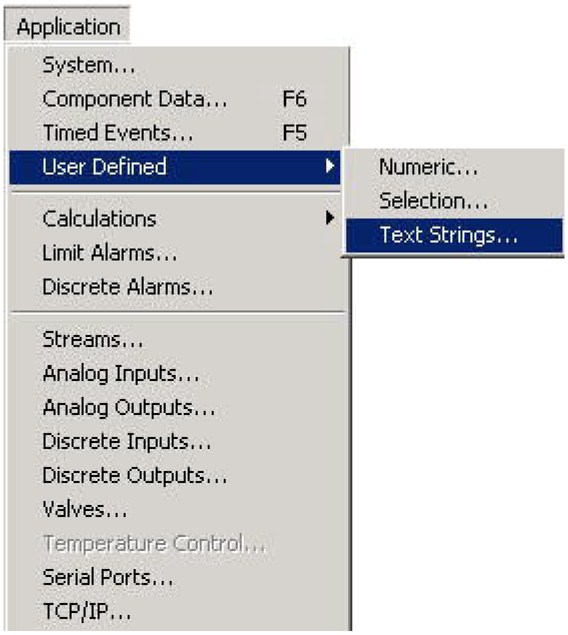
button to accept your changes and return to the main window.

   Click the 

button to abort and return to the main window.

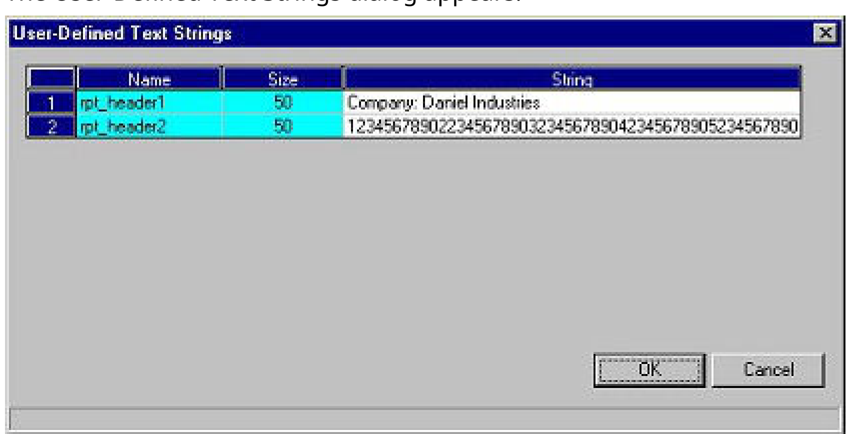
5.4.3 Text Strings

Use this function to edit text strings for defined string variables that may be used in reports. The User Defined Text Strings dialog defines the symbol name, size, and assigned text string for all application-specific text variables



Procedure

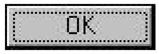
1. Use the *Application* > *User Defined* > *Text Strings* menu to access this function.
2. The User-Defined Text Strings dialog appears.



   Double-click the desired String cell and type the new text.

Note

String length (i.e., how many characters you can enter) is limited to the number cited in the Size cell.

3. Click the 

button to accept your changes and return to the main window.

   Click the 

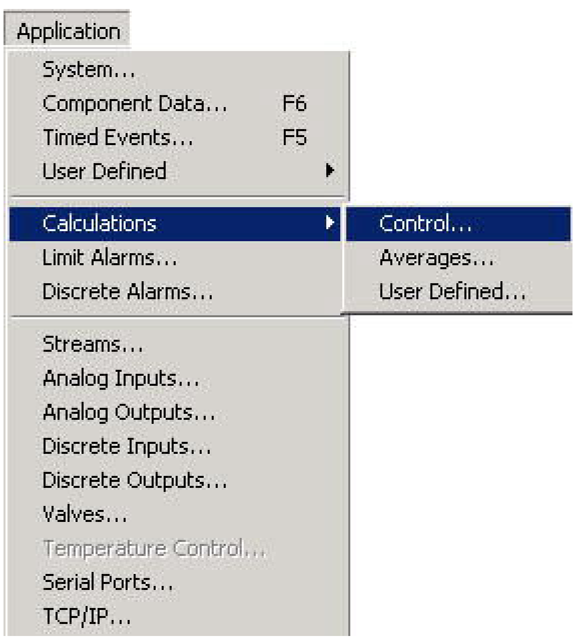
button to abort and return to the main window.

5.5 Calculations

These options allow you to activate and define how the output of standard or user-defined chromatograph analysis data is used in various calculations.

5.5.1 Control

Use this function to designate, by streams, the standard calculations (e.g., mole percent, liquid volume, gas density, Wobbe index, etc.) that should be performed from the GC analysis data. Calculations are enabled or disabled for each sample stream.



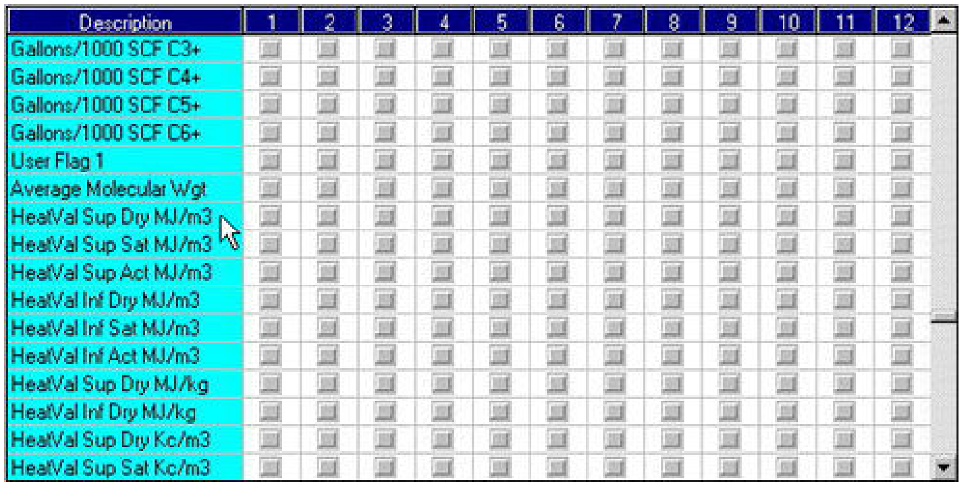
Procedure

1. Use the *Application* > *Calculations* > *Control* menu to access this function.
   The Control Calculations dialog appears.
2. Click the check boxes to toggle a calculation ON or OFF for a given stream.

Note

You can use the arrow keys to move from one Stream cell to another, and press the space bar to toggle the calculation.

Scroll towards the end of the list to set metric calculations.



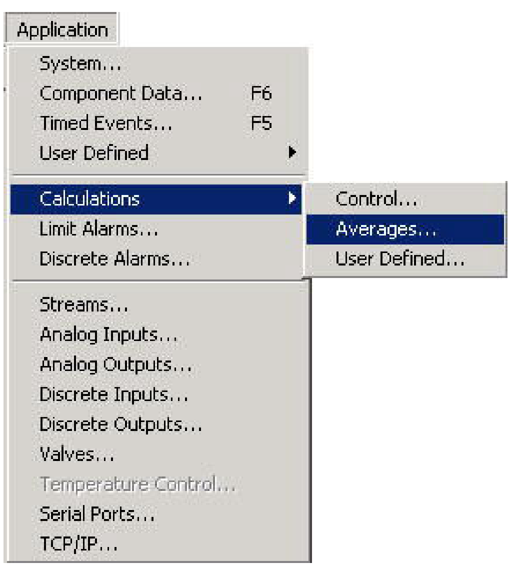
Before enabling a metric calculation, ensure that you also enable the Metric Base Conditions setting in the Systems dialog (System).

3. Click the OK button to accept your selections and return to the main window.

   Click the Cancel button to abort and return to the main window.

5.5.2 Averages

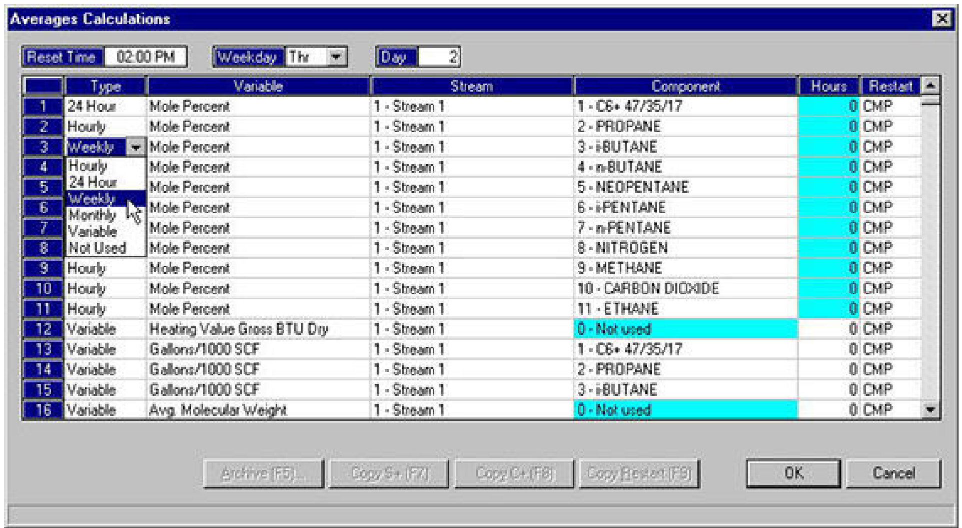
Use this function to designate, by streams and components, averages of standard calculations MON2000 should perform.



Procedure

1. Use the *Application* > *Calculations* > *Averages* menu to access this function.
2. The Averages Calculations dialog appears.

   Double-click the desired cell and use the pull-down menu to select the new setting.



When changing the reset time, note the following:

Average	Setting Used
Hourly	Reset Time
24-Hour	Day, Reset Time
Weekly	Weekday
Monthly	Day, Reset Time

To set a custom time interval per calculation, set the *Type* to Variable and enter the desired interval length in the *Hours* cell. A setting of “0” means an average calculation will be performed for each analysis run of that stream.

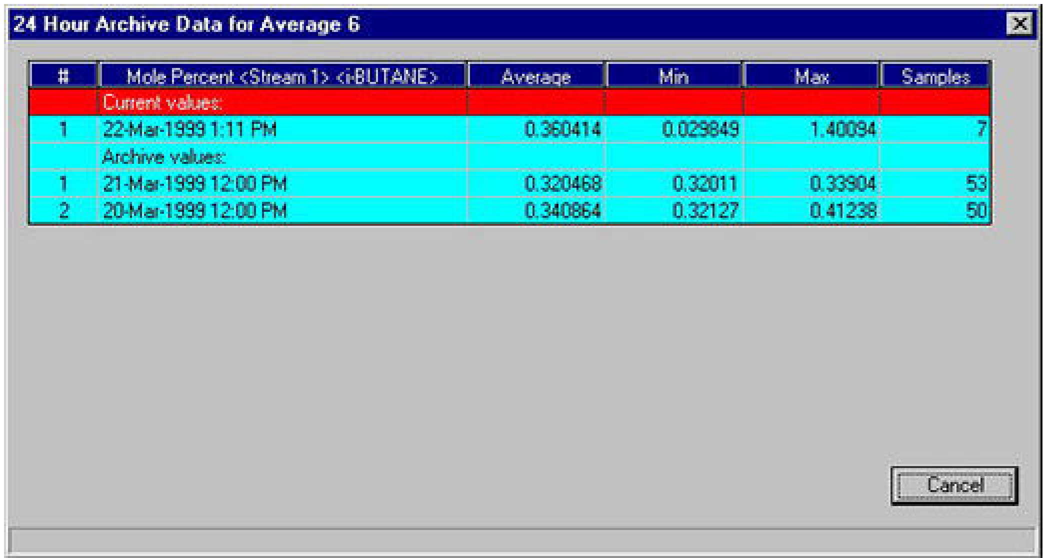
Note

Any GC analysis variable with defined alarm limits cannot be averaged or archived while in an active alarm state (Limit Alarms for more information on Limit Alarms). To disable this feature, use the Control Calculations function to set Avg Limit Alarm Test to OFF (Control).

Note that this custom Hours setting overrides the Reset Time setting.

3. Use the provided pull-down menu to add a new variable to the list.
4. To view an archive of averages for a given variable, select the desired variable and click the Archive (F5)... button or press the F5 key.

   The Archive Data dialog for that variable appears.



#	Mole Percent <Stream 1> <i-BUTANE>	Average	Min	Max	Samples
	Current values:				
1	22-Mar-1999 1:11 PM	0.360414	0.029849	1.40094	7
	Archive values:				
1	21-Mar-1999 12:00 PM	0.320468	0.32011	0.33904	53
2	20-Mar-1999 12:00 PM	0.340864	0.32127	0.41238	50

To save this archive to disk, right-click the archive table and select the Save Sheet option from the pop-up menu.

5. To copy the stream settings from a highlighted row and apply them to the next row, click the Copy S+ (F7) button or press the F7 key. This feature also increments the *Stream* value to the next available stream (e.g., incrementing from Stream 2 to Stream 8), per the GC application.

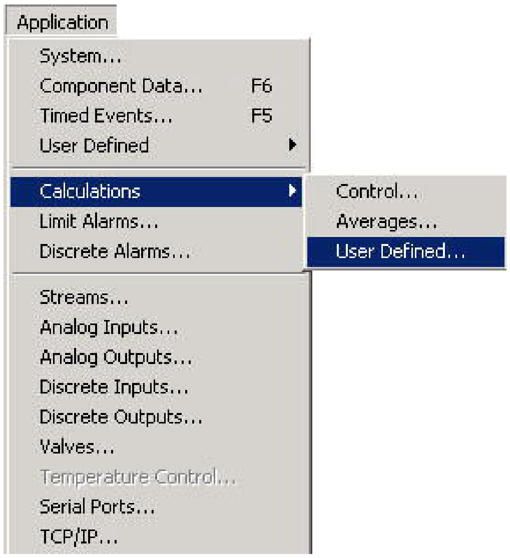
Note
An error message displays when the last available stream or component is reached.

6. To copy the component settings from a highlighted row and apply them to the next row, click the Copy C+ (F8) button or press the F8 key. This feature also increments the *Component* value to the next available component (e.g., incrementing from “Ammonia” to “Benzene”), per the GC application.
7. To copy the *Restart* setting from a highlighted row and apply it to the next row, click the Copy Restart (F9) button or press the F9 key.
8. Click the OK button to accept your selections and return to the main window.

   Click the Cancel button to abort and return to the main window.

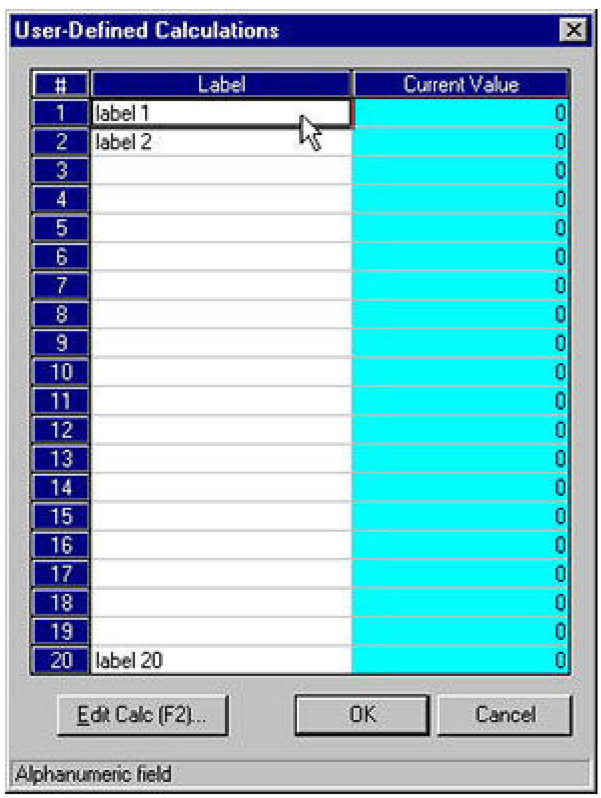
5.5.3 User Defined

Use this function to create and edit customized calculations on GC analysis data. MON2000 will allow up to 20 user-defined calculations.



Procedure

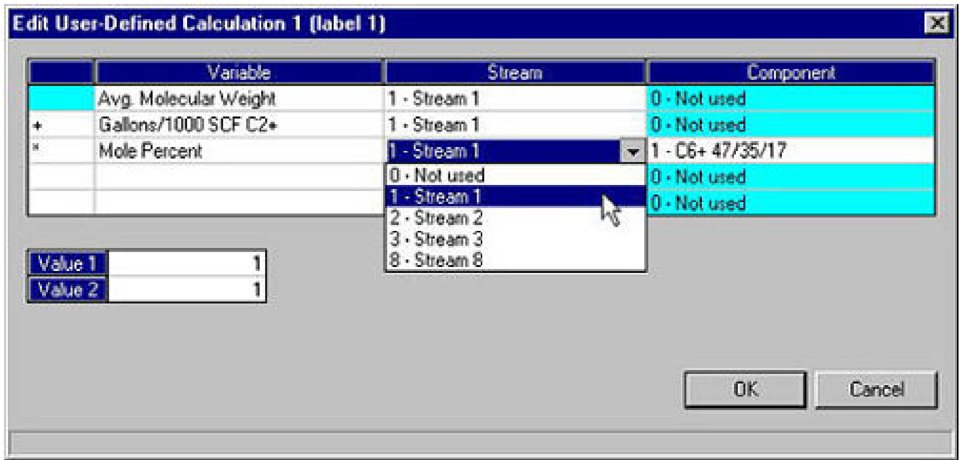
1. Use the *Application* > *Calculations* > *User Defined* menu to access this function.
2. The User-Defined Calculations dialog appears.



3. Click the calculation name you wish to edit, or click in the next available blank Label cell. The Label field accepts 15 characters.

Note
Your user-defined calculation becomes a variable that can be used when: calculating averages, assigning alarm limits, calculating analog outputs, generating bargraphs and reports, creating other user-defined calculations.

4. Click the Edit Calc (F2)... button to edit or create the calculation function. The Edit User-Defined Calculation dialog appears.



a) To change the calculation function, click the appropriate cell and use the pull-down menu to choose the desired operator.

Note
The calculation completes each step from top to bottom.

To change or add a variable name, use the Variables pull-down menu.

To select a stream or component, click the appropriate cell and use the pull-down menu to choose the desired stream/component.

Enter any constant values in the Value 1 and Value 2 cells.

b) Click the OK button to accept your changes and return to the User-Defined Calculation dialog.

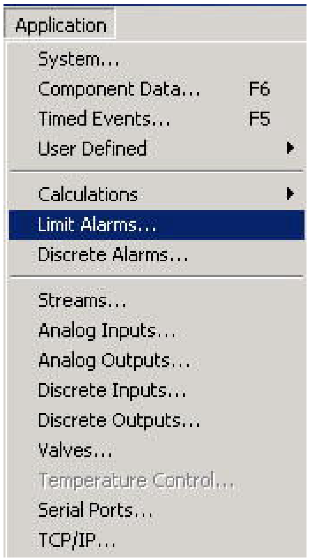
Click the Cancel button to abort and return to the User-Defined Calculation dialog.

5. Click the OK button to accept your new or edited calculation and return to the main window.

Click the Cancel button to abort and return to the main window.

5.6 Limit Alarms

Use this function to set threshold limits for GC analysis data. When a limit is exceeded, an alarm is activated and logged. Alarm Log for information on Alarm Logs.



Note that Modbus Registers assigned to alarms are application-specific.

Procedure

1. Use the *Application* > *Limit Alarms* menu to access this function.
2. The Limit Alarms dialog appears
3. To change the assigned variable, stream or component, click the appropriate cell and use the provided pull-down menu.

   Note
   You can add a new variable only if an available row is blank. The number of allowed limit alarms is fixed by the GC application.

   Note that you must first select a variable before entering the related data.

4. To assign the discrete hardware output that will be set when the alarm is active, click in the appropriate cell and use the provided pull-down menu.

   Output values range from “1” to “N”, per the discrete hardware output identification number and the GC application. A discrete output of “0 - Not used” indicates that no output is set.

   Note
   A discrete output can be used to monitor one or more inputs. If you are using discrete outputs to reflect the status of discrete inputs, ensure that the output assignments set here coordinate with those set in the Discrete Alarms dialog (Discrete Alarms).

   To set discrete outputs, Discrete Outputs.

5. To change the alarm type, click the appropriate cell and use the provided pull-down menu.

Type	Purpose
All	use all 4 limits (both Low and both High)
High	use only High and High-High limits

Type	Purpose
Low	use only Low and Low-Low limits

6. Input the desired high/low limits in the appropriate cells.
7. To copy the stream settings from a highlighted row and apply them to the next row, click the Copy S+ (F5) button or press the F5 key. This feature increments the Stream value to the next available stream (e.g., incrementing from "Stream 2" to "Stream 8"), per the GC application.

   Note
   An error message displays when the last available stream or component is reached.

8. To copy the component settings from a highlighted row and apply them to the next row, click the Copy C+ (F6) button or press the F6 key. This feature increments the Component value to the next available component (e.g., incrementing from "Ammonia" to "Benzene"), per the GC application.
9. Click the OK button to accept your changes and return to the main window.

   Click the Cancel button to abort and return to the main window.

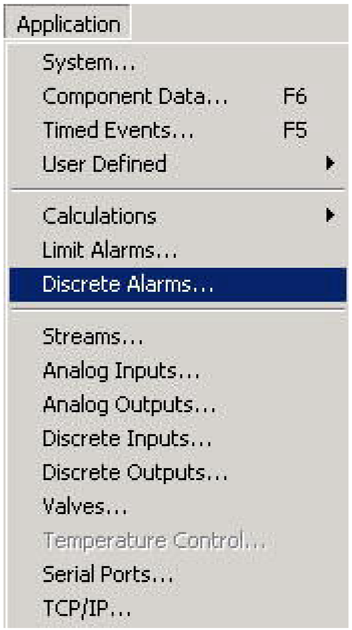
Limit Alarms Description

- Variable - selected variable assigned to the limit alarm
- Stream - stream number assigned to the variable or the channel number if an analog input or analog output
- Component - component name and number assigned to the variable
- Discrete Output - number of the discrete hardware output that will be set when the alarm is active; zero indicates no discrete output will be set
- Type - High uses only the high and the high-high limits, Low uses only the low and the low-low limits, and All uses both low and both high limits

Type	Purpose
Low-Low	If the variable value falls below this limit, the low-low limit alarm is activated. This alarm is for extreme situations.
Low	If the variable value falls below this limit, the low limit alarm is activated.
High	If the variable value rises above this limit, the high limit alarm is activated.
High-High	If the variable value rises above this limit, the high-high limit alarm is activated. This alarm is for extreme situations.

5.7 Discrete Alarms

Use this function to assign discrete hardware inputs, used to set alarms, to one of the available discrete hardware outputs.



For more information on discrete outputs, Discrete Outputs.

Procedure

1. Use the *Application* >> *Discrete Alarms* menu to access this function.
2. The Discrete Alarms dialog appears.
3. Use the provided Discrete Input pull-down menu to select the identification number of the discrete hardware input to be used for alarm purposes.

   Input values can range from “1” to “N”, per the discrete hardware output identification number and the GC application. A discrete input of “0 - Not used” indicates that no input has been assigned.

   Note
   All alarms from digital inputs with assignments other than “0” are recorded in the Alarm Log.

   To configure discrete inputs, Discrete Inputs.

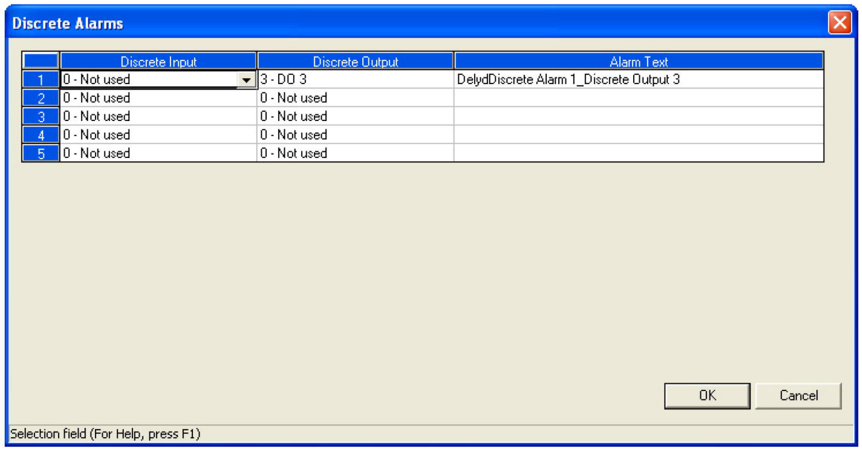
4. Use the provided Discrete Output pull-down menu to select the identification number of the discrete hardware output to be used for alarm purposes.

   Note
   A discrete output can be used to monitor one or more inputs. If you are using discrete outputs to reflect the status of GC analysis data alarms, ensure that the output assignments set here coordinate with those set in the Limit Alarms dialog (Limit Alarms).

   Output values can range from “1” to “N”, per the discrete hardware output identification number and the GC application. A discrete output of “0 - Not used” indicates that no output has been assigned. To configure discrete outputs, Discrete Outputs.

5.7.1 Delayed Discrete Alarms

A *delayed discrete alarm* can be set to trigger a discrete alarm and activate the appropriate discrete output if a previously specified discrete input has been closed for a user-defined amount of time.



For example, if discrete input #1 is closed for 60 seconds, discrete alarm #1 will be activated, which will in turn activate discrete output #3. MON2000 will display an active alarm in the bottom row of the GC column of the GC Status Bar. MON2000 will also copy the alarm description in the *Alarm Text* column to the appropriate Alarm screens.

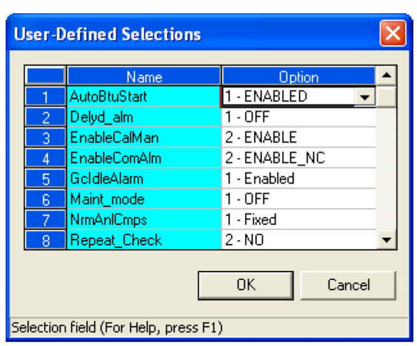
The delayed discrete alarm feature is only available with the following apps installed:

- 700_Mode0_v192 or later;
- 700_DewUS_v184 or later;
- 700_Mode1_v193 or later;
- 2350A_Mode0_v183 or later;
- 2350A_Mode1_v184 or later.

To set up a discrete alarm, do the following:

Procedure

1. Select Applications > *User Defined* > *Selection... . The User-Defined Selections window displays.*



2. Locate the **Delyd_alm** variable under the *Name* column and set its *Option* to ON and click OK.

Note that setting the Option to OFF disables the delayed discrete alarm feature.

3. Select *Applications* > *Discrete Alarms... . The Discrete Alarms window displays.*
4. For the appropriate alarm, select the discrete output that should be activated if the associated discrete input is closed.

   By default, discrete outputs #1, #2, and #3 can be selected.

   Example

   To make discrete output #4 available for selection, do the following:

   a) Select *Applications* > *User Defined* > *Selection... . The User-Defined Selections window displays.*

   b) Set EnableComAlarm to **Disable**.

   c) Select *Applications* > *Discrete Outputs... . The Discrete Outputs window displays.*

   d) Set the Switch field for discrete output #4 to **Auto**.

   Example

   To make discrete output #5 available for selection, do the following:

   a) Select *Applications* > *User Defined* > *Selection... . The User-Defined Selections window displays.*

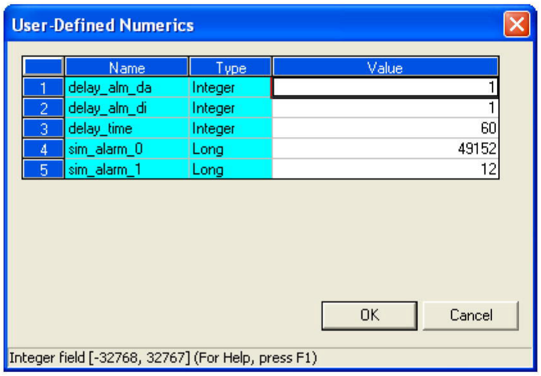
   b) Set EnableCalMan to **Disable**.

   c) Select *Applications* > *Discrete Outputs... . The Discrete Outputs window displays.*

   d) Set the Switch field for discrete output #5 to **Auto**.

   Note
   All discrete inputs should be set to “0 - Not used”.

5. Enter the appropriate alarm text in the *Alarm Text* column, if desired. This text will be copied to the appropriate alarm screens if the discrete alarm is triggered.
6. Click **OK** to accept your changes.
7. Select *Applications* > *User Defined* > *Numeric... . The User-Defined Numerics window displays.*



8. The following variables apply to the delayed discrete alarm:
   - **delay_alm_da**: Defines which discrete alarm will be activated.
   - **delay_alm_di**: Defines which discrete input will be used to initiate the delayed discrete alarm.

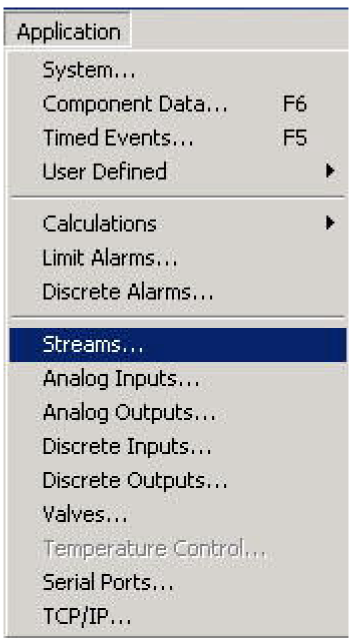
Note

Although there are five discrete inputs available, closing Discrete Input #4 will result in an active Analyzer Failure alarm that will cause the GC to go to idle if Discrete Input #4 remains closed up to the end of the current analysis. Discrete Input #5 can be used if the run_Aux_Seq option in the 'User-Defined Selections window is set to OFF.

- **delay_time**: Defines the time, in seconds, between the moment the discrete input is closed and the delayed discrete alarm is activated. Range is 0 to 500 seconds. Default value is 60 seconds.

5.8 Streams

This function allows you to:

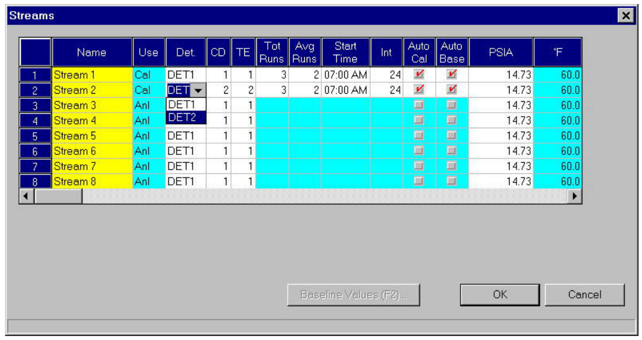


- assign CDTs and TEVs to a particular stream
- designate a stream for analysis or calibration (or none)
- control automatic calibration parameters, such as the total number of runs, runs to be averaged, starting times, and time between automatic calibrations and baseline runs
- define baseline pressure and temperature conditions that are applicable to calculated GC analysis data, such as compressibility

To use the Streams function,

Procedure

1. Use the *Application* > *Streams* menu to access this function.
2. The Streams dialog appears



3. To edit the settings displayed, click the appropriate cell, use the provided pull-down menus, or to choose the check boxes to enable or disable the automatic calibration and baseline calibration.

   See the following tables for details.

   The **standard settings** include:

Std Setting	Description
<Number>	Number label assigned by MON2000 This number correlates with the stream switch. A maximum of 12 streams can be controlled by MON2000 and a standard GC application.
Name	Text string label to identify a stream (12 character maximum)
Use	How stream is used Settings include: calibration (CAL); analysis (ANL); not used (NOT)
Det	Detector used by this stream Control of the detector is application-specific. For example, • for Model 700/2350A, Modes 0 and 1, the Det col is “DET1” and read-only • for Model 700/2350A, Mode 2, the Det col is editable • for Model 700/2350A, Mode 3, the Det col is “DUAL” and read-only
CD CD2	CDT associated with this stream (Component Data) CDT 2 For the Model 700/2350A Modes 2 and 3, an additional CD column displays.
TE TE2	TEV associated with this stream (Timed Events) TEV 2 For the Model 700/2350A Modes 2 and 3, an additional TE column displays.

   For **calibration (CAL) streams**, you can edit the following control parameters:

Cal Setting	Description
Tot	Number of runs made for each calibration Range: 1 to 10
Avg	Number of last calibration runs to average E.g., if 5 calibration runs are performed and *Avg* is set to “3”, then the last 3 runs are used to average the calibration results.
Start	Time the first automatic calibration is to be performed
Int	Number of hours between automatic calibrations

Cal Setting	Description
Auto Cal Auto Base	enable/disable the automatic calibration and baseline run (first check box sets the automatic calibration; second check box sets the baseline run) **Note** For the automatic calibration to work, at least one stream switch (valve event Strm Sw) must be included in the corresponding TEV (Timed Events). If the automatic baseline run is enabled, the GC performs an additional calibration run (before the calibration runs to be averaged) without the calibration gas. This run evaluates peaks caused by the GC valve action alone; any peak areas found are subtracted from the subsequent analyses. To view or print the baseline run results, Step 4. **Note** Disabling the Auto Base setting will delete existing CDT baseline data for the associated stream.

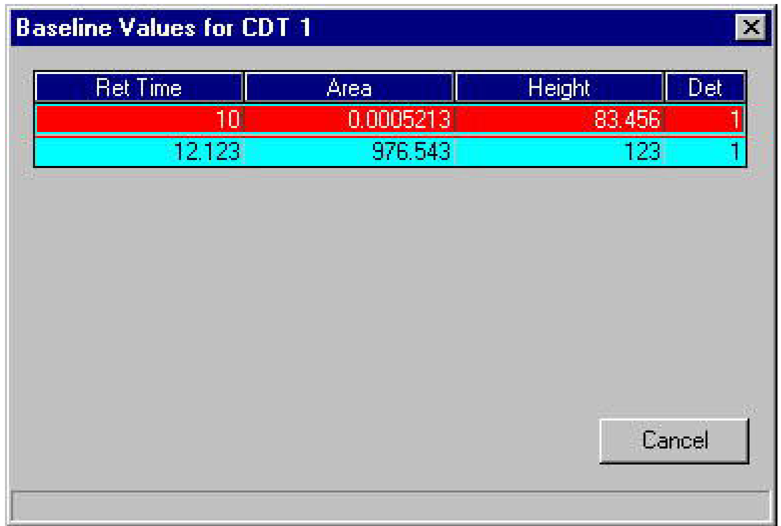
You can edit the following parameters for a defined stream used in **GC calculations**. These parameters are also used for post-analysis calculations that use stream-specific base pressure and temperature values. Note that these parameters are not applicable for every application.

Par Setting	Description
PSIA BAR	Base temperature in PSIA or bar units **Note** To change the displayed system units, System for details.
deg F deg C	Base temperature in degrees Fahrenheit or Celsius
Opt Pres 1 Opt Pres 2 Opt Pres 3	If compressibility is activated for a particular stream (Calculation Control function, (Control), up to 3 optional pressures can be defined to calculate additional post-analysis data.

Only the base pressure can be edited. The base temperature is a constant 6°F (15°C) for all calculations.

4. To view or print the baseline run results, click the 

button or press the f2 key. The Baseline Values dialog appears.



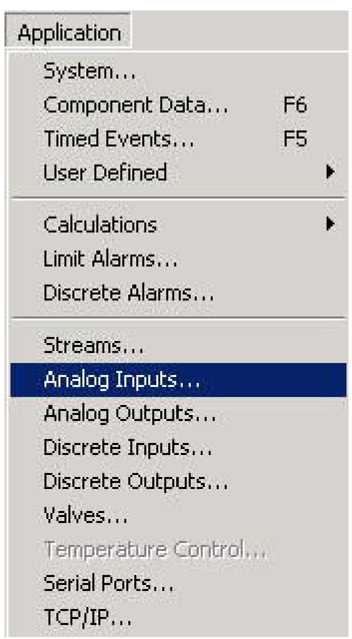
Note

If a stream is not used, you cannot access baseline data for that stream.

5. Click the  button to return to the main window.

5.9 Analog Inputs

This function allows you to:



- Assign identifying labels
- Assign scale ranges
- Calibrate analog inputs for zero and full scale values

Electrical current signals ranging from 4 to 20mA (±10%) are accepted as analog inputs.

To use the Analog Inputs function,

Procedure

1. Use the *Application* > *Analog Inputs* menu to access this function.
2. The Analog Inputs dialog appears.

   To edit the settings displayed, click the appropriate cell or click and use the provided pull-down menus.

   Note
   The 2350A GC Controller and the Model 700 unit supports up to four AI channels.

   See the following table for details or refer to Step 3 for a more automated process.

Setting	Description
Channel	channel number assigned Number of available analog inputs is dependent upon the GC Controller model.
Label	name used to identify the analog input (12 characters maximum)
Zero Scale	value used as the zero scale when converting the analog input value
Full Scale	value used as the full scale when converting the analog input value
Fixed/Variable	analog input operation mode FXD = fixed VAR = variable If the operation mode is fixed, the analog input is set to the number entered for the Fixed Value.
Fixed Value	analog input value used during fixed operation
Current Value	current readout values of the analog inputs (values reflect scale assignments)
GC GRI PAZ **Note** MON2000 accepts a Zero Scale calibration value that is higher than the Full Scale value. A higher Zero Scale value can be useful in applications that require an inverse display, or record of analog signal levels.	Gain Ratio Index (GRI) and Preamp Zero (PAZ) readouts from the GC preamplifier's 4 stages; use as a troubleshooting aid Normal preamp stage (gain) operating ranges for Models 500, 700 and 1000 GC units are shown in Table 1-8 below.
Zero Scale Calib Adjustment mA	calibrated analog inputs for known zero scale electrical current levels
Full Scale Calib Adjustment mA	calibrated analog inputs for known full scale electrical current levels

GC	GRI	PAZ (12-bit AD)	Value (12-bit AD)	PAZ (16-bit AD)	Value (16-bit AD)
1	0.0 to 0.0	600 to 800	0 to 4095	4800 to 6400	-32767 to 32767

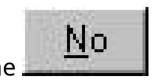
GC	GRI	PAZ (12-bit AD)	Value (12-bit AD)	PAZ (16-bit AD)	Value (16-bit AD)
2	0.8 to 1.1	600 to 800	0 to 4095	4800 to 6400	-32767 to 32767
3	0.8 to 1.1	600 to 800	0 to 4095	4800 to 6400	-32767 to 32767
4	0.8 to 1.1	1150 to 1500	0 to 4095	9200 to 12000	-32767 to 32767

3. To perform an automated input calibration,
   a) Select the desired channel by clicking anywhere in that row.
   b) Set the analog input signal to either its minimum level or the anticipated Zero Value.

   Note
   This step may require adjusting a rheostat, or another controlling device, at the source of the analog input signal.

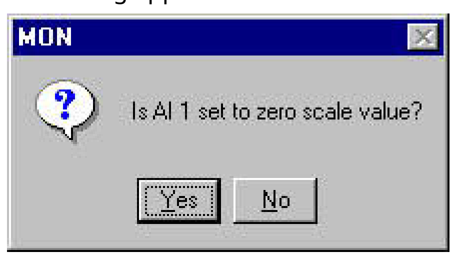
   c) Set the anticipated Full Value.
   d) Click the 

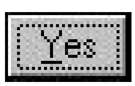
button or press the F3 key.

   You can abort this process at any time by clicking the 

button.

4. The Zero Scale Adjustment dialog appears.

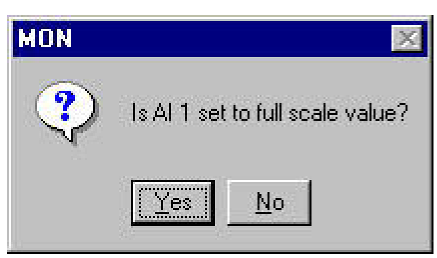


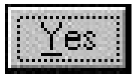
Click the 

button to continue.

MON2000 accepts a Zero Scale calibration value that is higher than the Full Scale value. A higher Zero Scale value can be useful in the applications that require an inverse display, or record, of analog signal levels. 2350A GC Controllers and Model 700 units support up to 4 Analog channels.

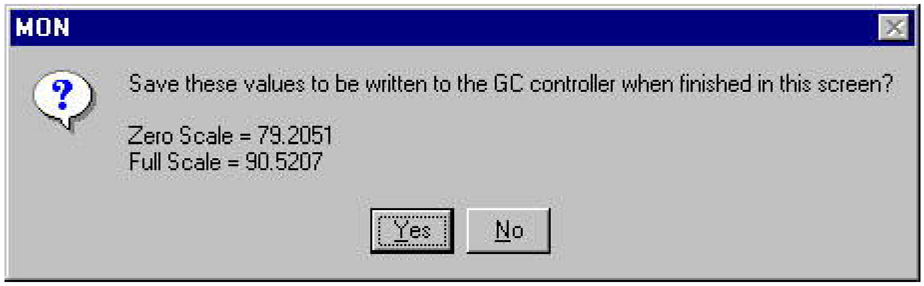
5. The Full Scale Adjustment dialog appears. Adjust the Analog Input to its Full Scale value.

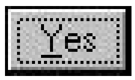


Click the 

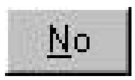
button to continue.

6. MON2000 verifies that the recorded values are acceptable. A confirmation dialog displays



Click the 

button to accept your changes.

Click the 

button to cancel and return to the Analog Input dialog.

7. To perform a GRI (Gain Ratio Index) calculation, click the 

button or press the F4 key.

Note
Ensure that you halt any ongoing analysis runs (Halt) before performing a GRI calculation.

A GRI calculation confirms the GC Controller preamp operation. It can be performed after a preamp calibration has been completed, or as a trouble shooting procedure.

8. Click the 

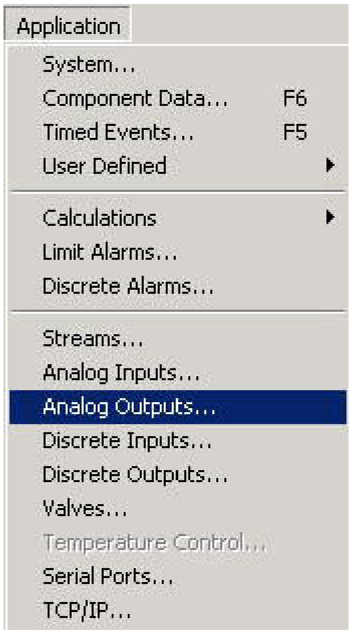
button to accept your changes and return to the main window.

Click the 

button to abort and return to the main window.

5.10 Analog Outputs

This function allows you to:



- Assign variables to Analog Outputs
- Assign scale ranges
- Calibrate analog outputs for zero and full scale values

5.10.1 Analog Output Dialog Description

To use the Analog Outputs function,

Procedure

1. Use the *Application* > *Analog Outputs* menu to access this function.
2. The Analog Outputs dialog appears.

   To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus.

   Note
   When assigning analog outputs, first check the CGM Analog Output Config field in the System dialog (System). An analog output assignment that uses the same analog output number as the CGM setting will produce erratic CGM trace output, possibly with incorrect scaling.

   See the following table for details.

Setting	Description
<Number>	Number assigned to Analog Output Number of available analog outputs is dependent upon the GC Controller model. **Note** If the GC unit includes a Rosemount Analog Expansion Module (AEM), P/N 1-0500-001, reserve analog output number 1 (first row) for the variable Bargraph.

Setting	Description
Variable	Type of GC analysis data on which to base signal level of analog output
Stream	Stream number assigned to the variable or the channel number if referencing an analog output
Component	Name of component monitored by this output
Current Value	Current readout values of the analog output (values reflect scale assignments)
Zero Scale	Value used to represent the minimum value (4mA) when scaling the analog output value
Full Scale	Value used to represent the maximum value (20mA) when scaling the analog output value
Fixed/Var	Analog output operation mode • Fixed = fixed • Var = variable If the operation mode is fixed, the analog output is set to the number entered for the Fixed Value.
Fixed Value	Analog output value used during fixed operation
Zero Adjustment **Note** When defining a new analog output, perform a calibration first to obtain accurate Zero and Full Adjustment values (Performing a Manual Calibration or Performing an Automated Calibration).	Value used to correct Zero Scale
Full Adjustment	Value used to correct Full Scale

3. Click the 

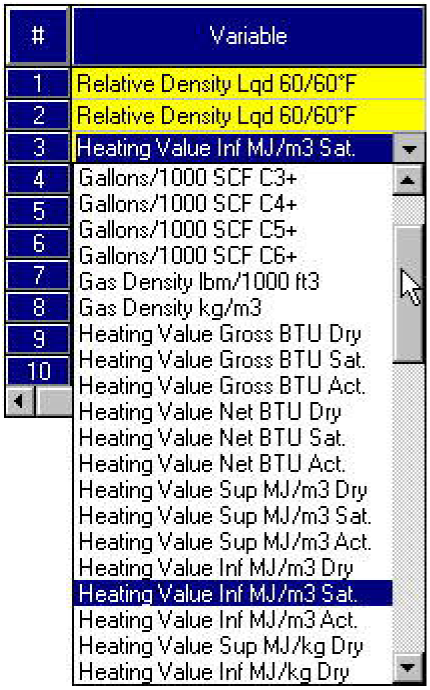
button to accept your changes and return to the main window.

   Click the 

button to abort and return to the main window.

5.10.2 Changing a Variable

To change a variable assignment, click the appropriate Variable cell. Use the provided pull-down menu and click the desired variable to select it.



5.10.3 Changing the Bargraph

Use this function to designate which AEM output analog signals can be used to drive the bargaph device inputs. Each of the 16 available AEM output signals can be assigned to represent various GC analysis data variables.

To edit the variables and corresponding settings displayed by the bargraph,

Procedure

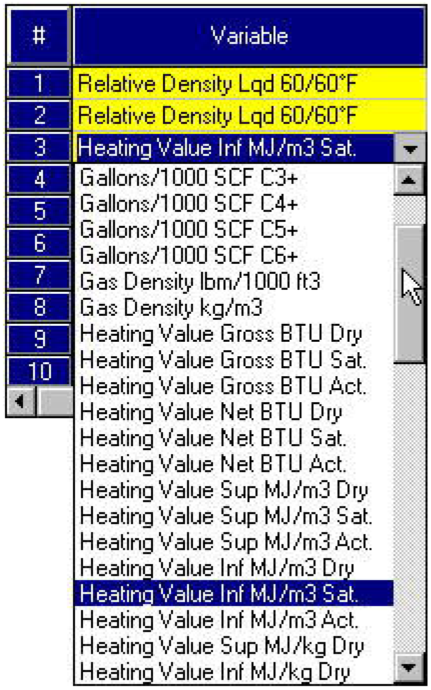
1. Click the Bargraph (F5)... button or press the F5 key.

   The Bargraph dialog appears.

2. To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus. Analog Output Dialog Description for more details.

   Note
   Multiple streams can be entered by separating the stream numbers with commas (e.g., 2,3). Bargraph results will be produced for each stream.

3. To change a variable assignment, click the appropriate Variable cell. Use the provided pull-down menu and click the desired variable to select it.



4. Click the OK button to accept your changes and return to the Analog Outputs dialog.

   Click the Cancel button to abort and return to the Analog Outputs dialog.

5.10.4 Performing a Manual Calibration

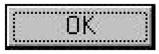
To manually calibrate an analog output,

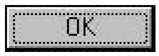
Procedure

1. Select the desired analog output by clicking anywhere in the corresponding row.
2. Set the *Zero Scale* and *Full Scale* values as desired.
3. Set the *Fixed/Var* parameter to “Fixed”.
4. Set *Fixed Value* equal to the Zero Scale value.
5. Set *Zero Adjustment* and *Full Adjustment* to “0.0”.

   Note
   Setting both adjustment values to “0.0” disables the scale adjustment. PC Config Report for an alternative calibration method for analog outputs. Analog Output Cal. For 2350A includes an example of calibrating an output scale of 0 to 1200.

6. Click the OK button to accept your changes and exit from the Analog Outputs dialog.
7. Return to the Analog Outputs dialog. Wait until the *Current Value* of the analog output is equal to the Zero Scale value (Step 2).
8. Record the value, in engineering units, read by the receiving device (e.g., a voltmeter).

9. Set *Fixed Value* equal to the Full Scale value (Step 2).
10. Click the 

button to accept your changes and exit from the Analog Outputs dialog.
11. Return to the Analog Outputs dialog. Wait until the *Current Value* of the analog output is equal to the Full Scale value (Step 2).
12. Record the value, in engineering units, read by the receiving device (e.g., a voltmeter).
13. Set *Zero Adjustment* to the value recorded in Step 8.
14. Set *Full Adjustment* to the value recorded in Step 12.
15. Set the *Fixed/Var* parameter to "Var".
16. Click the 

button to complete the calibration and return to the main window.

5.10.5 Performing an Automated Calibration

To perform an automated analog output calibration,

Note
To determine the uncalibrated Zero Scale and Full Scale analog output levels, see Analog Output Dialog Description.

Procedure

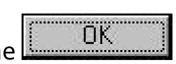
1. Select the desired analog output by clicking anywhere in the corresponding row.
2. Click the 

button or press the F8 key.

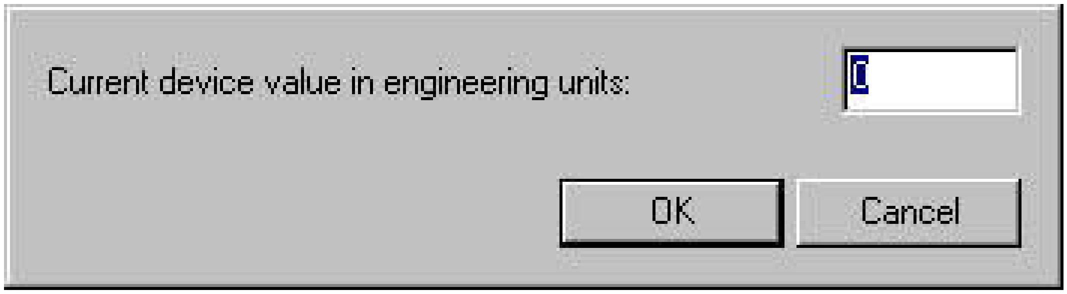
   You can abort this process at any time by clicking the 

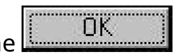
button.
3. The Zero Scale Adjustment dialog appears.

   Note
   To prevent scale adjustment, set both adjustment values to zero (0.0). PC Config Report for additional instructions on calibrating analog outputs. Analog Output Cal. For 2350A also includes a calibration example for an output scale of 0 to 1200.

   Input the appropriate value and click the 

button.
4. The Full Scale Adjustment dialog appears

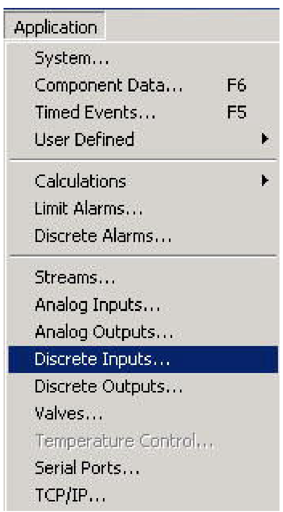


Input the appropriate value and click the  button.

5. If the values entered are within tolerance, data in the zero and full adjustment columns is updated. Otherwise, MON2000 displays an error message.

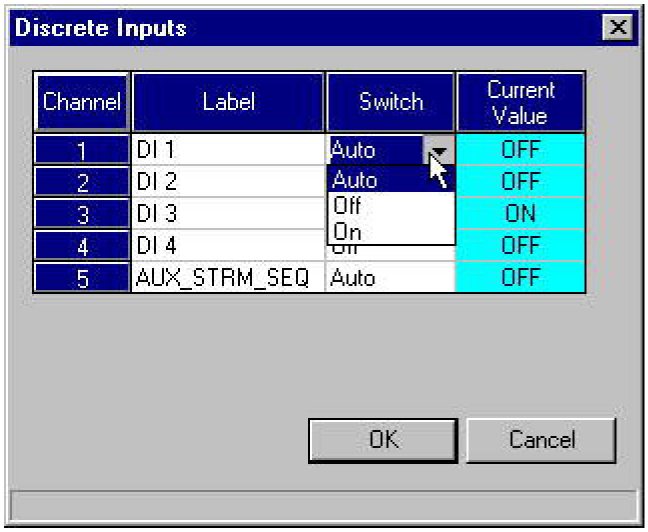
5.11 Discrete Inputs

Use this function to assign labels to the GC discrete inputs and control their operational modes. The number of discrete inputs available depends on the GC application.



Procedure

1. Use the *Application* > *Discrete Inputs* menu to access this function.
2. The Discrete Inputs dialog appears.



To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus.

See the following table for details.

Setting	Description
Channel	Channel number assigned
Label	Name used to identify the discrete input (12 characters maximum)
Switch	Sets operational mode for this discrete input • Auto = value is determined by application • Off = value is set to OFF • On = value is set to ON
Current Value	Current state of the discrete input

3. Click the 

button to accept your changes and return to the main window.

Click the 

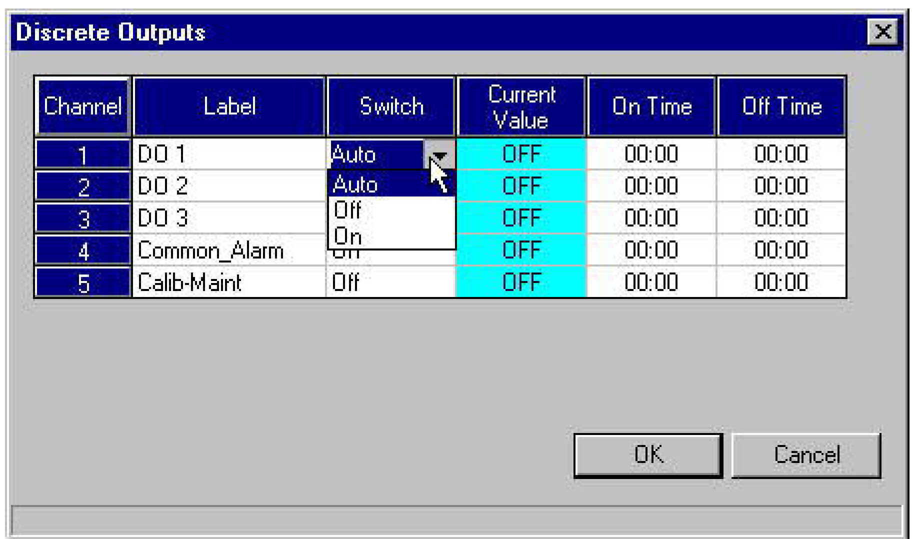
button to abort and return to the main window.

5.12 Discrete Outputs

Use this function to assign labels to the GC discrete outputs and control their operational modes. The number of discrete outputs available depends on the GC application.

Procedure

1. Use the *Application* > *Discrete Outputs* menu to access this function.
2. The Discrete Outputs dialog appears.



To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus.

Note
Signals routed to discrete outputs are assigned via the Limit Alarm and Discrete Alarm functions (Limit Alarms and Discrete Alarms).

See the following table for details.

Setting	Description
Channel	Channel number assigned

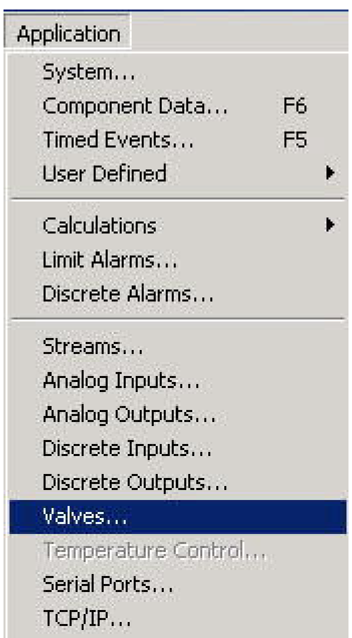
Setting	Description
Label	Name used to identify the discrete output (12 characters maximum)
Switch	Sets operational mode for this discrete output • Auto = value is determined by application • Off = value is set to OFF • On = value is set to ON
Current Value	Current state of the discrete output
On Time Off Time	Time the digital output will be turned ON/OFF (MON2000 clock based on user PC system clock) If the ON/OFF times are the same, the timing feature has no effect.

3. Click the OK button to accept your changes and return to the main window.

   Click the Cancel button to abort and return to the main window.

5.13 Valves

This function allows you to:



- Assign identifying labels
- Monitor valve operation
- Control the operation modes

The number of discrete outputs available depends on the GC application.

Note

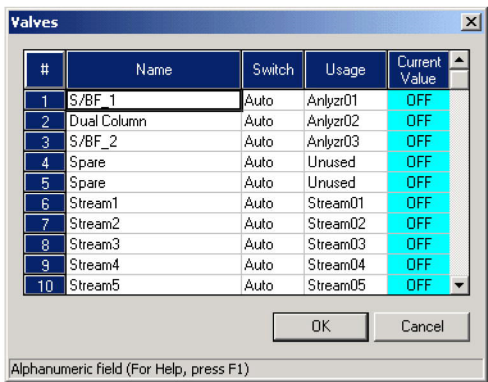
2350A GC Controllers support up to 12 Stream valves and 5 Analyzer valves, for a total of 17 valves. Model 700 controllers support up to Analytical Valves (AV-1 to AV-5 and S-1 to S-8 Stream valves

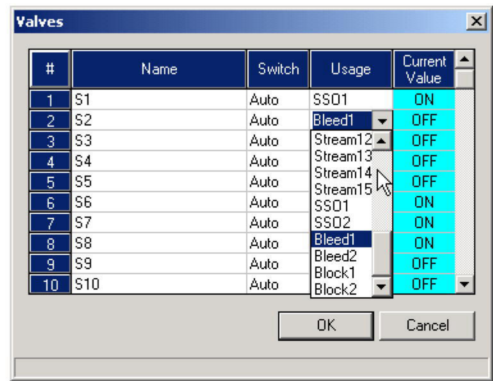
---

To use the Valve function,

Procedure

1. Use the *Application* > *Valves* menu to access this function.
2. The Valves dialog appears, per GC type.





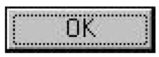
Valves dialog for Model 700 GC   Valves dialog for 2350A GCs

To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus.

See the following table for details.

Setting	Description
Channel	Channel number assigned
Label	Name used to identify the valve (12 characters maximum) **Note** By default, the 2350A GC stream valves are shown first and are labeled S1 - S12 followed by the analytical valves (AV1 - AV5). Model 700 GCs analytical valves are shown first and are labeled AV1 - AV5 followed by the stream valves (S1 - S8).
Switch	Sets operational mode for this discrete output • Auto = value is determined by application • Off = value is set to OFF • On = value is set to ON

Setting	Description
Usage (Model 700 and Model 500 GCs with 2350A Controllers)	Sets which digital output from the Timed Events function(Timed Events) is assigned to this valve Each Usage option is created per the following example:1-AV1 - where the digit “1” is taken from the valve number set by the Valve/DO# option (see Timed Events, Timed Events), and the name “AV1” is taken from Label set in this Valve dialog. **Note** The same Usage assignment cannot be used for multiple valves, unless these valves are set to “Unused”.
Current Value	current state of the valve

3. Click the 

button to accept your changes and return to the main window.

   Click the 

button to abort and return to the main window.

5.14 Temperature Control

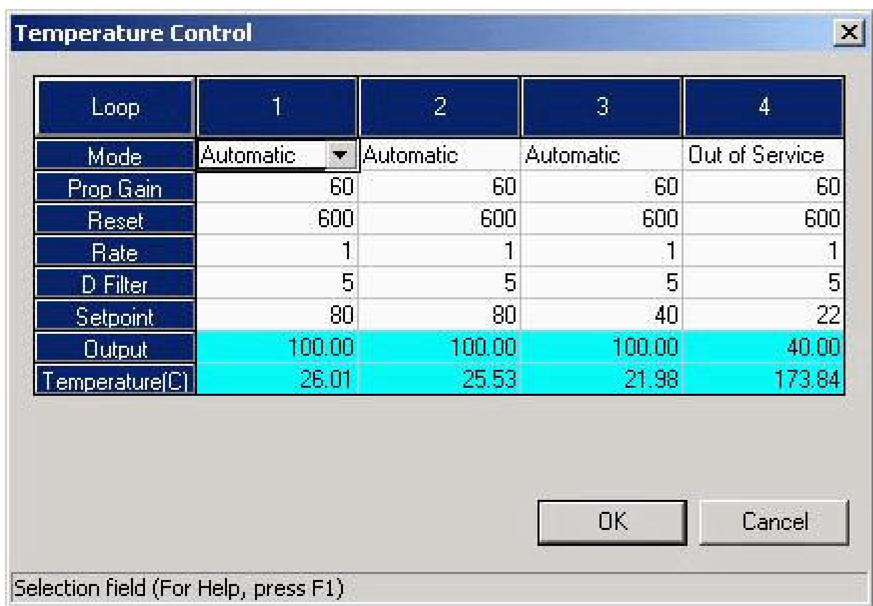
Use the Temperature Control function for monitoring the Temperature of the Oven (Detector/s and Columns) and the Stream Switching block to determine when the MON2000 is thermally stable. The bottom row labeled Temperature (C) displays the current temperatures.

The settings and values are shown in the following figure and table. The settings and values are preset at the factory and are based on the specific customer application. These values should not be changed unless recommended by Emerson Customer Service Personnel, or it is a factory application requirement.

Procedure

1. Use the *Application>Temperature* Control menu to access this function.

2. The Temperature Control dialog displays.



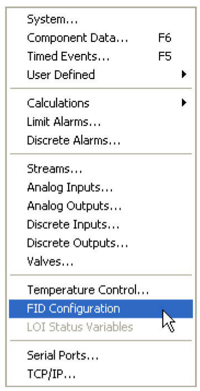
3. Use the pull down menu to select the appropriate mode setting (e.g. AUTOMATIC, MANUAL, or Out of service). Ensure that the temperature is constant for the Oven (i.e. Multivalve System block and column module kit) and the SSS.

Column	Function	Factory Default Setting
Column 1	Detector/s or Block Temperature	80° C (176.0° F)
Column 2	Column Temperature	80° C (176.0° F)
Column 3	Sample Stream Block Temperature	40° C (104.0° F)

Column	Function	Factory Default Setting
Column 4	(Spare)	Future Use

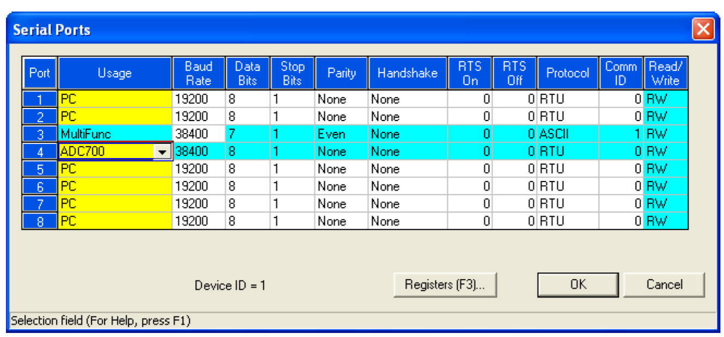
4. Click the OK button to apply the changes or click the Cancel button to discard your changes and return to the MON2000 Main window.

5.15 FID Configuration



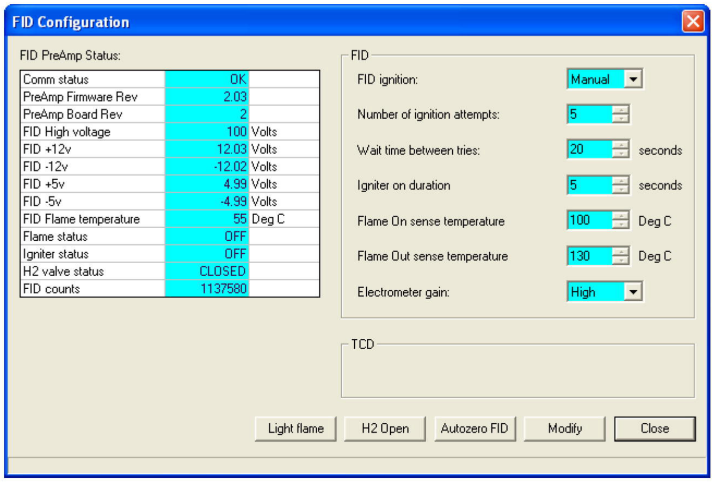
Use this function to view the status information about the Model 700 Gas Chromatograph's Preamplifier Assembly, as well as to modify certain FID parameters.

To access the FID Configuration window, MON2000 must be connected to a GC that has its serial port #4 configured to use 'ADC700'.



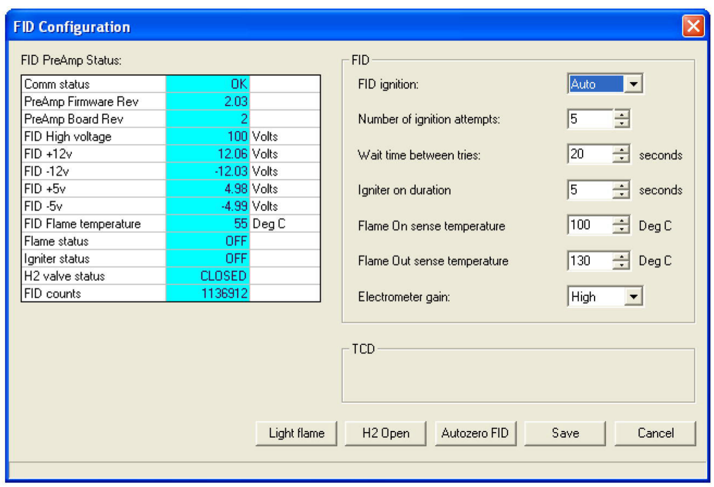
Procedure

1. Use the *Application* > *FID Configuration* menu to access this function. The FID Configuration window appears.



Information concerning the current status of the FID Preamplifier Assembly displays in the upper left corner.

2. To modify FID parameters, do the following:
    a) Halt the analysis.
    b) Click **Modify**. The blue background of the parameter fields will turn white, indicating that they are now modifiable.



The parameters that you can configure are:

- FID ignition - Select *Manual* if you wish to control the ignition of the FID (default); select *Auto* to let the GC control the ignition of the FID.
- Number of ignition attempts - Indicates the number of times the GC will try to light the flame. If an 'Auto' FID ignition sequence fails to light the flame after the specified number of attempts, the GC will close the hydrogen valve, switch the FID ignition parameter to *Manual*, and set an active alarm.
- Wait time between tries.
- Igniter on duration.
- Flame On sense temperature.

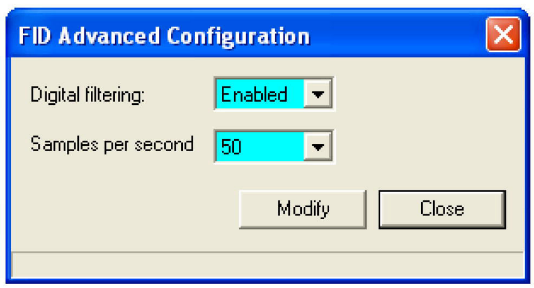
- Flame Out sense temperature.
- Electrometer gain - Your choices are *High* and *Low* (default).

c) Click **Save** to accept the changes or **Cancel** to reject them.

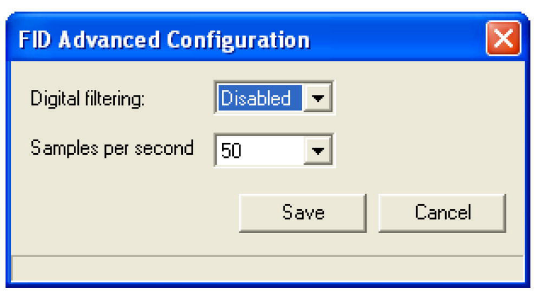
3. If *Flame status* is OFF, due to a power failure or maintenance, for example, you can restart the flame by doing the following:
   a) Click **H2 Open**. The H2 *valve status* parameter displayed in the FID PreAmp Status table changes to OPEN.
   b) Click **Light flame**. The *Flame status* parameter displayed in the FID PreAmp Status table will change to ON when the FID internal temperature exceeds the value set in the *Flame On sense temperature* field.

If **FID ignition** is set to *Auto*, the GC will automatically restart the flame if it goes out.

4. To enable or disable digital filtering, do the following:
   a) Right-click on the FID Configuration window. The FID Advanced Configuration window appears.



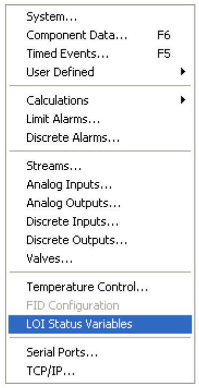
   b) Click **Modify** to make the appropriate selection from the *Digital filtering* drop-down list.



   c) Click **Save** to accept the change, or **Cancel** to reject the change.
   d) Click **Close** to leave the FID Advanced Configuration window.

5. To reset the *FID counts* parameter, click **Autozero FID**.

5.16 LOI Status Variables

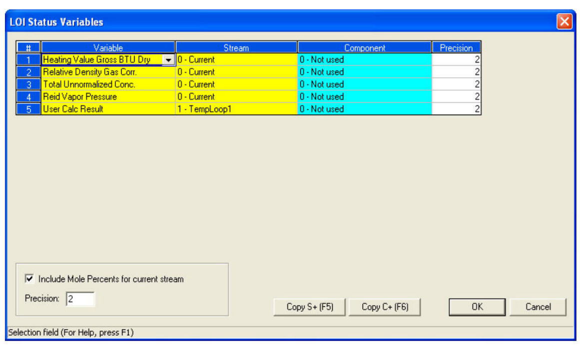


Use this function to select and configure up to 25 GC parameters that you would like to monitor using the LOI's *Display* mode (refer to the *Model 700 Gas Chromatograph System Reference Manual* for more information about this mode).

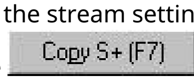
Procedure

1. Use the *Application* > *LOI Status Variables* menu to access this function.

   The LOI Status Variables window appears.

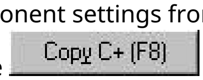
   

2. If *Include Mole Percents for current stream* is checked, which is the default, the maximum number of variable you can select is five; if *Include Mole Percents for current stream* is not checked, you can choose up to 25 variables.
3. To select a new variable, click on the appropriate drop-down list under the Variable column.
4. Select a stream from the drop-down list in the Stream column. If you want to use the current stream, select '0' in this column.

   To copy the stream settings from a highlighted row and apply them to the next row, click the 

   button or press the F7 key. This feature also increments the *Stream* value to the next available stream (e.g., incrementing from Stream 2 to Stream 8), per the GC application.

5. Select a component from the drop-down list in the Component column. If you do not want to use a component, select '0' in this column.

   To copy the component settings from a highlighted row and apply them to the next row, click the 

   button or press the F8 key. This feature

also increments the *Component* value to the next available component (e.g., incrementing from “Ammonia” to “Benzene”), per the GC application.

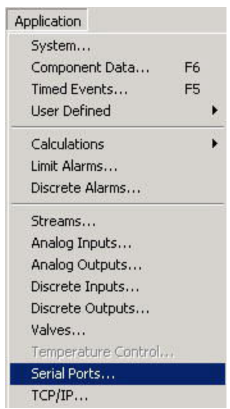
6. Enter a value in the Precision column that indicates the number of decimal places to display for this particular variable. For component concentrations, the range of possible Precision values is between 2 and 6. For all other variables, the range of possible values is between 0 and 6.

5.17 Serial Ports

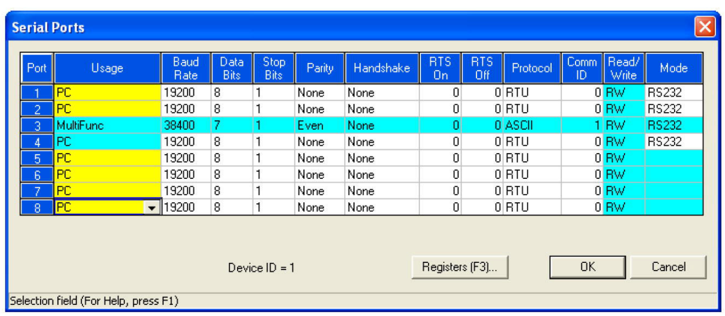
Use this function to configure and manipulate the serial port communication parameters the GC Controller uses to connect with MON2000.

Procedure

1. Use the *Application* > *Serial Ports* menu to access this function.



2. The Serial Ports dialog appears.



Note

The Mode column applies only to the following CPU boards: 2350A CPU board (P/N 2-3-2350-190) and Model 700 CPU board (P/N 2-3-0700-036).

To edit the settings displayed, double-click the appropriate cell or click and use the provided pull-down menus.

Note

For proper communications, these parameters, which are continuously downloaded to the GC, must be identical to the parameters set in the MON2000 GC Directory.

See the following table and individual sections for details.

Setting	Description
Port	Serial port number for GC Controller. The Model 700 and Model 500 with 2350A Controller (with the PC/104 COM 4A board installed) the controller supports 8 ports (9 ports with the modem). With the Multifunction board installed, COM3 is the assigned port.
Usage	Defines port usage – such as a slave config-uration (i.e.,User_Modbus, SIM_2251), PC communication port, a Report, or Serial Port – as well as the general type of serial communications protocol. To accommodate installations that use Modbus registers and the SIM_2251 protocol along with a data acquisition system, MON2000 enables you to arrange data values for a more effective polling. Note that the contents of all SIM_2251 Modbus registers are predefined, and the values for component variables are predetermined. However, a cross-index to these predefined assignments can be developed. With the Multifunction board installed, COM3 is the assigned port.
Baud Rate	Baud rate setting. Range: 1200, 2400, 4800, 9600, 19200, 38400. For high performing PCs, set the baud rate to 19200. If you experience a communications failure at this rate, set the baud rate to 9600. Baud rate settings less than 9600 may result in real-time delivery that is unacceptably slow.
Data Bits	Number of data bits. Range: 7, 8. Default: 8.
Stop Bits	Number of stop bits. Range: 1, 2. Default: 1.
Parity	Parity check method. Range: None, Even, Odd. Default: None.
Handshake	Handshaking method. Range: None, RTS-CTS, XON-XOFF. Default: None.
RTS On	Delay in milliseconds between RTS activation and the start of data transmission . **Note** If used, it may be necessary to set an extra delay in the GC Directory, accessed via the File>GC Directory menu. Range: 0 to 5000.
RTS Off	Delay in milliseconds between RTS termination and the end of data transmission. Range: 0 to 5000.
Protocol	Transmission protocol. Range: ASCII, RTU Default: ASCII
Com ID	Modbus slave address. To use the address defined by the GC Controller DIP switches, set to 0.
Read/Write	Read/write setting Range: R (Read only), W (Write only), RW (Read and write). This parameter only functions with slave ports.

Setting	Description
Mode	Only applies to 2350A CPU board (P/N 2-3-2350-190) or Model 700 CPU board (P/N 2-3-0700-036). Sets the communication protocol directly, instead of through jumper settings. Range: RS232, RS422, RS485.

Click the OK button to accept your changes and return to the main window.

Click the Cancel button to abort and return to the main window.

5.17.1 Serial Ports Configuration

Each GC Controller port number is listed in the Port column of the Serial Ports dialog. The number of available ports is hardware-specific.

These ports can be configured with the Usage settings to accommodate any one of the following end-connection devices:

Note
The optional internal modem installed on a Model 700 or Model 500 uses COM9 only, except when a keyboard and display are installed. The optional internal modem would then use COM8 only.

Note
For proper communications, these parameters, which are continuously downloaded to the GC, must be identical to the parameters set in the MON2000 GC Directory.

- PC – direct serial line connection to the PC, a serial line connection to an external or internal modem or an ethernet connection
- Report – direct serial line connection to a printer
- User_Modbus or SIM_2251 – connection to a Data Collection System (DCS) or a multi-drop serial data highway network

Specific configurations of these ports may also include settings for serial interface protocols (i.e., RS-232, RS-485, or RS-422).

These protocols can either be set from the Serial Ports window, or they can be configured through jumper settings that are located on the CPU board. See the appropriate GC hardware manual for instructions and drawings.

Note
Communications between the GC and a DCS or multi-drop serial data highway can be established with Modbus protocol. For this, the Usage setting should be either User_Modbus or SIM_2251.

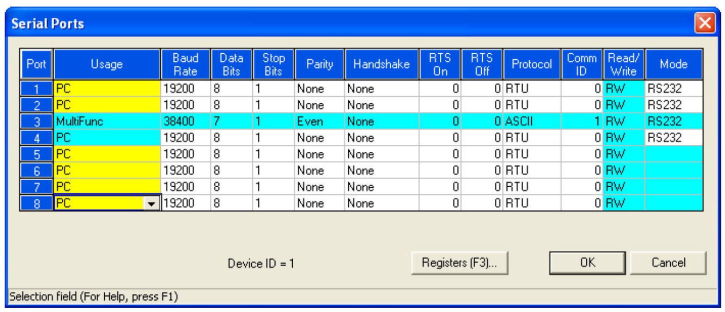
In any Modbus host-slave configuration, there must be one Host to which any one of the GCs can respond as a Slave. Thus, the controller could be connected to a maximum of 4 different serial data networks.

The serial interface protocol RS-232 will service most end-connection devices (i.e., PC and Report). DCS connections use either RS-485 or RS-422 protocols although, in some cases, the RS-232 protocol can be used.

To access this function,

Procedure

From the *Application>Serial Ports* menu, select the Usage column and use the pull-down menu to select the appropriate configuration



Note

The Mode column applies only to the following CPU boards: 2350A CPU board (P/N 2-3-2350-190) and Model 700 CPU board (P/N 2-3-0700-036)

5.18 GC Serial Port and Cable Configurations

This section provides more detailed information about the serial port connections of the 2350A GC Controller. It identifies serial port pin assignments and diagrams for designing RS-232 serial cables necessary for your application.

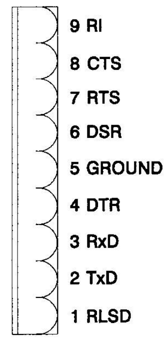
GC serial ports are found on the GC Controller Terminal Board for field wiring, and the connection points for external devices are as follows:

Port	DB-9 Plug	Phoenix Plug
1 (COM1)	P2	J5
2 (COM2)	P3	J6
3 (COM3)	n/a	J10
4 (COM4)	n/a	J11

External modem connections can be made to any of the four serial ports. However, a possible exception exists for Serial Port 4: the internal modem for the Model 500 with the 2350A Controller, if installed, uses Serial Port 4.

Phoenix plug (bare-wire) connections are available to all four serial ports. Pin-outs are identical for all four serial port Phoenix plugs and jacks. Each Phoenix plug / jack (male) combination allows bare-wire connection and uses 9 pins as illustrated:

Figure 5-1: Phoenix Connector Pinout for J5, J6, J10, J11

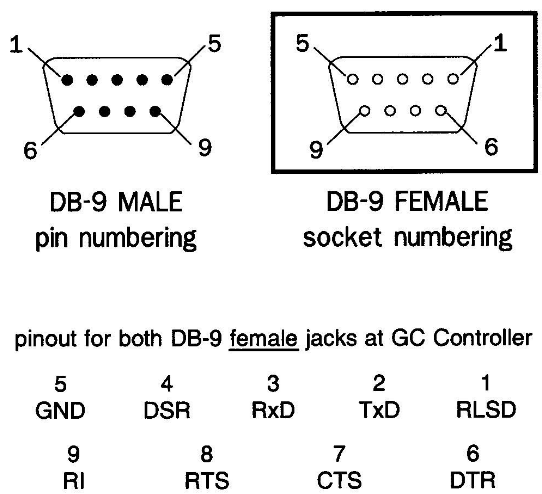


DB-9 plug connections available for serial ports 1 and 2 only. Two of the serial ports, as noted in Table 1-14, permit connection to an external modem via a DB-9 plug.

Both of the GC Controller DB-9 jacks are female and have identical pin assignments.

Note
A DB-9 male pin numbering scheme is also illustrated, but for reference purposes only.

Figure 5-2: DB-9 Connector and Pinout, P2 and P3



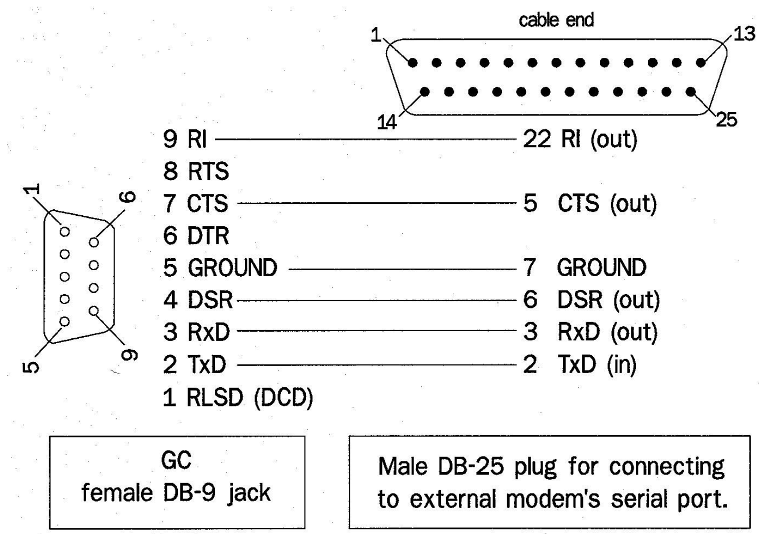
5.18.1 GC DB-9 Serial to External Modem DB-25

To make an RS-232 serial connection between one of the DB-9 serial ports of the GC, and an external modem with DB-25 serial port, you will need to manufacture a cable. The cable will need DB-9, male, and DB-25, male, plug cable ends as illustrated in Figure 5-3.

Note
GC serial ports were wired to appear as DCE so that a straight-through serial cable could be used, instead of a null-modem cable, for direct serial connection between the GC Controller and the PC, which is Data Terminal Equipment (DTE).

The DB-9 jack on the GC serial port is wired to appear like a Data Communications Equipment (DCE). Therefore, you use a custom "null-modem" type cable, as shown below, to make the connection between the GC and an external modem.

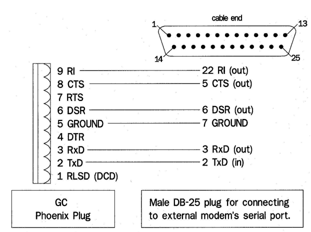
Figure 5-3: GC DB-9 Port to External Modem DB-25 Port



5.18.2 GC Phoenix Plug to External Modem DB-25

To make an RS-232 serial connection between one of the Phoenix Plug serial ports of the GC, and an external modem with DB-25 serial port, you will need to manufacture the cable and its DB-25, male plug cable end as illustrated in Figure 5-4.

Figure 5-4: Phoenix Plug Port to External Modem DB-25 Port



5.18.3 Com ID

The GC Controller Com ID is usually preset at the factory and defined by the DIP switch settings on the controller system interface board. Five switches are reserved for defining the Com ID; therefore, Com ID values range from 1 to 31.

Normally it is not necessary to change the Com ID value to anything other than 0. Setting the Com ID to zero allows the MON2000 software to automatically recognize the Com ID defined by the controller DIP switches. When connected, MON2000 displays the controller DIP setting as the Com ID in the main window titlebar. See Table 5-15 for more information.

Connection	Usage	Read/Write	Protocol
PC or modem (direct serial connection)	PC User_Modbus SIM_2251	R RW	ASCII RTU
DCS	User_Modbus SIM_2251	R RW	ASCII RTU
Printer (direct serial connection)	Report	W	ASCII

User_Modbus and SIM_2251 are slave port protocols (the GC Controller can operate only as a slave).

User_Modbus, a PLC emulation Modbus protocol, can use scaling to convert floating point numbers to integers.

SIM_2251 emulates Rosemount 2500 communication protocol and is a simulation of the 2251 GC Controller.

See Appendix I for instructions on how to connect a modem to the GC Controller.

5.18.4 Registers

To accommodate installations that use Modbus registers and the User_Modbus protocol, MON2000 enables you to assign GC analysis variables to registers.

⚠ CAUTION

This function is not required for normal GC operation. Only use this function if you are designing a special installation to directly access the GC Controller Modbus registers.

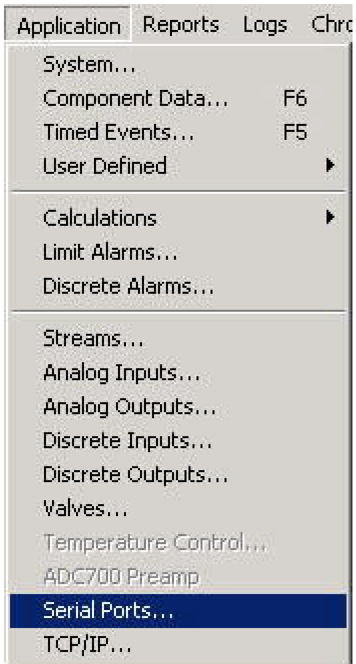
See A Modbus Reg. List for 2350A GC for more information regarding GC Modbus registers.

For a list of variable assignments made to all registers, print the communication section of the PC Config Report.

To assign GC analysis variables and scale ranges,

Procedure

1. Use the *Application>Serial Ports* menu to access this function.



The Serial Ports dialog displays.

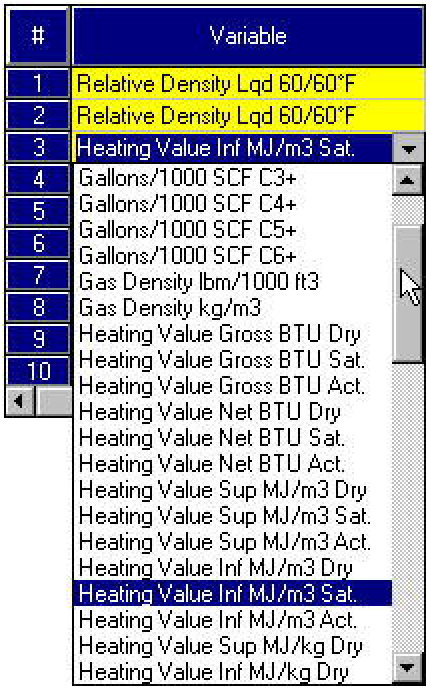
2. From the Serial Ports dialog, click the 

button or press the F3 key. The Registers dialog appears.
3. View or edit data. Double-click a given table cell or use one of the edit function buttons, described below, to make your changes.

Note
For each default 0 FloatPt scale assigned, reserve 2 Modbus registers for a given variable. Scale assignments other than 0 FloatPT require only one register per variable.

Note that the Reg column displays the number for the GC Controller Modbus register that will be polled by a connected data acquisition system.

4. To change a variable assignment, click the appropriate Variable cell. Use the provided pull-down menu and click the desired variable to select it.



From the Variables menu, you can assign the results of optional base pressure(s) to the Modbus register. Setting Optional Base Pressures.

5. To change the stream assignment, click the appropriate cell. Use the provided pull-down menu and click the desired stream to select it.

   To copy the stream settings from a highlighted row and apply them to the next row, click the Copy S+ (F7) button or press the F7 key. This feature also increments the Stream value to the next available stream (e.g., incrementing from Stream 2 to Stream 8), per the GC application. An error message displays when the last available stream is reached.

6. To change the component assignment, click the appropriate cell. Use the provided pull-down menu and click the desired option to select it.

   To copy the component settings from a highlighted row and apply them to the next row, click the Copy C+ (F8) button or press the F8 key.

   This feature also increments the Component value to the next available component (e.g., incrementing from Ammonia to Benzene), per the GC application. An error message displays when the last available component is reached.

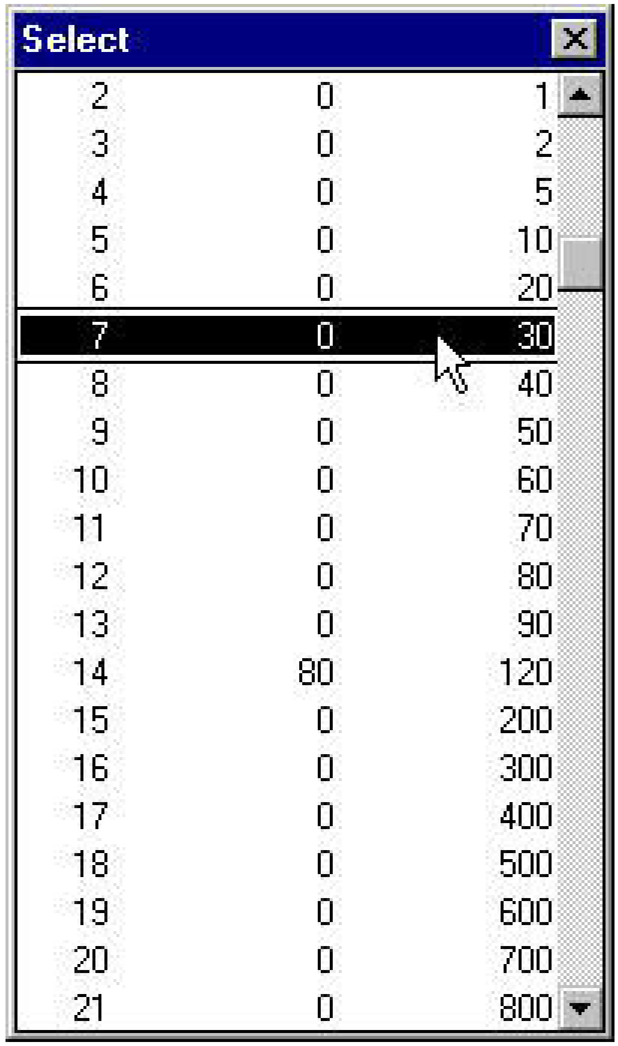
7. To select a scale and range,

   Note
   Assigning a scale and corresponding range is an optional step. The default scale assignment is 0 FloatPt, which means the value is not converted to integer and is stored in two (2) adjacent Modbus registers.

   a) Select the scale/range to be replaced.

      By assigning a scale range, a floating point value can be converted to an integer value per the user-defined scale assignment.

b) Click the Scale (F5)... button or press the F5 key. A menu list of all available scales and ranges appears.



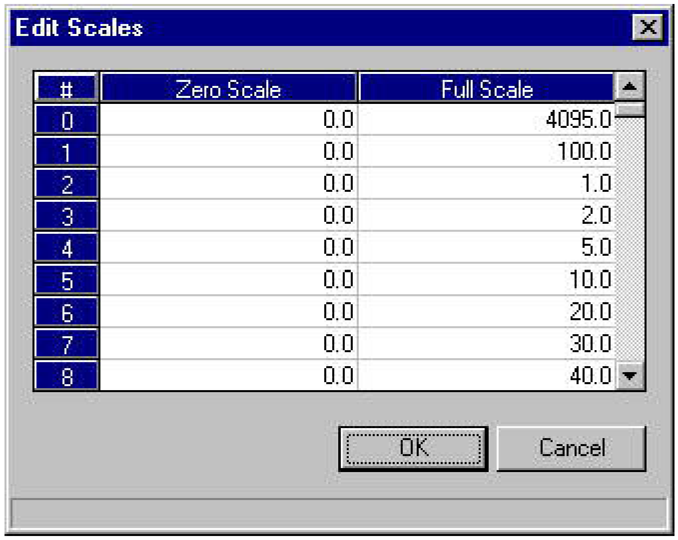
c) Double-click the desired new scale and corresponding range.

Note that any of the available 33 scales can be redefined via the Edit Scales function (Step 8).

8. To redefine a scale or create a custom scale,

a) Click the Edit Scales (F2)... button or press the F2 key.

b) The Edit Scales dialog appears.



All 33 scaling options will display.

c) Input the new Zero Scale or Full Scale values as appropriate.

To convert floating point data to a whole integer, each scale definition follows this algorithm:

$$integer = \left(\frac{R_F - R_Z}{S_F - S_z}\right)D_{fp} = 3977$$

where

RF = range, Full Scale =4095

Rz = range, Zero Scale =0

SF = scale, Full =100

Sz = scale, Zero =0

Dfp = data, floating pt =97.13

(% from Methane)

To convert floating point data to a whole integer, each scale definition follows this algorithm:

$$integer = \left(\frac{R_F - R_Z}{S_F - S_z}\right)D_{fp} = 3977$$

where

RF = range, Full Scale =4095

Rz = range, Zero Scale =0

SF = scale, Full =100

Sz = scale, Zero =0

Dfp = data, floating pt =97.13

(% from Methane)

d) Click the 

button to accept your changes and return to the Registers dialog.

Click the Cancel button to abort and return to the Registers dialog.

9. To check for conflicting Modbus register assignments,

   a) Click the OK button or press the F6 key.

   b) MON2000 displays the first encountered error.

   For this example, you would change the register number for Row 2. You would then verify all subsequent register numbers as well.

   c) Click the OK button to accept your changes and return to the Serial Ports dialog. MON2000 automatically checks for conflicting Modbus register assignments.

   Click the Cancel button to abort and return to the Serial Ports dialog.

5.18.5 Setting Optional Base Pressures

As discussed in Registers, you can assign GC analysis variables to various Modbus registers. Follow the procedure below to add the “Optional Base Pressure” variable to the Registers List.

Up to three (3) optional base pressures can be used for GC analysis calculations. These optional base pressure values are entered via the Streams function (Streams).

“Results - Opt. Base Press” – A group of 12 GC analysis calculations can be used to reflect the use of different base pressures. Analysis Computations for more information.

To assign the “Optional Base Pressure” variable,

Procedure

1. Verify the values for optional base pressures that have already been entered.

   a) Use the *Application* > *Streams* menu to access this function.
   The Streams dialog box displays.

   b) Scroll to the Opt Press columns and note these values along with the corresponding optional pressure and stream number(s).

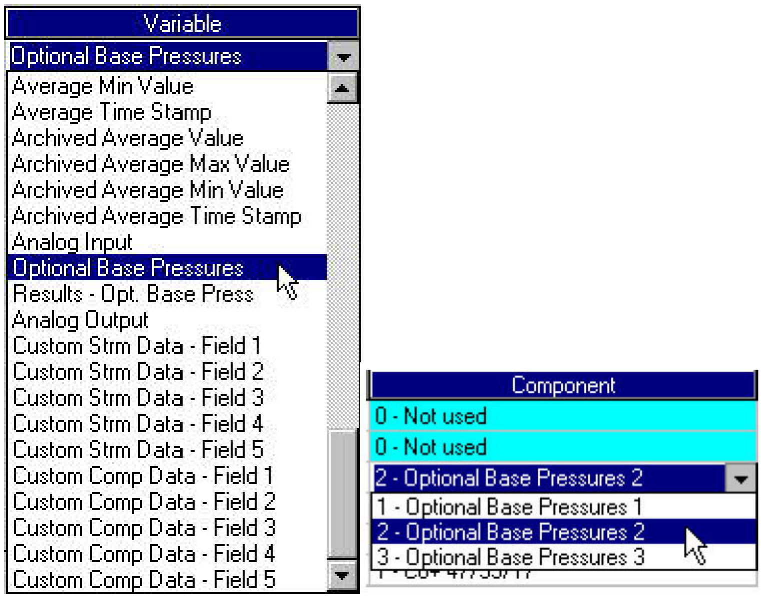
   c) If you wish to enter different pressure values, do so now and then click the OK button to accept your changes.

   Otherwise, click the Cancel button to return to the main window.

2. Use the *Application* > *Serial Ports* menu to access the Register function.

3. From the Serial Ports dialog, click the 

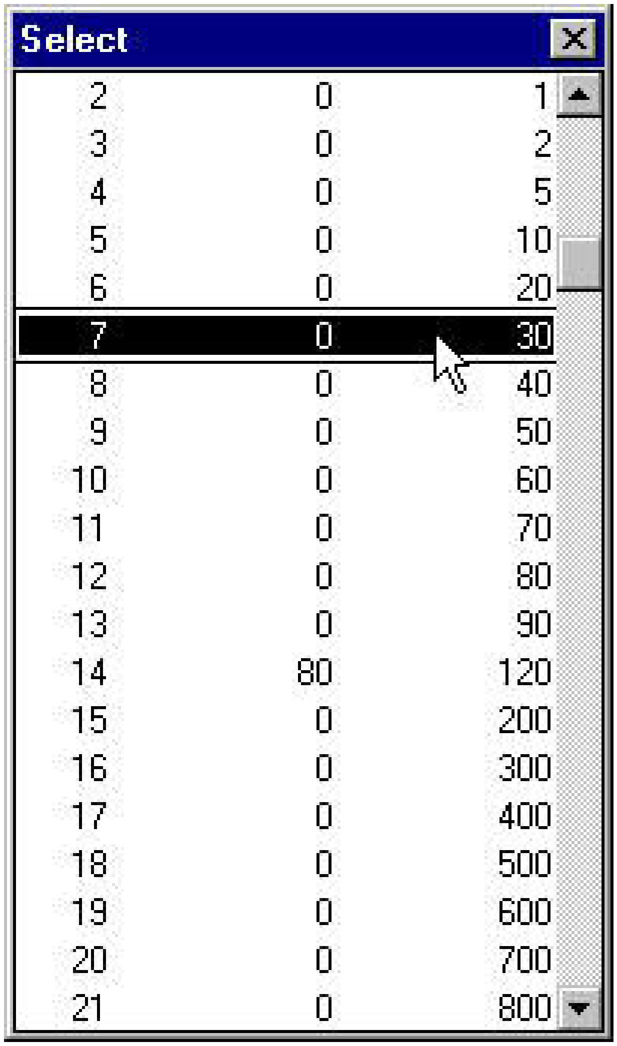
button or press the F3 key. The Registers dialog appears.
4. From the Registers dialog, use the Variable pull-down menu to select the *Optional Base Pressures* option.
5. Use the corresponding component pull-down menu to select the desired optional base pressure option.



6. To assign a scale, ensure that the correct row is selected and click the 

button or press the F5 key.

   Double-click the desired scale option to apply.



For instructions on creating or editing a scale, Registers.

7. The “Optional Base Pressure” variable should be listed with the settings specified.
8. Click the 

button to accept your changes.

5.18.6 Setting Optional Base Results

As discussed in Registers, you can assign GC analysis variables to various Modbus registers. Follow the procedure below to add the “Results - Opt. Base Press” variable to the Registers List.

A group of 12 GC analysis calculations can be used to reflect the use of different base pressures. Analysis Computations for more information.

To assign the “Results - Opt. Base Press” variable,

Procedure

1. Verify the values for optional base pressures that have already been entered.
   a) Use the *Application* > *Streams* menu to access this function.

The Streams dialog displays.

b) Scroll to the Opt Press columns and note these values along with the corresponding optional pressure and stream number(s).

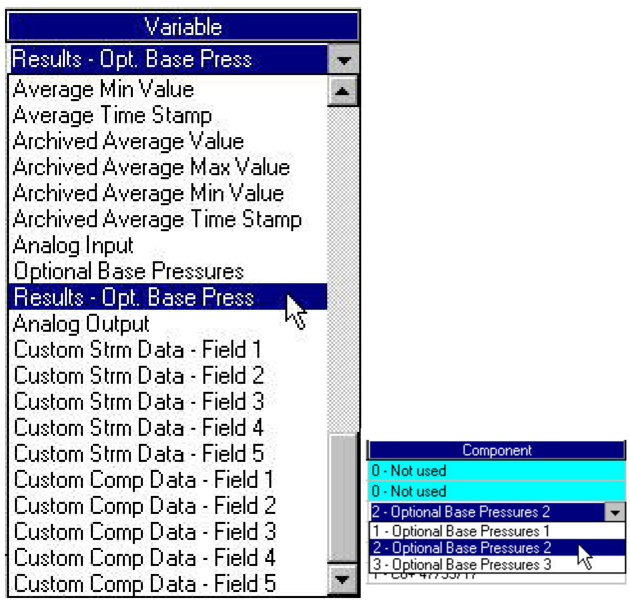
c) If you wish to enter different pressure values, do so now and then click the OK button to accept your changes.

Otherwise, click the Cancel button to return to the main window.

2. Use the *Application* > *Serial Ports* menu to access this function.
3. From the Serial Ports dialog, click the Registers (F3)... button or press the F3 key.

   The Registers dialog appears.

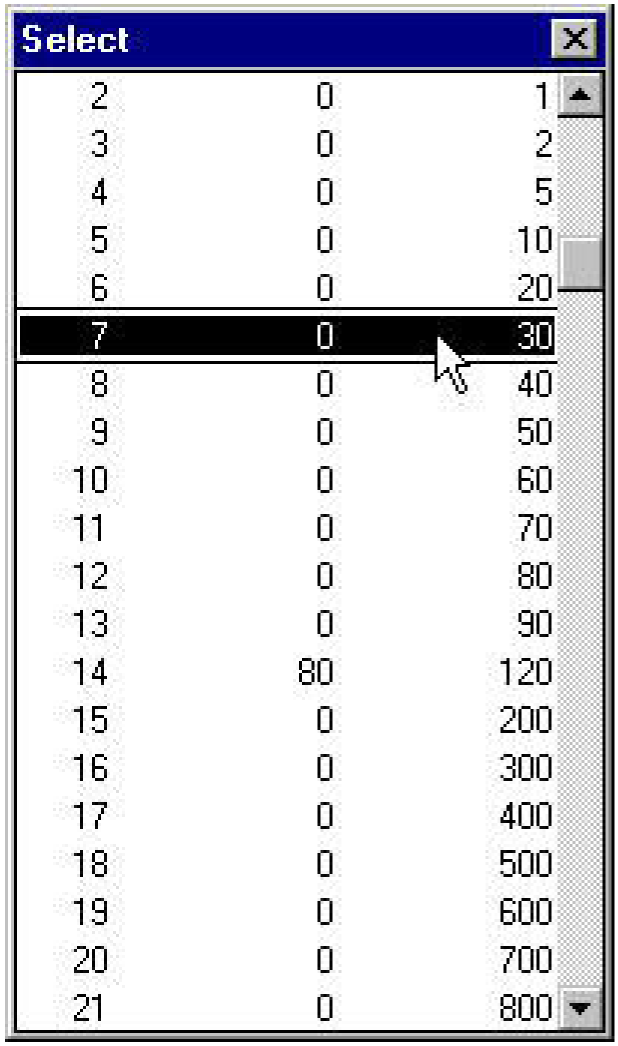
4. From the Registers dialog, use the Variable pull-down menu to select the *Results - Opt. Base Press* option.
5. Use the corresponding component pull-down menu to select the desired optional base pressure option.



See Table 5-16 to determine which number you should enter.

Note
Metric GC analysis variables are available only if the Metric Base Conditions option has been enabled (System).

6. To assign a scale, ensure that the correct row is selected and click the Scale (F5)... button or press the F5 key. Double-click the desired scale option to apply.



For instructions on creating or editing a scale, Registers.

7. The “Results - Opt. Base Press” variable should be listed with the settings specified.
8. Click the 

button to accept your changes.

GC Analysis Variable		Optional Pressure		
U.S.	**Metric**	**1**	**2**	**3**
Gross Heating Value or Btu (Dry)	Heating Value, Superior, MJ/m^3 (Dry)	1	13	25
Gross Heating Value or Btu (Sat.)	Heating Value, Superior, MJ/m^3 (Sat.)	2	14	26
Gross Heating Value or Btu (Act.)	Heating Value, Superior, MJ/m^3 (Act.)	3	15	27
Net Btu (Dry)	Heating Value, Inferior, MJ/m^3 (Dry)	4	16	28
Net Btu (Sat.)	Heating Value, Inferior, MJ/m^3 (Sat.)	5	17	29
Net Btu (Act.)	Heating Value, Inferior, MJ/m^3 (Act.)	6	18	30
Real Relative Density Gas	Heating Value, Superior, kcal/m^3 (Dry)	7	19	31
Gallons/1000 SCF C2 +	Heating Value, Superior, kcal/m^3 (Sat.)	8	20	32

GC Analysis Variable		Optional Pressure		
U.S.	**Metric**	**1**	**2**	**3**
Gallons/1000 SCF C3 +	Heating Value, Superior, kcal/m^3 (Act.)	9	21	33
Gallons/1000 SCF C4 +	Heating Value, Inferior, kcal/m^3 (Dry)	10	22	34
Gallons/1000 SCF C5 +	Heating Value, Inferior, kcal/m^3 (Sat.)	11	23	35
Gallons/1000 SCF C6 +	Heating Value, Inferior, kcal/m^3 (Act.)	12	24	36

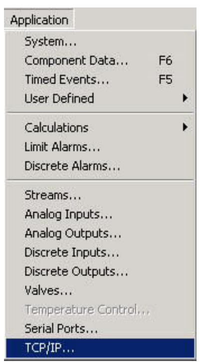
Note
Use the above index numbers to assign "Results - Opt. Base Press" to User_Modbus registers.

5.19 TCP/IP, Subnet, and Gateway Menu

Use this function to configure the TCP/IP, Subnet, and Gateway communication parameters for the 2350A GC Controller.

Procedure

1. Use the *Application* > *TCP/IP* menu to access this function.



2. The TCP/IP dialog displays.

   A Modbus Reg. List for 2350A GC for detailed instructions for the Ethernet card installation, TCP/IP, Subnet, and Gateway settings.

6 Chromatogram Viewer

Use the Chromatogram Viewer to display and print live, archived, or saved chromatograms (from a **.cgm** file on disk). The 2350A GC Controller saves the most recent chromatograms for each stream running in the Stream Sequence, as well as the chromatogram from the most recent calibration run for each CDT. See the following sections for further instructions.

6.1 Chromatogram Viewer Function

To access the Chromatogram Viewer,

Procedure

1. Connect to the GC.
2. Use the *Chromatogram* > *Chromatogram Viewer* menu to access this function.

3. The Chromatogram Viewer dialog appears.
4. Click the button to exit this dialog. Any display changes or open data will be lost. Saving a Chromatogram to Disk to save a chromatogram to disk.

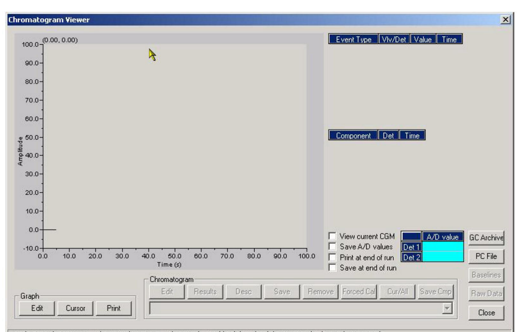
6.2 Viewing a Live Chromatogram

6.2.1 From Online GC

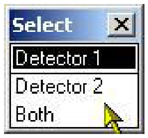
To view a live chromatogram trace from the online GC,

Procedure

1. Check the *View current CGM* option.



If a chromatogram contains data for more than one detector, a Select Detector menu dialog displays. Double-click either “Detector 1”, “Detector 2”, or “Both”.



2. MON2000 plots the current, live chromatogram.

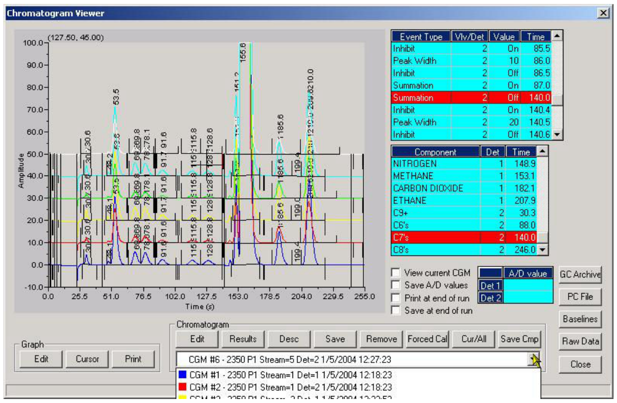
   The corresponding data is dynamically displayed in the provided legends.

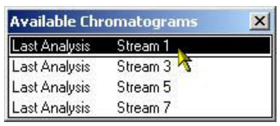
Tr	Type	Val	Num	Time
1	Detector	0	-1	0.0
1	Strm Switch	0	0	7.0
1	Peak Width	4	0	8.0
1	DO #	0	2	23.0
1	Integrate	1	0	100.0
1	Peak Width	3	0	143.0
1	Peak Width	8	0	173.0

Tr	Component	Det	Time
1	PROPANE	1	50.2
1	i-BUTANE	1	65.7
1	n-BUTANE	1	73.6
1	NEOPENTANE	1	86.3
1	i-PENTANE	1	109.4
1	n-PENTANE	1	121.6
1	NITROGEN	1	149.5
1	METHANE	1	153.1

   Use the Graph and Chromatogram functions to manipulate the display. To zoom in on a particular point, click and drag your mouse over that area; repeat as necessary. Use the Restore State or Zoom Out options from the right-click menu (Display Options) to return to the original display.

   You can display up to 8 chromatograms at one time. Each chromatogram is color-coded; use the Chromatogram pull-down menu to select a specific chromatogram.





6.2.2 From GC Archive

Archived chromatograms are stored on the GC, so you must be logged in to access them.

Archived chromatograms are sorted and displayed on three tabbed panes:

Chromatograms — This pane displays the chromatograms from the last five runs for each stream. To display a list of all the chromatograms that are stored on the GC, click **All**. If you are viewing all chromatograms you can return to the default display by clicking **Recent**. Non-final chromatograms as old as four days are available for viewing.

Protected Chromatograms — Protected chromatograms are never deleted from the GC. To protect a chromatogram, see Protected chromatograms.

> **Note**
> Protected chromatogram files have a “lock” icon displayed beside them.

Final Calibration — MON2000 will store up to one year's worth of final calibration chromatograms. MON2000 will delete any non-protected final calibration chromatogram that is older than 400 days. If storage space runs out, MON2000 will delete the oldest non-protected final calibration chromatogram for each new final calibration chromatogram that is created.

To view an archived chromatogram, do the following:

Procedure

1. Click **GC Archive**.
   The ***Select Archive Chromatogram(s)*** window opens.

   > **Note**
   > By default, the files are sorted by date, with the newest file listed first. However, the files can be sorted by Stream #, Stream Name, or Time by clicking on the appropriate column header.

2. Click the desired chromatogram to select it. You can select more than one chromatogram by using the SHIFT or CTRL key.

   Note
   To save the selected chromatograms, select the **Upload and save selected chromatograms** check box and then click **Upload & Save**.

3. Make sure the **Upload and save selected chromatograms** check box is not selected and then click **Upload & Show**.

   If the selected chromatogram(s) contain data from more than one detector, the ***Select*** window will open to ask the user to select either "Detector 1", "Detector 2", or "Both".

   MON2000 plots the archived chromatogram(s) and the corresponding data displays in the timed event and component data tables.

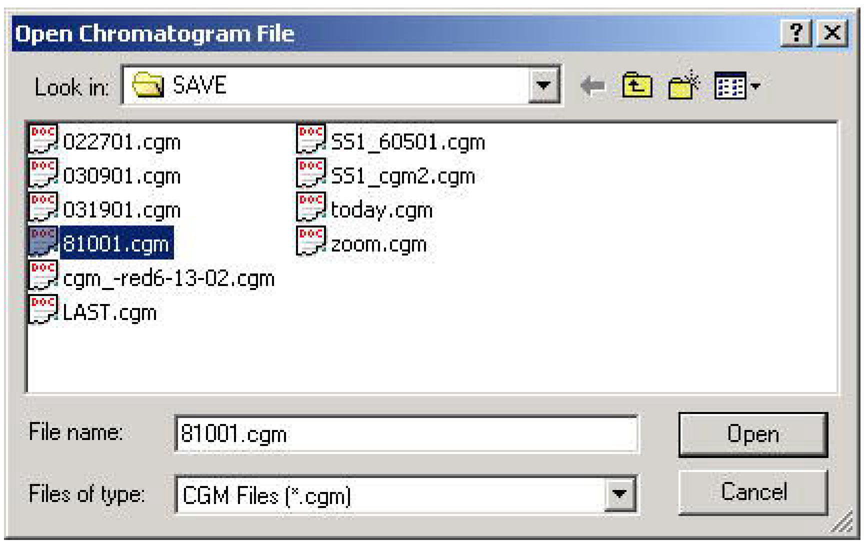
6.2.3 From File on Disk

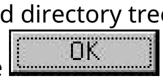
To view a chromatogram trace from a file previously saved to disk,

Procedure

1. Click the 

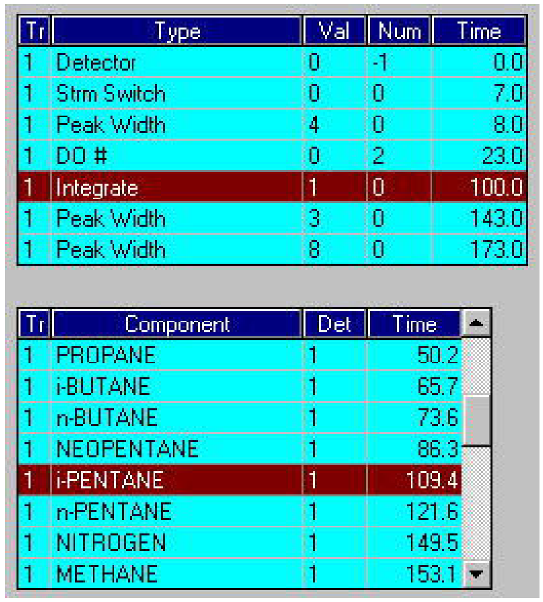
button. The Open Chromatogram File dialog appears



2. Use the provided directory tree to locate the desired CGM file or CGM Comparison file and click the 

button to open.
   The Chromatogram window displays.
3. If a chromatogram contains data for more than one detector, a Select Detector menu dialog displays. Double-click either “Detector 1”, “Detector 2”, or “Both”.
4. MON2000 displays the chromatogram file.

   The corresponding data is dynamically displayed in the provided legends.



Tr	Type	Val	Num	Time
1	Detector	0	-1	0.0
1	Strm Switch	0	0	7.0
1	Peak Width	4	0	8.0
1	DO #	0	2	23.0
1	Integrate	1	0	100.0
1	Peak Width	3	0	143.0
1	Peak Width	8	0	173.0

Tr	Component	Det	Time
1	PROPANE	1	50.2
1	i-BUTANE	1	65.7
1	n-BUTANE	1	73.6
1	NEOPENTANE	1	86.3
1	i-PENTANE	1	109.4
1	n-PENTANE	1	121.6
1	NITROGEN	1	149.5
1	METHANE	1	153.1

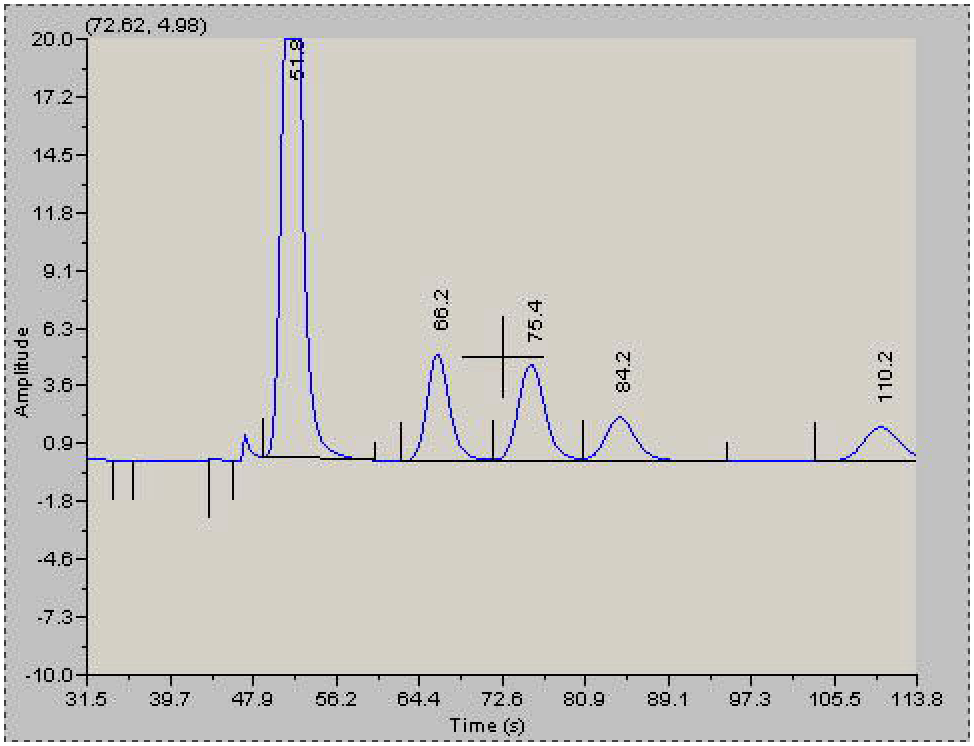
Use the Graph and Chromatogram functions to manipulate the display. To zoom in on a particular point, click and drag your mouse over that area; repeat as necessary. Use the Save State, Restore State, or Zoom In or Out options from the right-click menu (Display Options) to return to the original display for both Live and Archived CGM views. Press the keyboard home key to force the CMG view to the default state. Also, pressing the keyboard home key sets the CGM view to the default state if the current application analysis time is different from the previous application analysis time.

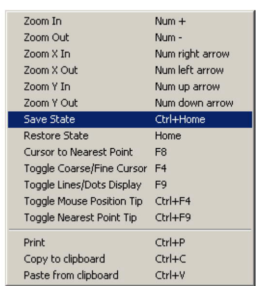
Note

The Save State function is available when viewing a live or archived CGM.The Save State function is available when viewing a live or archived CGM.

Note

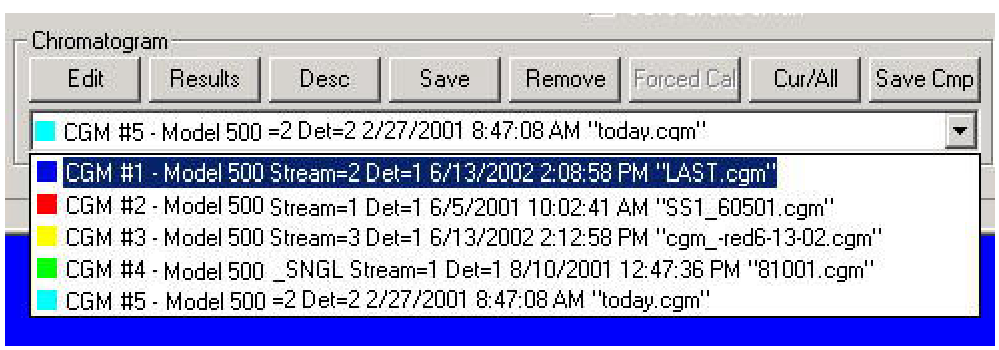
The MON2000 software looks for and finds the application’s analysis time. Pressing the ”Home” key returns the user to the default CGM state





Right Click Menu

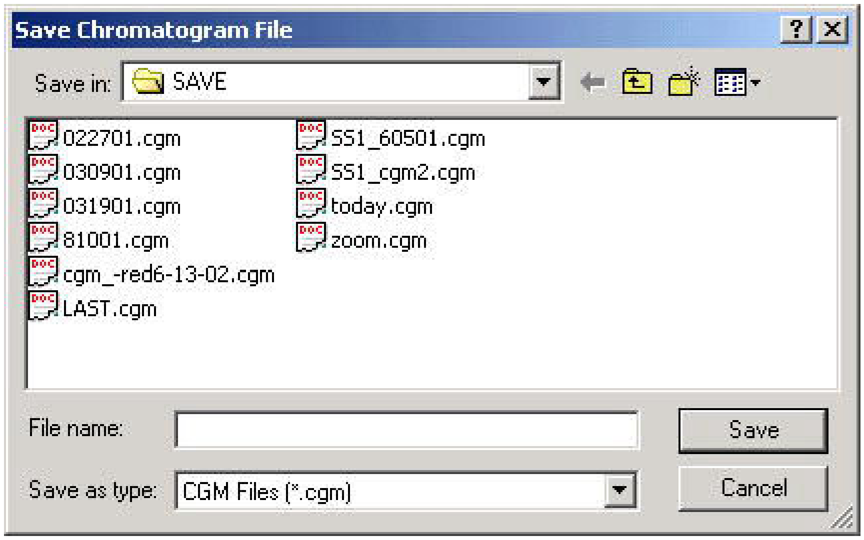
You can display up to 8 chromatograms at one time. Each chromatogram is color-coded; use the Chromatogram pull-down menu to select a specific chromatogram



5. Click the 

 button to save the selected comparison file to disk.

 The Save Chromatogram Comparison File dialog appears



6. Enter the file name to be saved and click the button to save the file to disk.

   Or,

   Click the 

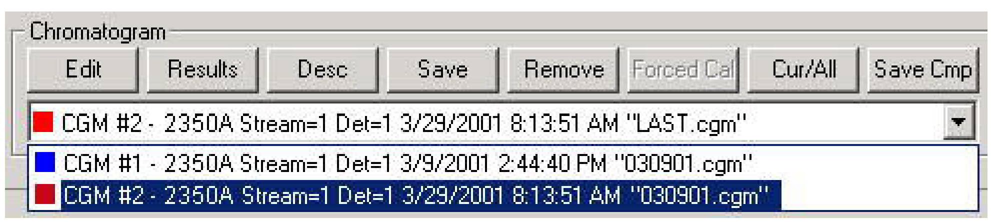
 button to exit this dialog.

6.3 Removing a Chromatogram from View

To remove a chromatogram trace from the Viewer display (and close the cgm file, if reading from disk),

Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

 button. MON2000 removes the chromatogram from view and, if applicable, closes the cgm file.

6.4 Saving a Chromatogram to Disk

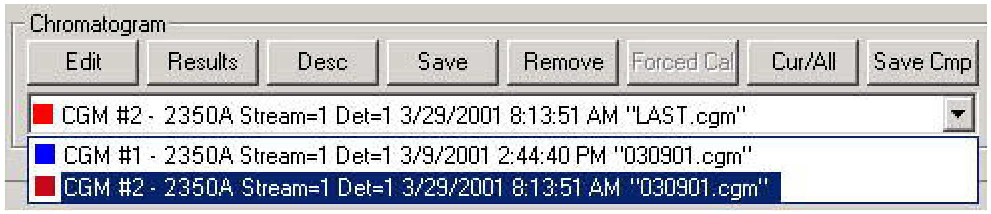
To save a currently displayed chromatogram to disk,

Note

This function will save a live chromatogram at the current point, thus overwriting the "last.cgm" file.

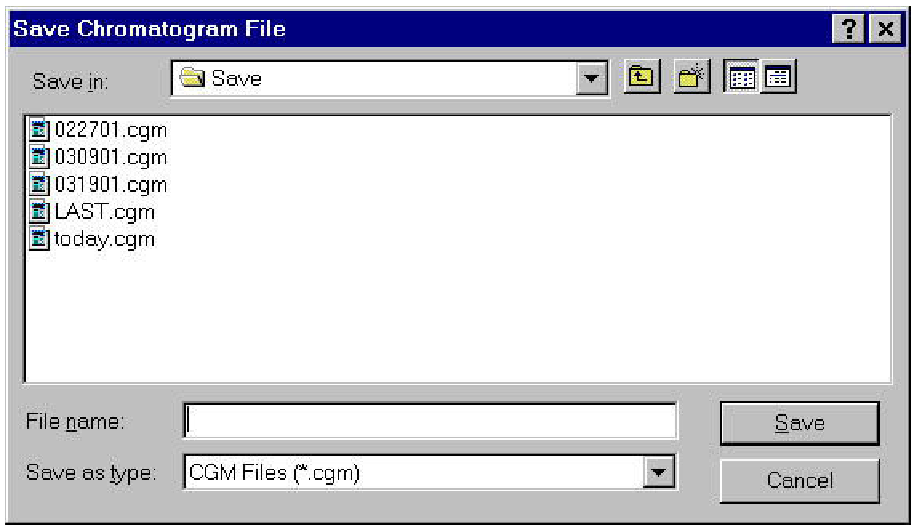
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the button.

   MON2000 displays the Save Chromatogram File window.



   Use the provided directory tree to select the desired file location and name, then click the button.

3. MON2000 saves the specified chromatogram along with its corresponding graph settings.

6.5 Protected chromatograms

By default, archived chromatograms are not saved indefinitely. Once the GC's storage capacity for archived chromatograms has been reached, the oldest archived chromatograms are deleted to make room for the newest archived chromatograms.

If you have a chromatogram that you would like to preserve, it is possible to "protect" it. Protected chromatograms will not be deleted to accommodate newer chromatograms. To delete a protected chromatogram, it must first be unprotected. See Unprotect a protected chromatogramfor more information.

Note
Protected chromatograms have a “lock” icon displayed beside them.

Note
To protect an archived chromatogram you must be logged in as a supervisor or administrator.
To protect a chromatogram, do the following:

Procedure

1. Click **GC Archive**.
   The *Select Archive Chromatograms(s)* window opens. The chromatograms can be sorted by date, file name, analysis type, time, or stream number by clicking the appropriate column header. By default, they are sorted by date, with the newest chromatogram listed first.

   Note
   By default, only recent chromatograms—that is, the last five runs for each stream—are displayed. To view all archived chromatograms, click **All**. To return to viewing only recent chromatograms, click **Recent**.

2. Make sure the *Chromatogram* tab is selected and then select the appropriate archived chromatogram by clicking it. Use the SHIFT or CTRL key to make multiple selections.
3. Click **Protect**.
   The *Edit Description* window displays.
4. Enter any information that you would like to have associated with the chromatogram and then click **OK**. If you do not want to enter any information, click **Cancel**.
   MON2000 will place a "lock" icon beside the selected chromatogram to verify its protected status. You can also click on the *Protected Chromatograms* tab to view your newly protected archived chromatogram(s).

6.6 Unprotect a protected chromatogram

To unprotect a protected file, do the following:

Procedure

1. Click **GC Archive**.
   The *Select Archive Chromatogram(s)* window opens.
2. Locate and select the protected chromatogram that you want to unprotect. Use the SHIFT or CTRL key to make multiple selections.
3. Click **Unprotect**.
   MON2000 will remove the "lock" icon from beside the selected chromatogram. The chromatogram's description information, if any, will also be deleted. This chromatogram is now eligible to be deleted to make room for newer archived chromatograms.

6.7 Graph Functions

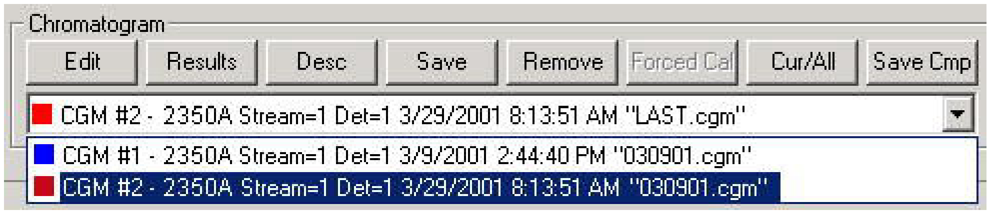
Use the Graph buttons to access any of the following graph-related functions.

6.7.1 Editing the Chromatogram Graph

Use the Edit Graph function to change the span and interval for the x/y axis, as well as other display parameters.

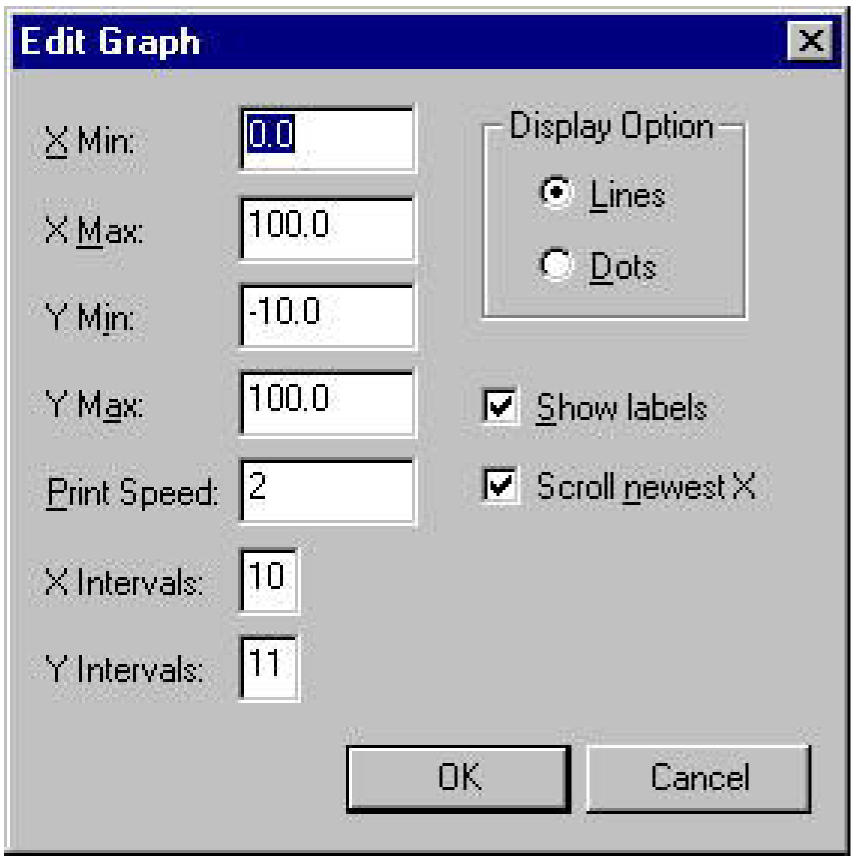
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

button. The Edit Graph dialog appears.



3. Use the provided attributes and options to change the chromatogram display and printer speed as desired.

4. Click the 

button to accept your changes and return to the Chromatogram Viewer dialog.

   Click the 

button to abort and return to the Chromatogram Viewer dialog.

5. The chromatogram display changes as specified.

Additional display options are available by right-clicking the display area. Display Options for more information.

6.7.2 Changing Cursor Size

To toggle the cursor size from coarse movement (less accurate) to fine movement (more accurate), click the 

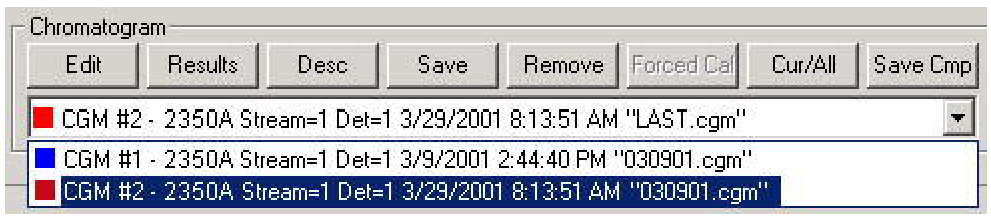
button.

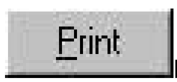
6.7.3 Printing the Chromatogram

To print a currently displayed area of the chromatogram,

Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

button.

6.8 Chromatogram Functions

Use the Chromatogram buttons to access any of the following chromatogram-related functions.

- Edit - edit the Chromatogram
- Results - view the CGM calculation results
- Desc - save a description of the CGM
- Save - save the displayed chromatogram to disk
- Remove - removes a chromatogram from view
- Forced Cal - perform a forced calibration
- Cur/All - toggle the TEV and CGM Component spreadsheet display
- Save CMP - save multiple CGMs

Note
To save the displayed chromatogram to disk, Saving a Chromatogram to Disk.
To remove a chromatogram from view, Removing a Chromatogram from View.To

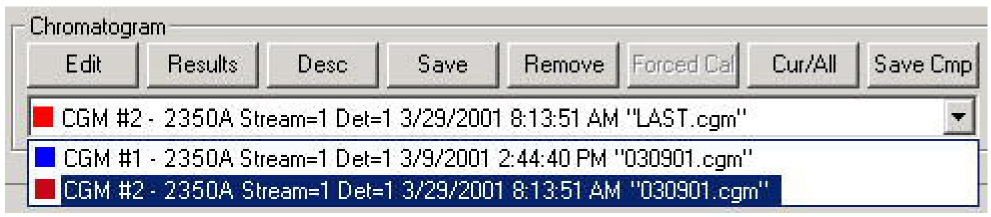
toggle the TEV and CGM Component spreadsheet display, Toggling TEVs and CGM Components.

6.8.1 Editing the Chromatogram

Use the Edit Chromatogram function to change the x/y offset values and other display parameters such as color.

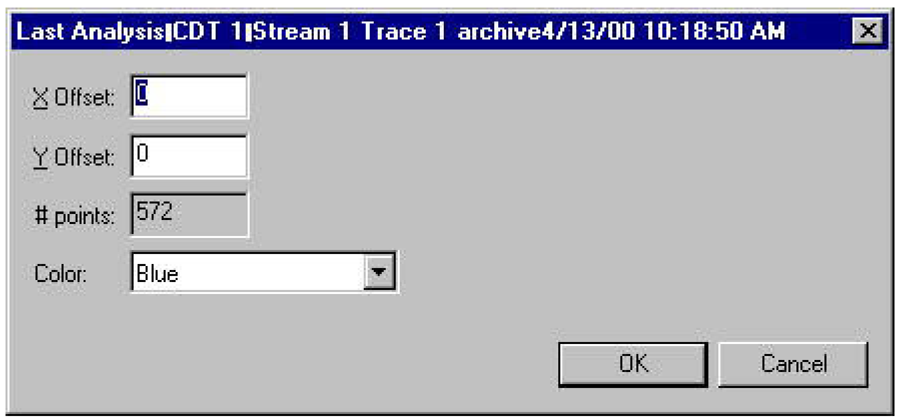
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

button. The Edit Chromatogram dialog appears.



3. Use the *X Offset* and *Y Offset* values to change the chromatogram display as desired.
4. Use the *Color* pull-down menu to assign a different color to this chromatogram.
5. Click the 

button to accept your changes and return to the Chromatogram Viewer dialog.

   Click the 

button to abort and return to the Chromatogram Viewer dialog.

6.8.2 Editing TEVs from CGM Viewer

To edit the Timed Events Table (TEV) from the Chromatogram Viewer window,

Note
In the edit mode, initial focus is applied to the currently selected event in the table, or to the event with the closest time.

Note

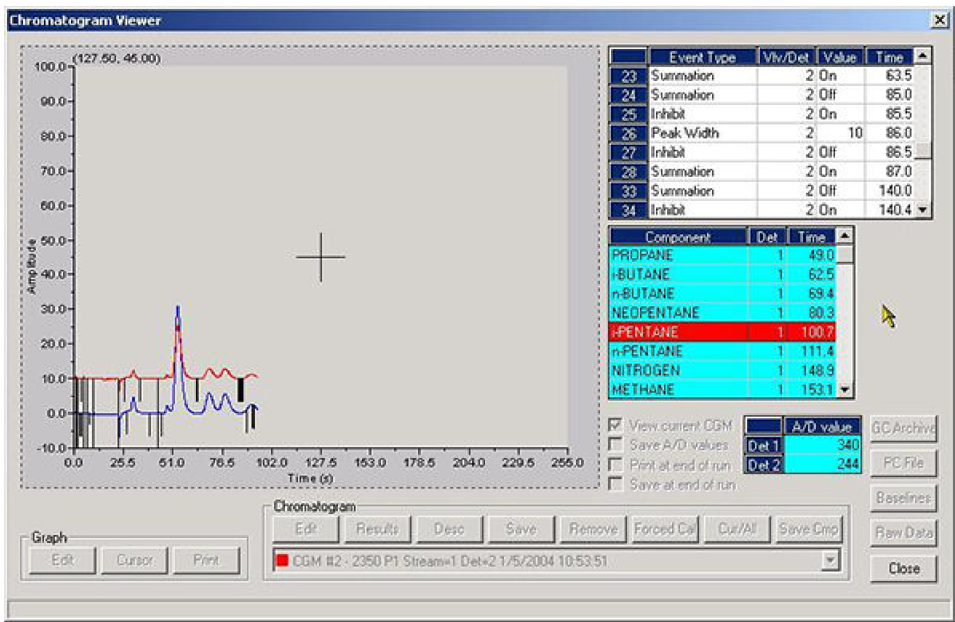
If more than one CGM is displayed, only the selected CGM timed events will be available to edit.If more than one CGM is displayed, only the selected CGM timed events will be available to edit.

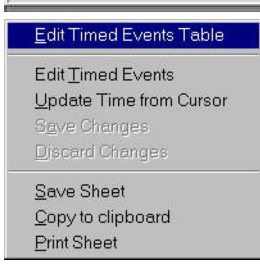
Procedure

1. Double-click the left mouse button, while hovering over the TEV legend, to edit the timed events from the CGM viewer (see the following figures).

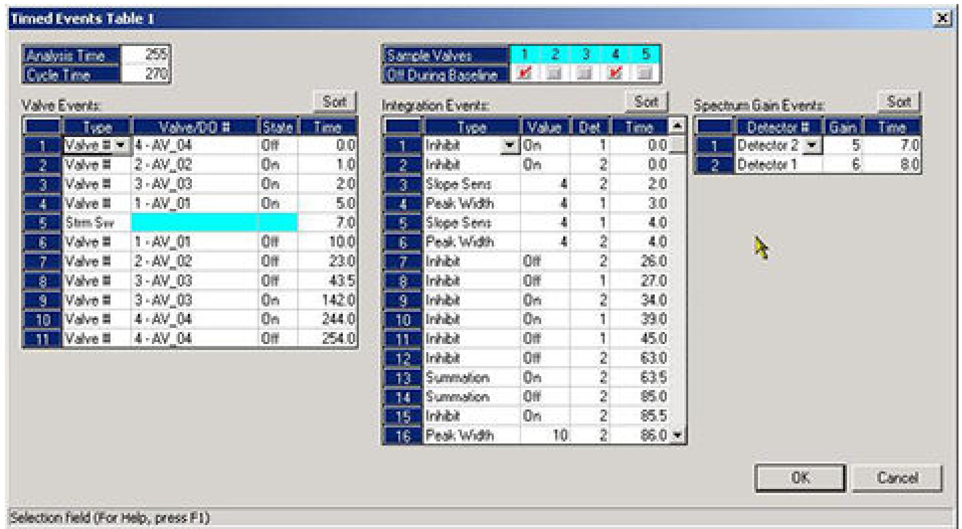
   Or,

   Right-click and use the drop-down menu to modify, add, insert, and delete TEV's via the normal editing procedures.

   MON2000 displays the Timed Events Table dialog.



2. Click the button to save your changes, or press the F8 key.

Note
Save changes and discard changes options are available from the right-click menu.

3. Press the ESC key to discard changes.

6.8.3 Editing Retention Times from CGM Viewer

To edit component retention from the Chromatogram Viewer window,

Procedure

Double-click the left mouse button to edit the retention times from the CGM viewer

Or,

Right-click and use the drop-down menu to modify retention times via the normal editing procedures.

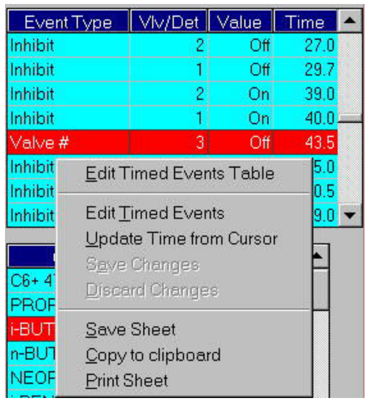
Note
You must access the Component Data Table to add, insert, and delete retention times. Use the *Application*> *Component Data* menu or press the F6 key.

6.8.4 Editing TEVs from Cursor

To update Timed Events from the Chromatogram Viewer using the cursor,

Procedure

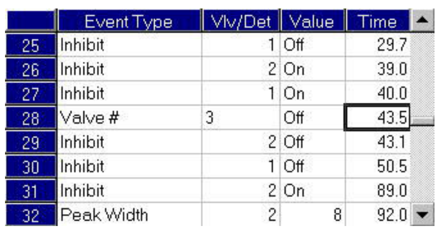
1. Right-click the mouse button, with the mouse pointer hovered over the Event Time legend.



From the pull-down menu, select Update Time from Cursor.

Or,

Press the f9 key. MON2000 displays the message, “Reading GC Data” in the status bar, then actives the TEV Table.



2. Click the button to save your changes, or press the F8 key.

Note
Save changes and discard changes options are available from the right-click menu.

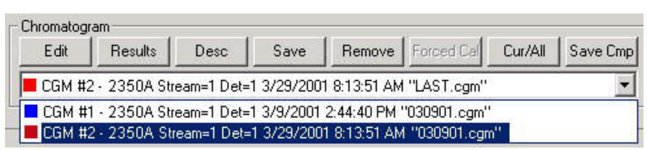
Press the ESC key to discard changes.

6.8.5 Viewing the Chromatogram Results

To read a table of calculation results for a selected chromatogram,

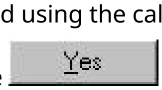
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.

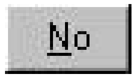


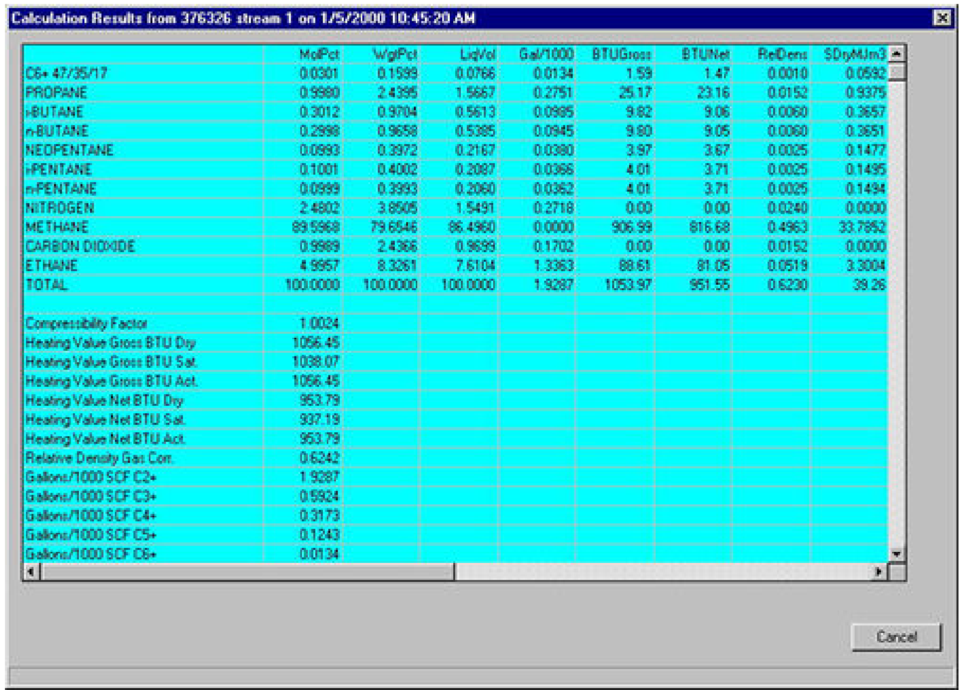
2. Click the 

button. A dialog appears asking if the results should be displayed using the calculation control flags.

3. Click the 

button to display the report using the calculations selected in the *Application>Control* menu.

Click the  button to display the report using ALL calculations.



Calculation Results from 376326 stream 1 on 1/5/2000 10:45:20 AM

	MolPct	WgtPct	LiqVol	Gal/1000	BTUGross	BTUNet	RelDens	SDryMJm3
C6+ 47/35/17	0.0301	0.1599	0.0766	0.0134	1.59	1.47	0.0010	0.0592
PROPANE	0.9980	2.4395	1.5667	0.2751	25.17	23.16	0.0152	0.9375
i-BUTANE	0.3012	0.9704	0.5613	0.0985	9.82	9.06	0.0060	0.3657
n-BUTANE	0.2998	0.9658	0.5385	0.0945	9.80	9.05	0.0060	0.3651
NEOPENTANE	0.0993	0.3972	0.2167	0.0380	3.97	3.67	0.0025	0.1477
i-PENTANE	0.1001	0.4002	0.2087	0.0366	4.01	3.71	0.0025	0.1495
n-PENTANE	0.0999	0.3993	0.2060	0.0362	4.01	3.71	0.0025	0.1494
NITROGEN	2.4802	3.8505	1.5491	0.2718	0.00	0.00	0.0240	0.0000
METHANE	89.5968	79.6546	86.4960	0.0000	906.99	816.68	0.4963	33.7852
CARBON DIOXIDE	0.9989	2.4366	0.9699	0.1702	0.00	0.00	0.0152	0.0000
ETHANE	4.9957	8.3261	7.6104	1.3363	88.61	81.05	0.0519	3.3004
TOTAL	100.0000	100.0000	100.0000	1.9287	1053.97	951.55	0.6230	39.26
Compressibility Factor	1.0024							
Heating Value Gross BTU Dry	1056.45							
Heating Value Gross BTU Sat.	1038.07							
Heating Value Gross BTU Act.	1056.45							
Heating Value Net BTU Dry	953.79							
Heating Value Net BTU Sat.	937.19							
Heating Value Net BTU Act.	953.79							
Relative Density Gas Corr.	0.6242							
Gallons/1000 SCF C2+	1.9287							
Gallons/1000 SCF C3+	0.5924							
Gallons/1000 SCF C4+	0.3173							
Gallons/1000 SCF C5+	0.1243							
Gallons/1000 SCF C6+	0.0134							

Cancel

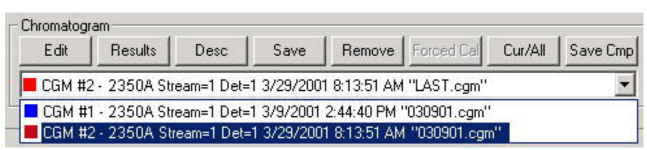
Click the  button to return to the Chromatogram Viewer dialog.

6.8.6 Entering a Description

To enter a description for the selected chromatogram,

Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the  button.

   The Edit Description dialog appears.

3. Type the desired statement(s).
4. Press the ENTER key to accept this description.

   Use the  button or press the esc key to exit this dialog without accepting your entry.

5. Click the 

button to save this description with the chromatogram file.

6.8.7 Forcing a Calibration

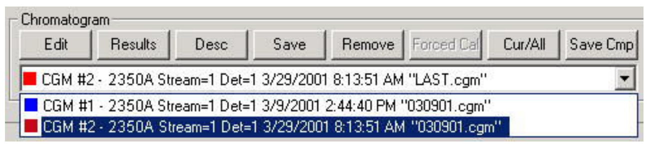
Use the Forced Cal function to calibrate the GC, using the raw data and stream number for the selected GC Archive chromatogram. The results are stored in the CDT under the corresponding stream number.

Note
The selected GC Archive chromatogram must be from a good calibration gas run.

To perform a forced calibration,

Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

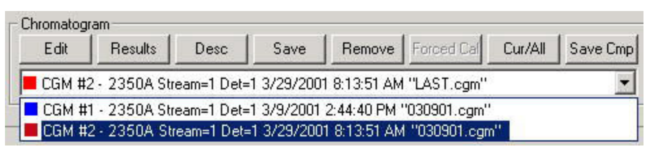
button.

6.8.8 Toggling TEVs and CGM Components

To toggle the display of the TEV and CGM Component speadsheets,

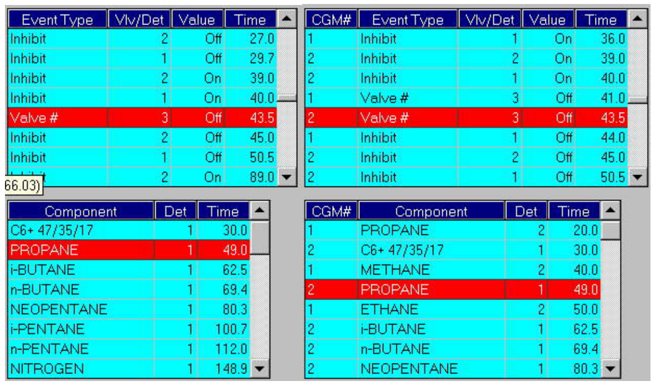
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

button. If multiple CGMs are displayed in the graph area, the 'CUR/ALL' button toggles between showing all TEVs and all components for all CGMS to showing only the TEVs and components for the currently selected stream.
3. MON2000 toggles the display of the TEVs and Components spreadsheets and the CGM view.

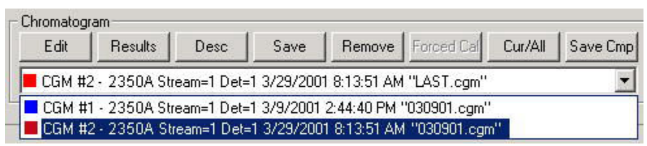


6.9 Viewing Baseline Data

Use the Baseline function to display the retention times and baselines for the selected chromatogram.

Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

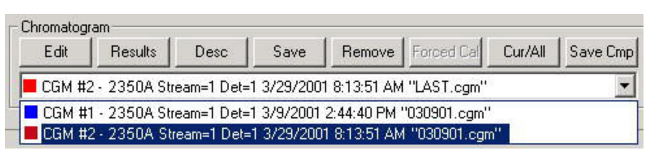
button. This removes the integration lines from a displayed Archive CGM.
3. MON2000 displays a plot of the baseline values, and lists the corresponding retention times in the legend table.

6.10 Viewing RAW Data

Use the Raw Data function to display the Raw Data Table for the selected chromatogram.

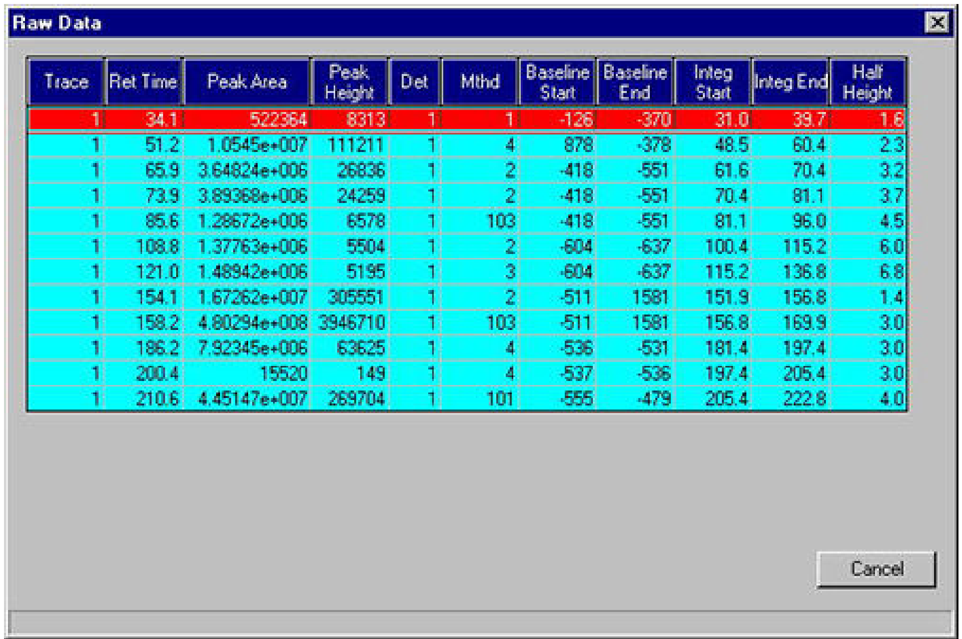
Procedure

1. Use the Chromatogram pull-down menu to select a specific chromatogram.



2. Click the 

button. The Raw Data dialog displays and shows the raw data for all CGMs in the graph area.



Trace	Ret Time	Peak Area	Peak Height	Det	Mthd	Baseline Start	Baseline End	Integ Start	Integ End	Half Height
1	34.1	522364	8313	1	1	-126	-370	31.0	39.7	1.6
1	51.2	1.0545e+007	111211	1	4	878	-378	48.5	60.4	2.3
1	65.9	3.64824e+006	26836	1	2	-418	-551	61.6	70.4	3.2
1	73.9	3.89368e+006	24259	1	2	-418	-551	70.4	81.1	3.7
1	85.6	1.28672e+006	6578	1	103	-418	-551	81.1	96.0	4.5
1	108.8	1.37763e+006	5504	1	2	-604	-637	100.4	115.2	6.0
1	121.0	1.48942e+006	5195	1	3	-604	-637	115.2	136.8	6.8
1	154.1	1.67262e+007	305551	1	2	-511	1581	151.9	156.8	1.4
1	158.2	4.80294e+008	3946710	1	103	-511	1581	156.8	169.9	3.0
1	186.2	7.92345e+006	63625	1	4	-536	-531	181.4	197.4	3.0
1	200.4	15520	149	1	4	-537	-536	197.4	205.4	3.0
1	210.6	4.45147e+007	269704	1	101	-555	-479	205.4	222.8	4.0

3. Click the Cancel button to return to the Chromatogram Viewer dialog.

6.11 Display Options

Right-click the graph area to access these options, or use the corresponding keystroke(s). Options are listed in alphabetical order.

See Table 1-1 for a complete listing of option names, descriptions, and keystroke sequences.

Keystroke	Right-Click Option	Description
CTRL C	Copy to clipboard	allows you to copy this graph to another application such as MSWord or Excel
F8	Cursor to nearest point	snap cursor to nearest point in both the X and Y directions
CTRL V	Paste from clipboard	allows you to plot a range of points from another application such as MSWord or Excel
CTRL P	Print Graph Area	print currently displayed chromatograph area
CTRL S	Print Series All	print all displayed chromatograms
HOME	Restore State	restore last saved display settings for Live or Archived for the selected chromatogram
CTRL HOME	Save State	save current or archived display settings for the selected chromatogram
F4	Toggle Coarse/Fine	toggle cursor from coarse (less accurate) to fine (more accurate)
F9	Toggle Lines/Dots	toggle graph from line(s) to dots
CTRL F4	Toggle Mouse Position Tip	graph cursor follows movement of mouse while tooltip displays exact coordinates of the current point

Keystroke	Right-Click Option	Description
CTRL F9	Toggle Nearest Point Tip	graph cursor follows movement of mouse cursor
NUM +	Zoom In	zoom in on entire graph
NUM –	Zoom Out	zoom out from entire graph
NUM →	Zoom X In	zoom in on X axis
NUM ←	Zoom X Out	zoom out from X axis
NUM ↑	Zoom Y In	zoom in on Y axis
NUM ↓	Zoom Y Out	zoom out from Y axis

7 Reports

The options listed in the Reports menu enable you to display, print, or store various pre-configured GC reports.

See the following sections for more information on specific reports and related functions.

7.1 Report Display

This function allows you to immediately display, print, or store preconfigured reports on GC analysis data. Data is reported either real-time from the GC unit or from previously stored files.

Note
You must be currently online with the desired GC unit to generate a report from the controller.

7.1.1 View Report from Live Data

To display a report with live data from the GC unit,

Procedure

1. Use the *Reports* > *Report Display* menu to access this function.

2. The Report Display dialog appears, per GC type.

Figure 7-1: Report Display dialog for 2350A GC Controllers

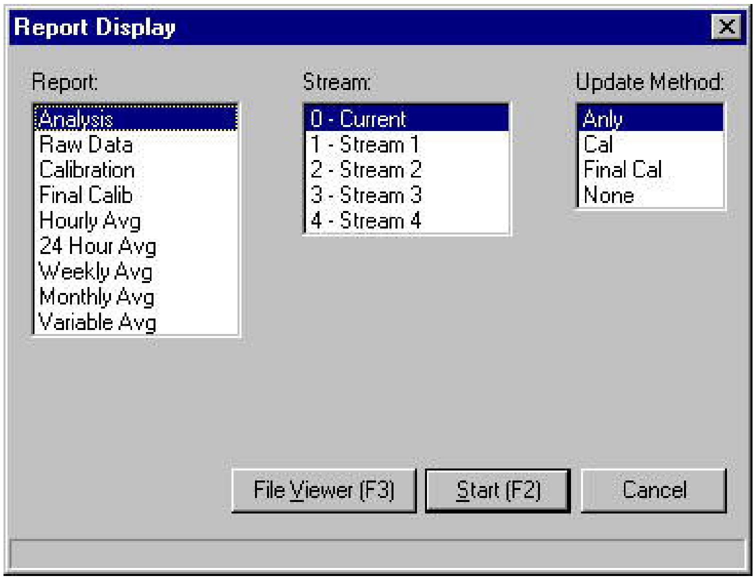
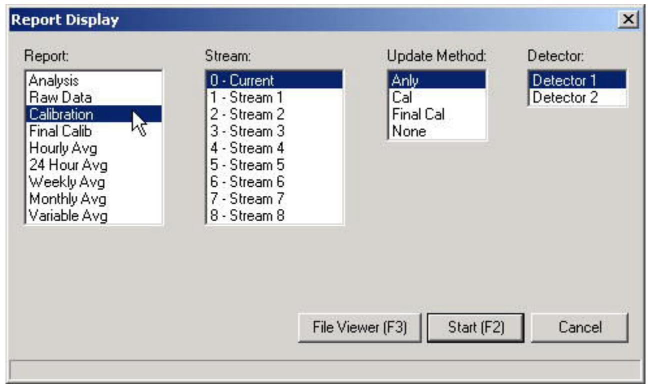


Figure 7-2: Report Display dialog for Model 700 GC



3. Select the report type, stream, and update setting from the lists provided.

Table 7-1: Description of Report Display Settings

Setting	Description
Reports	list of pre-defined reports; Shows report type (Analysis, Raw Data, Calibration, etc...)
Select Stream	list of available streams For a single detector GC: 0–Current = last stream analyzed For a dual detector GC: 0–Current Det1 = last stream analyzed, Detector 1 0–Current Det2 = last stream analyzed, Detector 2
Update Method	list of update options that determine when the report display is refreshed Anly = after each analysis Cal = after each calibration Fcal = after each final calibration None = not updated

Note

The contents of the GC analysis reports are defined by the GC application as well as by functions such as Calculations, User Defined, Limit Alarms, and Streams.

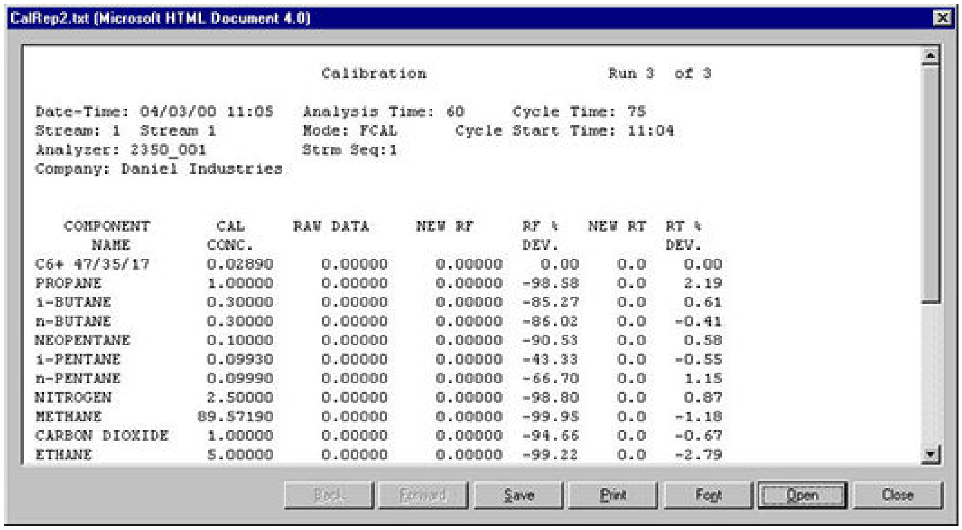
4. Click the 

button or press the f2 key to generate and display the selected report.

   To close this dialog without generating a report, click the 

button to return to the main window.

5. MON2000 generates the report, per your specifications, and displays the results in the File Viewer dialog.



MON2000 creates a temporary HTML file to display the generated report. If you want to save this report to disk, Save Report to Disk.

Note

The display refreshes per the update setting configured in the Report Display dialog (MON2000 Printer Control).

For example, in the Report Display dialog, if Stream is set to “0–Current” and Update is set to “Anly”, the report display will refresh after the GC analyzes the stream selected via the Report Display dialog.

The refresh function displays the newly generated report and deletes the previous report (unless already saved to disk).

Check the GC status bar for the run time and current stream.

Use the scroll bars to see other areas of the report. Use the 

button to increase or decrease the font size displayed.

See the following sections for instructions printing the displayed file or opening other report files from disk.

6. Click the 

button or press the esc key to exit this function and return to the Report Display dialog.

7.1.2 View Report from File

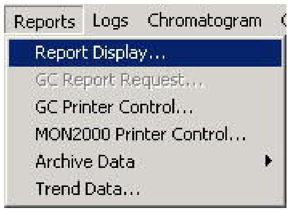
Note

MicroSoft Internet Explorer 5.0 (or later) is required to view a report file in HTML format.

To open a report file for viewing,

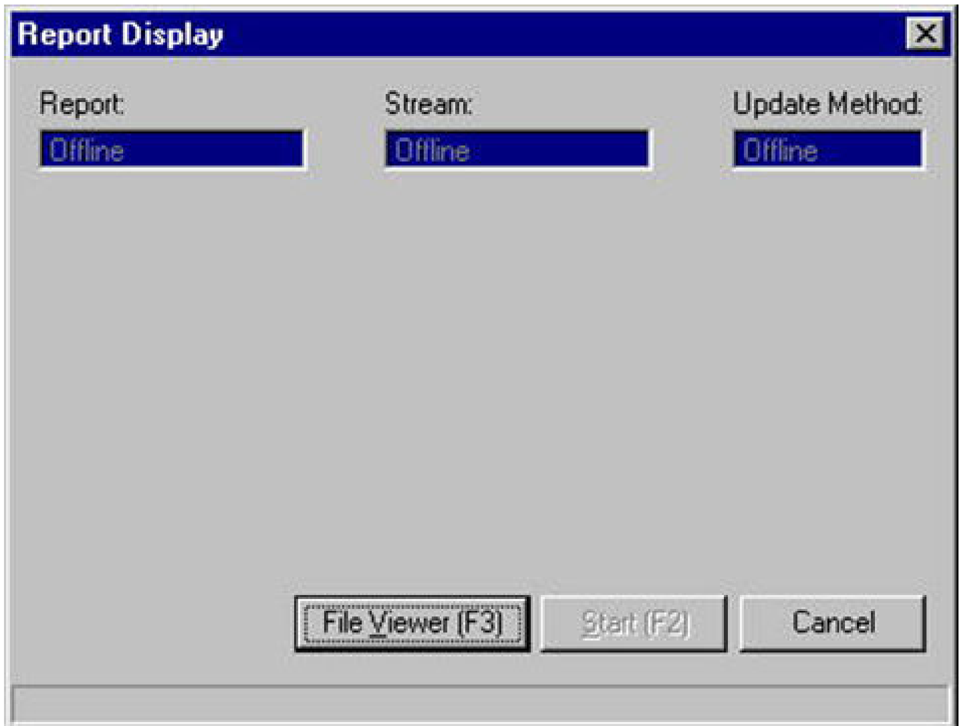
Procedure

1. Use the *Reports* > *Report Display* menu to access this function.



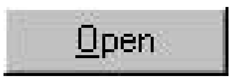
2. The Report Display dialog appears.

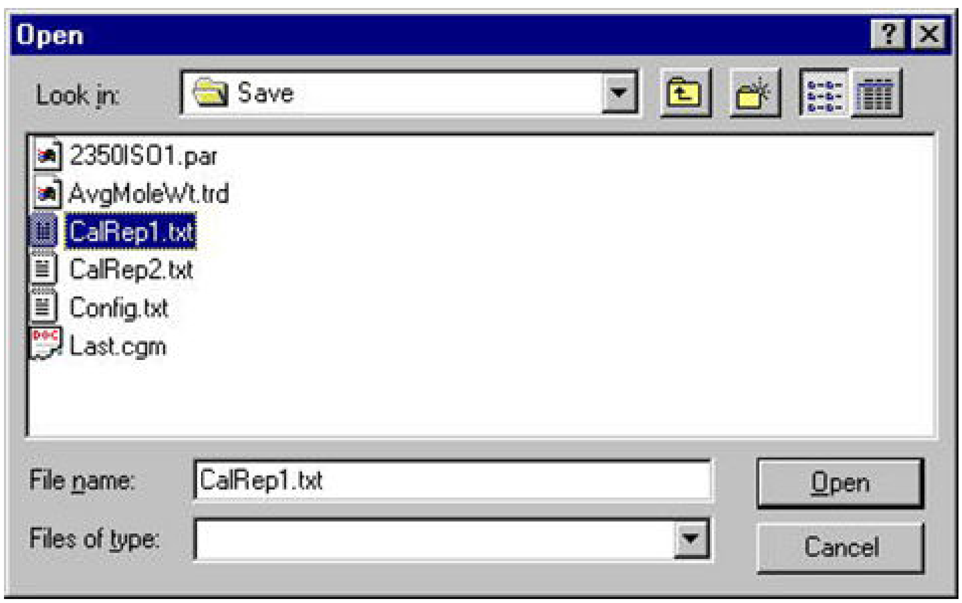
   If you are working in off-line mode, the Report Display dialog will appear blank.

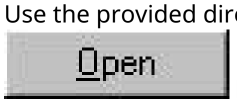


3. Click the 

button or press the F3 key to access the File Viewer dialog.

4. Click the  button. The Open dialog appears.



5. Use the provided directory tree to select the desired report file. Click the  button.

Note
By default, the Open dialog displays the c:\GC\Save directory.

6. MON2000 opens the file and displays it in the File Viewer dialog.

Use the scroll bars to see other areas of the report. Use the  button to increase or decrease the font size displayed.

Use the Back and Forward buttons to browse through multiple report files.

7. Click the Close button or press the esc key to return to the Report Display dialog.

7.1.3 Print Report

To print a report,

Note
The refresh function displays a newly generated report and deletes the currently displayed report (View Report from Live Data for details). You should print or save the current report immediately after it is displayed.

Procedure

1. Display a live report or open a report file from disk. View Report from Live Data or View Report from File for details.
2. Click the Print button.
3. MON2000 prints the report to your configured printer (Configuring Your Printer).

7.1.4 Save Report to Disk

To save a report to disk,

Procedure

1. Display a live report or open a report file from disk.

   View Report from Live Data or View Report from File for details.

2. Click the Save button. The Save HTML Document dialog appears.

   Note
   MicroSoft Internet Explorer 5.0 (or later) is required to view a report file in HTML format.

3. Select the directory in which you want to save this report and type the desired name.

   Note
   You can save the report in any of these formats: .txt (ASCII Tab-delimited), .cvs (Comma-deliminted), .xls (Excel), .htm (HTML), .xml (EXtensible Markup Language).

   Note that the default location is `c:\GC\Save`.

4. Click the Save button.

7.1.5 Report Contents

This section includes examples of the following reports: Analysis, Raw Data, Calibration, 24-Hour Average, Weekly Average, Hourly Average, and Variable Average. After each sample report, a table describes the contents and identifies which functions affect the data.

Each report contains the header information, including:

Content	Related Function(s)	Menu	Section
Date-Time	standard GC application	n/a	n/a
Analysis Time	Timed Events Table (TEV)	Application > Timed Events [F5]	Timed Events
Cycle Time	TEV	Application > Timed Events [F5]	Timed Events
Stream	Report Display, Select Stream Stream Name	Reports > Report Display Application > Streams	Report Display Streams
Mode	standard GC application	n/a	n/a
Cycle Start Time	standard GC application	n/a	n/a
Analyzer	System, Analyzer Name	Application > System	System
Strm Seq	System, Stream Sequence	Application > System	System
Report Header (optional)	User Defined, Text Strings	Application > User Defined > Text Strings	Text Strings

Analysis Report

```
Date-Time: 03/24/95 12:24  Analysis Time:   225  Cycle Time:   240
Stream: 3   Stream 3        Mode: ANLY      Cycle Start Time: 12:20
Analyzer: AT401STD          Strm Seq:1,2,3,4,5,6,7,8
Company: Daniel Industries, Houston, TX

   Component          Mole    Weight    LiqVol  Gallons/   BTU      BTU    Relative
     Name           Percent  Percent   Percent 1000 SCF   Gross    Net     Density
C6+ 47/35/17         0.0187   0.1076   0.0488   0.0083     0.99     0.92   0.0006
PROPANE              0.4922   1.3011   0.7918   0.1364    12.41    11.42   0.0075
i-BUTANE             0.0998   0.3477   0.1906   0.0326     3.25     3.00   0.0020
n-BUTANE             0.1017   0.3543   0.1872   0.0321     3.33     3.07   0.0020
NEOPENTANE           0.0493   0.2132   0.1102   0.0189     1.97     1.82   0.0012
i-PENTANE            0.0500   0.2162   0.1068   0.0183     2.01     1.85   0.0012
n-PENTANE            0.0502   0.2171   0.1062   0.0182     2.02     1.87   0.0013
NITROGEN             0.5624   0.9443   0.3599   0.0616     0.00     0.00   0.0054
METHANE             97.1656  93.4236  96.1229  16.4696   983.61   885.66   0.5382
CARBON DIOXIDE       0.3987   1.0518   0.3967   0.0679     0.00     0.00   0.0061
ETHANE               1.0114   1.8230   1.5789   0.2706    17.94    16.41   0.0105
TOTALS             100.0000 100.0000 100.0000   0.6649  1027.52   926.02   0.5761

'*' indicates user-defined components

 Compressibility Factor (1/Z) @ 14.730 PSIA &  60.0 DEG. F = 1.0021

Base Pressures                  14.730    15.550
-----------------------------------    --------
Gross Dry BTU               =  1029.67   1086.99  Corrected/Z
Gross SAT BTU               =  1011.75   1068.08  Corrected/Z
Actual Gross BTU            =  1029.67   1086.99  Corrected/Z
Net Dry BTU                 =   927.96    979.62  Corrected/Z
Net SAT BTU                 =   911.81    962.57  Corrected/Z
Actual Net BTU              =   927.96    979.62  Corrected/Z
Total GPM C2+               =   0.6649    0.7020
Total GPM C3+               =   0.3328    0.3513
Total GPM C4+               =   0.1284    0.1356
Real Relative Density Gas   =   0.5771
Real Relative Density Lqd   =   0.3087
WOBBE                       =  1331.89
Gas Density                 =   44.143 lb/1000 cu.ft. at 14.73 PSIA and 60 Deg.F
Liquid Density              =    2.572 lb/gal
Reid Vapor Pressure         =  4867.46 PSIA

User Defined Calculations
     Label                Value
test                        0.10
ACTIVE ALARMS
```

Content	Related Function(s)	Menu	Section
Component Name	Component Data Table (CDT)	Application > Component Data [F6]	Component Data
GC Analysis Data variables (std)	Calculations, Control	Application > Calculations > Control	Control
GC Analysis Data variables (user)	Calculations, User Defined	Application > Calculations > User Defined	User Defined
Alarms	Limit Alarms	Application > Limit Alarms	Limit Alarms
Additional Base Pressures	Compress(ibility) enabled Streams, Optional Pressure	Application > Calculations > Control Application > Streams	Control Streams

Raw Data Report

```
Date-Time: 03/24/95 12:24  Analysis Time: 225    Cycle Time: 240
Stream: 3   Stream 3         Mode: ANLY      Cycle Start Time: 12:20
Analyzer:  AT401STD          Strm Seq: 1,2,3,4,5,6,7,8
Company: Daniel Industries, Houston, TX

No. RETENTION      PEAK          PEAK       DET MTHD  INTEGRATION   Peak Width
      TIME         AREA         HEIGHT                START   END   Half Height
1         25.7          1640.           44.   1    2    24.0   26.5    0.7
2         29.0         24864.          409.   1    3    26.5   33.6    1.4
3         48.8  3.66064e+005          4707.   1    4    46.4   56.8    1.8
4         63.5         86164.          792.   1    2    59.5   68.0    2.5
5         71.5         90836.          737.   1    2    68.0   78.1    2.9
6         82.6         45000.          299.   1    3    78.1   90.3    3.6
7        105.7         49350.          261.   1    2    99.2  112.3    4.5
8        117.8         50382.          244.   1    3   112.3  127.7    4.9
9        145.6   2.4774e+005          4635.   1    2   142.9  148.6    1.3
10       150.1  3.50245e+007  3.2258e+005   1    3   148.6  167.8    2.7
11       177.6   2.0876e+005          1804.   1    1   173.1  189.4    2.8
12       203.6  5.87488e+005          3868.   1    1   196.6  215.6    3.7
```

Content	Related Function(s)	Menu	Section
Retention Time Peak Area Peak Height Det(ector) Integration Start/End Peak Width 1/2 Height	standard GC application	n/a	n/a
Mthd (method)	standard GC application, peak derivation method (non-edit)	Chromatogram Viewer	From Online GC

Calibration Report

```
                              Calibration                  Run 1   of 1

Date-Time: 03/24/95 12:28   Analysis Time: 225    Cycle Time: 240
Stream: 4   Stream 4          Mode: ANLY      Cycle Start Time: 12:24
Analyzer: AT401STD            Strm Seq:1,2,3,4,5,6,7,8
Company: Daniel Industries, Houston, TX

   COMPONENT        CAL      RAW DATA      NEW RF       RF %    NEW RT   RT %
      NAME         CONC.                                DEV.             DEV.
C6+ 47/35/17       0.02000 24840.00000  1.242e+006    -9.07     29.0    0.35
PROPANE            0.50000  3.66212e+5  7.32424e+5    -4.24     48.8    0.00
i-BUTANE           0.10000 86320.00000  8.632e+005    -2.76     63.5   -0.31
n-BUTANE           0.10000 90784.00000   9.0784e+5    -1.16     71.5   -0.28
NEOPENTANE         0.05000 45084.00000   9.0168e+5    -3.90     82.6   -0.36
i-PENTANE          0.05000 48978.00000   9.7956e+5    -3.46    105.7   -0.56
n-PENTANE          0.05000 50064.00000  1.00128e+6    -2.99    117.8   -0.76
NITROGEN           0.60000   2.4768e+5  4.128e+005    -8.88    145.6    0.00
METHANE           97.13000  3.50394e+7  3.60747e+5    -2.69    150.1   -0.20
CARBON DIOXIDE     0.40000  2.09216e+5   5.2304e+5    -2.88    177.6   -0.17
ETHANE             1.00000  5.88496e+5  5.88496e+5    -1.49    203.6    0.25

ACTIVE ALARMS
```

Content	Related Function(s)	Menu	Section
Component Name Cal. Conc.	CDT	Application > Component Data [F6]	Component Data

Content	Related Function(s)	Menu	Section
Raw Data New RF RF % Dev. New RT RT % Dev.	CDT (additional columns)	Application > Component Data [F6]	Component Data
Alarms	Limit Alarms	Application > Limit Alarms	Limit Alarms

Note
Streams used for analysis display “0”s in the calibration raw data columns (Streams)

Final Calibration Report

```
Date-Time: 03/24/95 12:28   Analysis Time: 225    Cycle Time: 240
Stream: 4   Stream 4        MODE:  ANLY     Cycle Start Time: 12:24
Analyzer: AT401STD          Strm Seq:1,2,3,4,5,6,7,8
Company: Daniel Industries, Houston, TX

   Component        Cal      Old RF       New RF     * RF %  Old RT New RT * RT %
     Name          Conc.                               DEV.                  DEV.
C6+ 47/35/17      0.03000  1.92126e+6  1.91453e+6  * -0.35   34.3   34.3 * -0.15
PROPANE           1.00300  1.11689e+6  1.11696e+6  *  0.01   50.8   50.8 *  0.00
i-BUTANE          0.30100  1.28687e+6  1.28641e+6  * -0.04   65.8   65.8 *  0.00
n-BUTANE          0.30200  1.32258e+6  1.32091e+6  * -0.13   73.5   73.4 * -0.07
NEOPENTANE        0.10000  1.39596e+6  1.39382e+6  * -0.15   86.0   86.0 *  0.06
i-PENTANE         0.09990   1.4712e+6  1.47663e+6  *  0.37  108.3  108.3 *  0.00
n-PENTANE         0.10000  1.51914e+6  1.52511e+6  *  0.39  120.2  120.2 *  0.00
NITROGEN          2.44300 726661.0000 726170.0000  * -0.07  145.1  145.1 *  0.00
METHANE          89.61810 585512.0000 585221.0000  * -0.05  149.4  149.4 *  0.00
CARBON DIOXIDE    1.00400 861074.0000 861836.0000  *  0.09  179.9  179.9 *  0.00
ETHANE            4.99900 953873.0000 953929.0000  *  0.01  207.2  207.1 * -0.02

ACTIVE ALARMS
```

Content	Related Function(s)	Menu	Section
Component Name Cal. Conc.	CDT	Application > Component Data [F6]	Component Data
Old RF New RF RF % Dev. Old RT New RT RT % Dev.	standard GC application results of final calibration, adjustments to response factors (RFs) and retention times (RTs) CDT (additional columns)	Application > Component Data [F6]	Component Data
Alarms	Limit Alarms	Application > Limit Alarms	Limit Alarms

Note
Report items marked with an asterisk (*) were updated during calibration.

Average Reports

There are five types of Average Reports:

- Hourly Average Report

- 24-Hour Average Report
- Weekly Average Report
- Monthly Average Report
- Variable Average Report

Sample 24-Hour Average Report

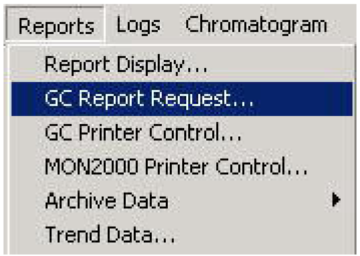
```
24 Hour Averages from Mon Apr 03 10:50:58 1995 Analyzer: AT401STD
 Company: Daniel Industries, Houston, TX

1   Mole Percent                S: 1 Stream 1     C: 1 C6+ 47/35/17
  Start: Mon Apr 03 06:00:00 1995 Stop: Tue Apr 04 06:00:00 1995
                               Average       Minimum       Maximum   Samples
  Current                       10.03610       2.25780      23.63960     8
  1 Mon Apr 03 06:00:00 1995     0.20443       0.01870       2.43300    37
  2 Sun Apr 02 07:00:00 1995     0.01918       0.01900       0.01940    39
  3 Sat Apr 01 06:00:00 1995     0.01918       0.01900       0.01940    38
2   Mole Percent                S: 1 Stream 1     C: 2 PROPANE
  Start: Mon Apr 03 06:00:00 1995 Stop: Tue Apr 04 06:00:00 1995
                               Average       Minimum       Maximum   Samples
  Current                        0.00000       0.00000       0.00000     8
  1 Mon Apr 03 06:00:00 1995     3.74130       0.00000       4.79480    37
  2 Sun Apr 02 07:00:00 1995     4.78225       4.77260       4.79290    39
  3 Sat Apr 01 06:00:00 1995     4.78240       4.77300       4.78990    3824
•
•
•
13  Net Heating Value (Dry)     S: 1 Stream 1
  Start: Mon Apr 03 06:00:00 1995 Stop: Tue Apr 04 06:00:00 1995
                               Average       Minimum       Maximum   Samples
  Current                     2551.31000    1403.71000    4175.43000     8
  1 Mon Apr 03 06:00:00 1995  1024.18000     906.22600    1647.33000    37
  2 Sun Apr 02 07:00:00 1995   988.18100     988.03000     988.36700    39
  3 Sat Apr 01 06:00:00 1995   988.18600     988.03300     988.30000    38
```

Content	Related Function(s)	Menu	Section
Item Number Analysis data/ calculation Stream Component	Calculations, Averages	Application > Calculations > Averages	Averages
Old RF New RF RF % Dev. Old RT New RT RT % Dev.	standard GC application results of ongoing or completed averages	n/a	n/a

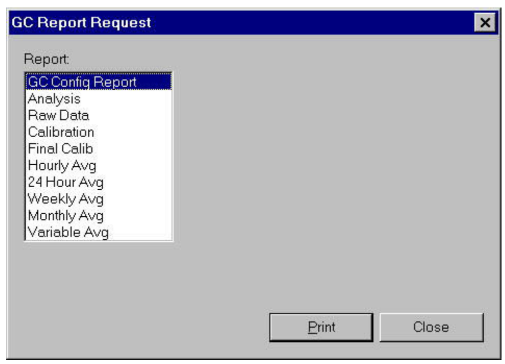
7.2 GC Report Request

This function allows you to send a report to a printer connected to the GC Controller.



Procedure

1. Use the *Reports* > *GC Report Request* menu to access this function.
2. The GC Report Request dialog appears.



3. Select the report you wish to print.

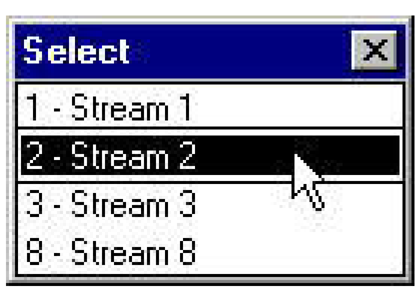
   The GC Config Report is a snapshot of the PC Config Report. Contents include:

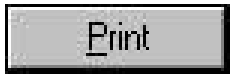
   - current alarms
   - streams
   - control calculations
   - CDTs
   - TEVs
   - GC serial port settings
   - analog outputs

   See PC Config Report for a sample PC Config Report.

   For reports other than the GC Config, a Streams list displays.

   Double-click the appropriate stream and the controller sends the report to the printer.

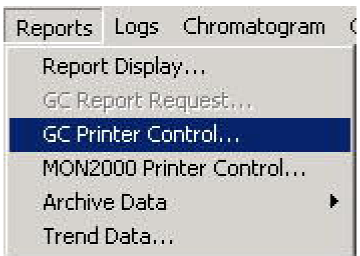


Click the  button. Double-click the appropriate stream and the print process begins.

Click the  button to abort and return to the main window.

7.3 GC Printer Control

This function allows you to define schedules for automatic printing of standard GC reports to a printer connected to the GC Controller.



Procedure

1. Use the *Reports* > *GC Printer Control* menu to access this function.
   The GC Printer Control dialog displays.
2. Use the provided data fields, check and combo boxes to select the desired settings. See Table 1-8 for detailed descriptions.

   Note
   You can, for example, set a report to print after each analysis and every 12 hours.

3. Click the  button to accept your selections and return to the main window.

   Click the  button to abort and return to the main window.

Setting	Description
Anly	Enables/disables report printing after each analysis run regardless of report type selected.
Cal	Enables/disables report printing after each calibration run regardless of report type selected.
FCal	Enable/disable report printing after every final calibration run regardless of report type selected.
Time	Time at which report should print at 24-hour intervals. To disable this feature, set Time to **00:00** or **12:00 AM**. The Time setting overrides the Hours setting and only applies to streams that are enabled (i.e., checked ON) for report printing.

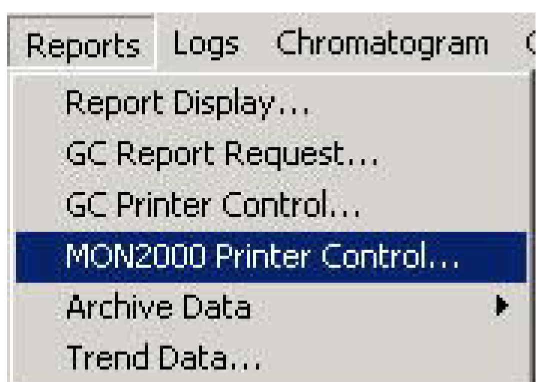
Setting	Description
Hours	hour interval at report should print Use this setting for intervals less than 24 hours. For example, use this setting if you wish to print a report every 8 hours. Ensure that the Time value is "00:00" to disable the 24-hour setting or "12:00 AM" to disable the 12-hour setting. This setting only applies to streams enabled (i.e., checked ON) for report printing.
Avg	average type to be used in the report calculations; calculations are dependent on settings in the Averages Calculations dialog (Averages) • No = disabled • Hr = hourly avg • 24 = 24-hour avg • Wk = weekly avg • Mn = monthly avg • Var = variable avg
<numbered columns>	streams to be used for data collection when the report is generated
Form Feed	enable/disable manual paper feed feature of printer
Alarm Logging	enable/disable real-time printing of alarms as they occur
Event Logging	enable/disable real-time printing of events as they occur

7.4 MON2000 Printer Control

This function allows you to define schedules for automatic printing of standard GC reports to a printer connected to your PC. Configuring Your Printer to configure the printer settings. The user must be on-line (connected to the controller) using either a serial port direct connection, modem or Ethernet card in order to print from the MON2000 printer.

Procedure

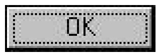
1. Use the *Reports* > ***MON2000*** PrinterControl menu to access this function.



The Printer Control dialog displays.

2. Use the provided data fields, check and combo boxes to select the desired settings. See Table 1-9 for detailed descriptions.

Note
You can, for example, set a report to print after each analysis and every 12 hours. Each report generation interrupts all current functions.

3. Click the 

button to accept your selections and return to the main window.

Click the 

button to abort and return to the main window.

Setting	Description
Anly	enable/disable report printing after each analysis run regardless of report type selected
Cal	enable/disable report printing after each calibration run regardless of report type selected
FCal	enable/disable report printing after every final calibration run regardless of report type selected
Time	time at which report should print (every 24 hours) 00:00 = disables 24-hour setting 12:00 AM = disables 12-hour setting Note that the Time setting will override the Hours setting.
Hours	hour interval at report should print Use this setting for intervals less than 24 hours. For example, use this setting if you wish to print a report every 8 hours. Ensure that the Time value is “00:00” to disable the 24-hour setting or “12:00 AM” to disable the 12-hour setting.
Avg	average type to be used in the report calculations; calculations are dependent on settings in the Averages Calculations dialog (Averages) No = disabled Hr = hourly avg 24 = 24-hour avg Wk = weekly avg Mn = monthly avg Var = variable avg
<numbered columns>	streams to be used for data collection when the report is generated
Form Feed	enable/disable manual paper feed feature of printer

7.5 Archive Data

This function enables you to view, print, or save various reports and records stored in the GC memory for the Model 500 and Model 700 analyzers. You can also reset (i.e., delete) the stored records from the GC memory.

The standard GC application can store up to ninety-nine days of analysis runs and calibration records.

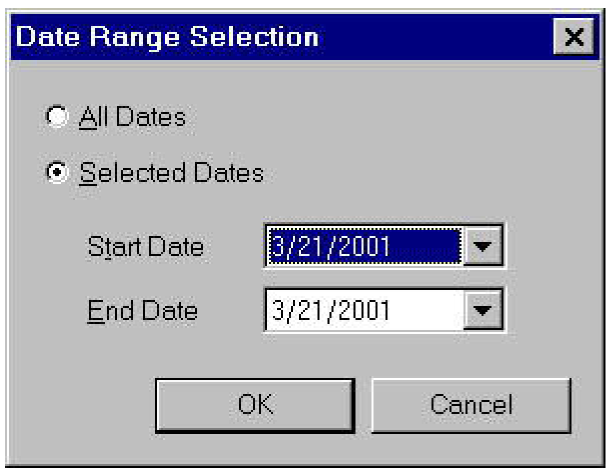
7.5.1 View Data Model 500/MON2000

To view, print, copy or save archived data,

Procedure

1. Use the *Reports* > *Archive Data* > *View Data* menu to access this function.

2. MON2000 displays the Date Range Selection pop-up dialog.



   Select All Dates radio button or choose Selected Dates. Select the Start date and End Date (date range) for the report to be archived.

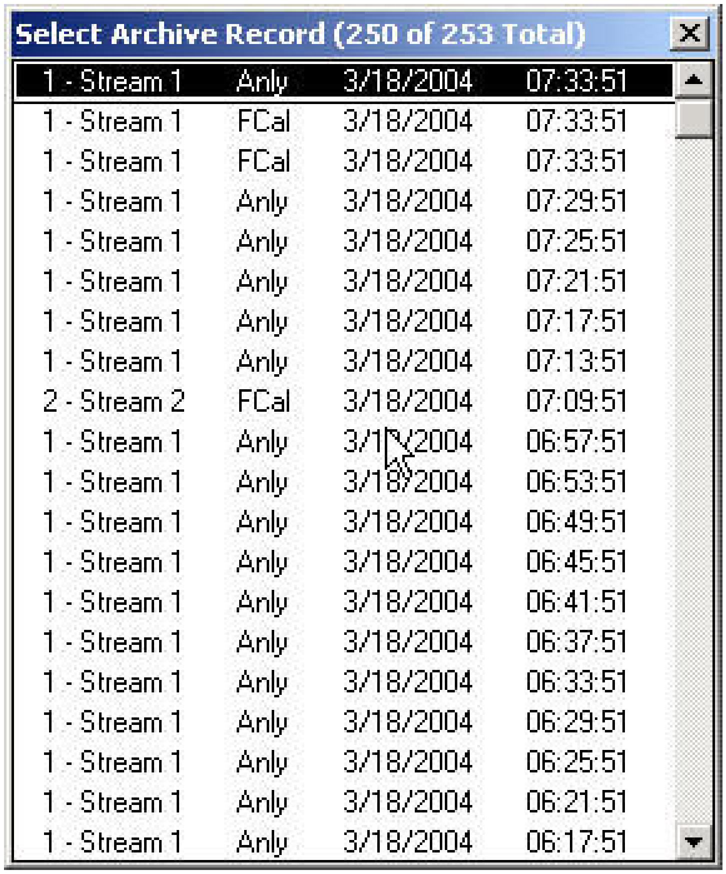
3. Click the  button to apply your selection.

   Or,

   Click the  button to return to the View Data window.

   MON2000 displays the message “Reading GC Data” in the status bar.

4. The Select Archive Record dialog appears.



Double-click the desired archived report or record. (If no records are found, an information dialog displays.) Select a range (multiple) of records to archive by left-clicking the mouse at the beginning record and dragging the pointer to the last record to be archived. Then, press the ENTER key.

Or,

Left-click the mouse pointer on the beginning record, then move the mouse pointer to another location (either further up or down the list) and while holding down the Shift key, click the ending record. All highlighted records will be automatically selected. Press the Enter key to display all of the selected records.

Note
MON2000 limits the number of viewable Archived Records to 100.

5. The Calculation Results from Ext. Modbus window appears.

   Use the ✕ button or press the esc key to exit this function and return to the main window.

   As applicable, use the scroll bars to see other areas of the record.

6. To print, copy to the clipboard, or save the report to disk, right-click the Archive Data sheet and select the desired option from the popup menu.

   Or, use the Print, Clipboard or Save buttons for these functions.

   Use the Save File dialog to choose the directory location and file name.

Note
You can save the report in any of these formats: .txt (ASCII Tab-delimited), .cvs (Comma-deliminted), .xls (Excel), .htm (HTML), .xml (EXtensible Markup Language).

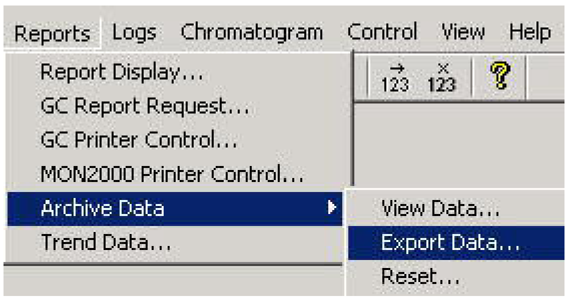
7. Click the 

button to return to the main window.

7.5.2 Archive Export Data

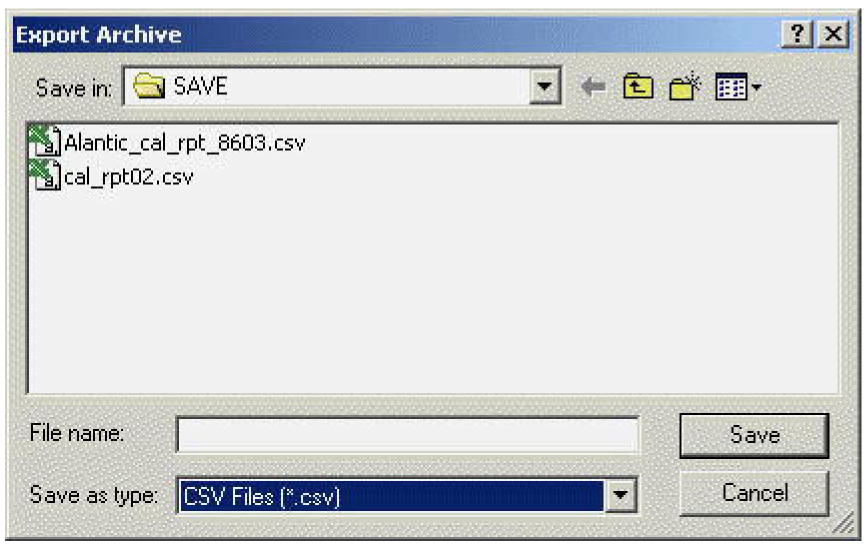
Use this function to export data files for review at a later time.

From the *Reports>Archive Data>Export Data* menu,

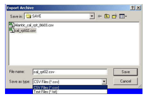


Procedure

1. Click Export Data and the Export Archive window displays.



2. The exported data file is saved in the default (GC>Directory). Use the pull-down menu to save the data file to a different directory.
3. Click an existing file (to write over an existing file) or enter a 'new' file name in the 'Data Field'.
4. Save the file as either:
   - .csv (spreadsheet application format)
   - .txt (Word Pad or Note Pad application format)



If the GC you are using is a Model 2350A, the Data Selection Range' dialog appears. Choose the date range as:

Figure 7-3: Default Settings

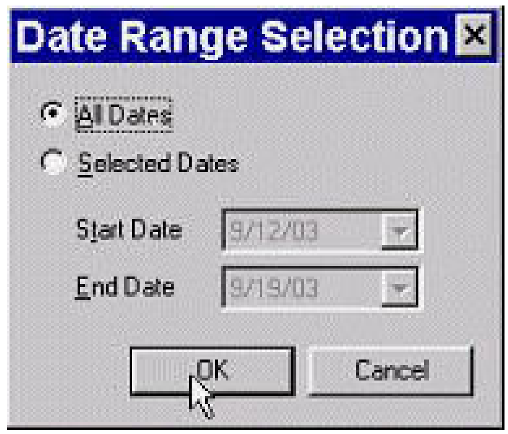
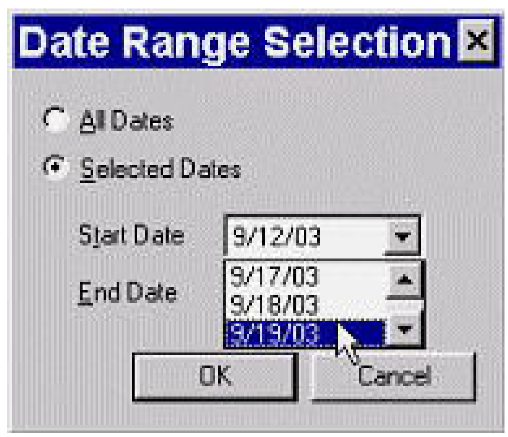


Figure 7-4: Date Range Selection



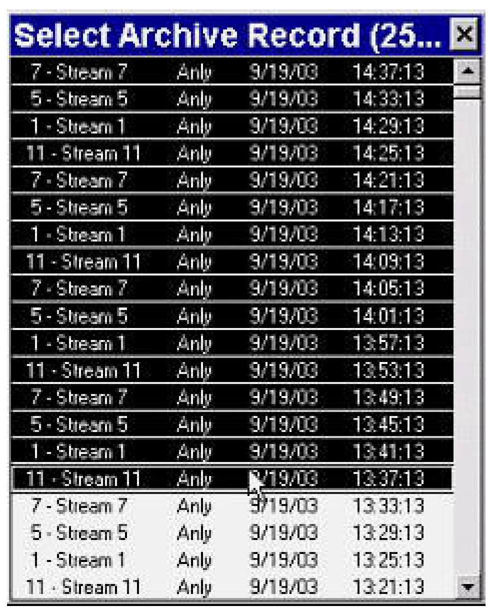
- All dates (radio button) or,
- Selected Dates (radio button)
- Start date
- End date

Also note that the Date Range dialog only displays when files are archived for more than one day.

5. Click the  button to apply your selection. Click the  button to abort and return to the Trend Data window.
6. The Select Archive Records dialog appears.

Figure 7-5: Select Archive Record Default

Figure 7-6: Select Archive Record Selection



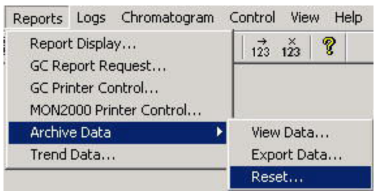
To Select all records, the operator may drag the slide bar down to the end of the list, then while holding down the 'Shift' key click the last report and MON2000 will automatically select all records in between. This also works for any number of records within the list.

The operator may select several records individually by holding down the 'Ctrl' key and clicking the mouse pointer on random selected reports. Reports that are several hours apart may be viewed in this manner.

Or, as the example .jpg above shows, the operator may click a report and drag the mouse pointer down, highlighting several reports in sequential order.

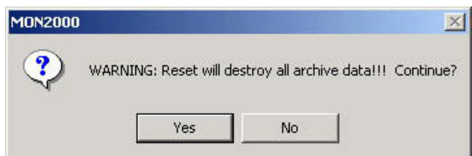
7.5.3 Reset

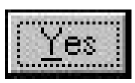
To delete archived data and reset the GC Controller memory,



Procedure

1. Use the *Reports* > *Archive Data* > *Reset* menu to access this function.
2. MON2000 displays a confirmation dialog.



Click the 

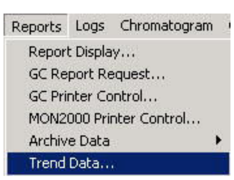
button to continue.

3. MON2000 clears the GC Controller memory. New archived records will begin accumulating again as analysis and calibration runs occur.

7.6 Trend Data

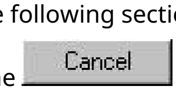
This function allows you to view, print, or save graphical representations, or trend lines, of accumulated analysis data for the 2350A and the Product Name GC Controllers.

7.6.1 Trend Data



Procedure

1. Use the Reports > *Trend Data* menu, then click the 

button to access this function.
The Trend Data dialog appears.
2. Use the enabled Graph and Trend push- buttons to access the Trend Data features. See the following sections for detailed information.
3. Click the 

button to return to the main window.

7.6.2 View Live Trend Online Product Name/2350A

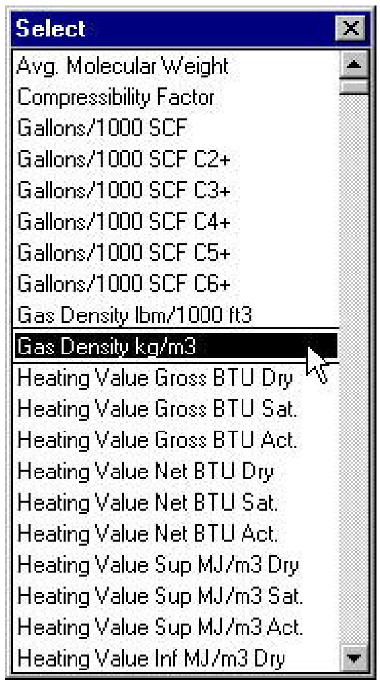
To view a live trend from the online Product Name/2350A GC,

Note
You cannot view a live trend if the corresponding analysis record does not exist in the GC memory. An error message will display: “No archive record.”

Procedure

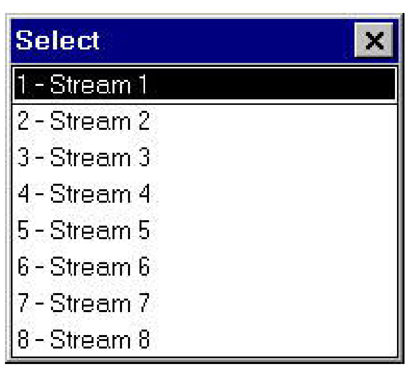
1. Click the 

button.
2. The Select menu for variable displays.

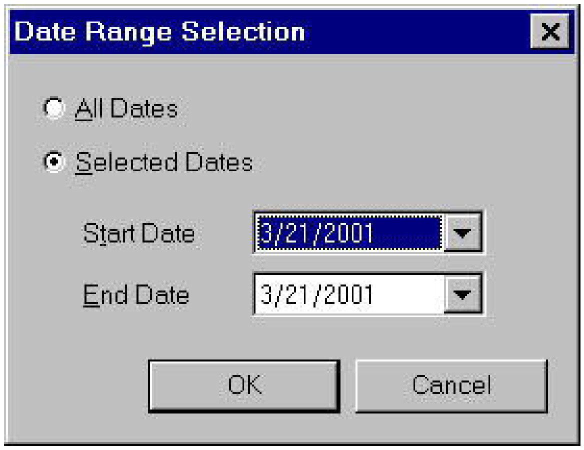


Double-click the desired variable. If the selected variable applies to a single component (e.g., Gallons/1000 SCF, Liquid Volume Percent, or Mole Percent), then the Standard Components menu appears.

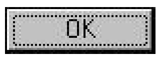
3. The Select menu for streams appears. Double-click the left mouse button on the desired stream to make your selection.



4. MON2000 displays the Date Range Selection pop-up dialog.



Select All Dates radio button or choose Selected Dates. From the pull-down menu, select the date range for the Trend report.

Click the  to apply your selection.

Or,

Click the  button to return to the trend window.

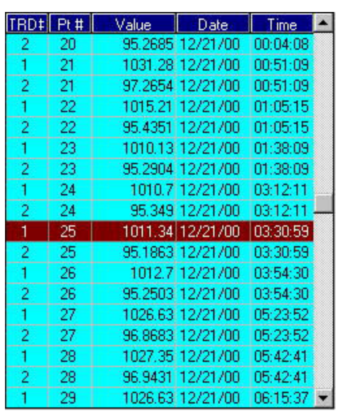
5. MON2000 reads data from the online GC unit and plots the current, live trend for the selected component and stream.

⚠ CAUTION

Plotting a trend line interrupts the normal storage of ongoing Auto Sequence analysis results. A trend line graph generated from the maximum 1200 archived analysis records can require up to 8 minutes to plot. Any Auto Sequence analysis that occurs during the plotting will not be retained for future retrieval nor will be included in ongoing calculations.

The Trend Data window appears.

The corresponding data is dynamically displayed in the provided legend.



TRD#	Pt #	Value	Date	Time
2	20	95.2685	12/21/00	00:04:08
1	21	1031.28	12/21/00	00:51:09
2	21	97.2654	12/21/00	00:51:09
1	22	1015.21	12/21/00	01:05:15
2	22	95.4351	12/21/00	01:05:15
1	23	1010.13	12/21/00	01:38:09
2	23	95.2904	12/21/00	01:38:09
1	24	1010.7	12/21/00	03:12:11
2	24	95.349	12/21/00	03:12:11
1	25	1011.34	12/21/00	03:30:59
2	25	95.1863	12/21/00	03:30:59
1	26	1012.7	12/21/00	03:54:30
2	26	95.2503	12/21/00	03:54:30
1	27	1026.63	12/21/00	05:23:52
2	27	96.8683	12/21/00	05:23:52
1	28	1027.35	12/21/00	05:42:41
2	28	96.9431	12/21/00	05:42:41
1	29	1026.63	12/21/00	06:15:37

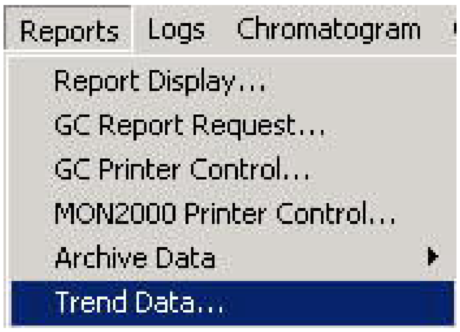
Use the Graph and Trend Options functions to manipulate the display. To zoom in on a particular point, click and drag your mouse over that area; repeat as necessary.

Use the Restore State or Zoom Out options from the right-click menu (Display Options) to return to the original display.

7.6.3 View Trend from File on Disk

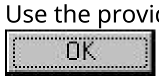
To view a trend from a file previously saved to disk, use the *Reports* > *Trend Data* menu, then click the 

button to access this function.

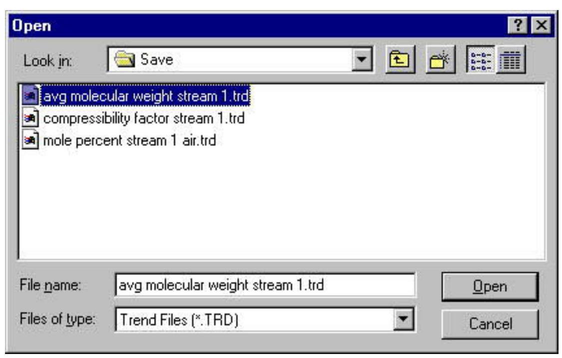


Procedure

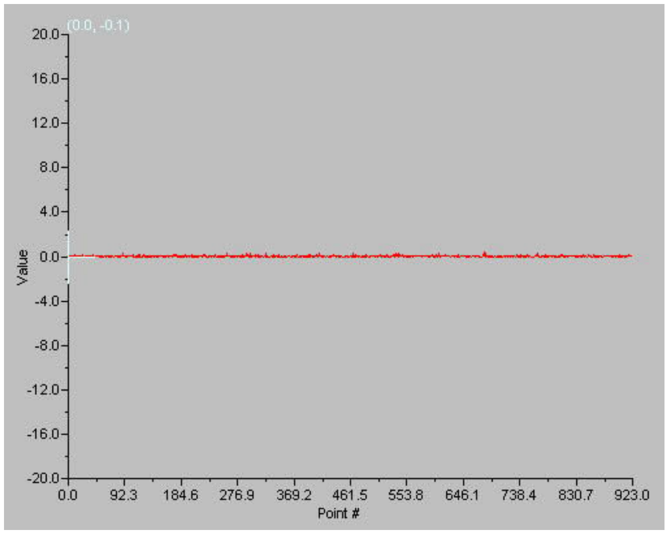
1. Click the 

button.
2. Use the provided directory tree to locate the desired TRD file and click the 

button to open.



3. MON2000 displays the trend file.



The corresponding data is dynamically displayed in the provided legend.

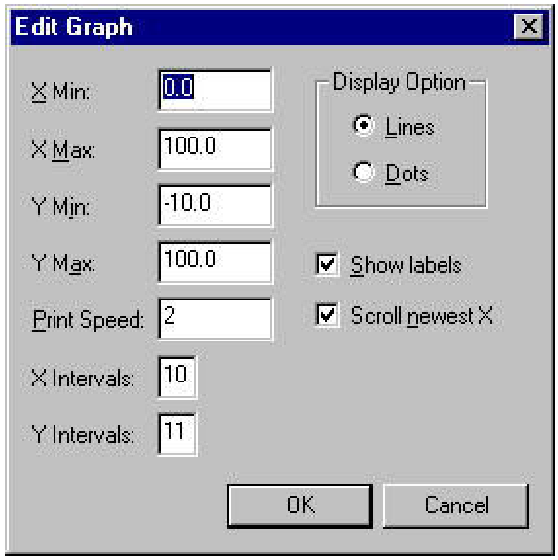
Pt #	Value	Date	Time
0	.0381946	9/26/1999	1:20:27 AM
1	0417453	9/26/1999	1:24:29 AM
2	.0123129	9/26/1999	1:28:32 AM
3	0946715	9/26/1999	1:32:34 AM
4	.0798518	9/26/1999	1:36:36 AM
5	0	9/26/1999	1:40:39 AM
6	.0982002	9/26/1999	1:44:41 AM
7	0	9/26/1999	1:48:44 AM
8	0585657	9/26/1999	1:52:46 AM
9	0	9/26/1999	1:56:48 AM
10	0	9/26/1999	2:00:51 AM
11	0.124345	9/26/1999	2:04:53 AM
12	0557224	9/26/1999	2:08:56 AM
13	0	9/26/1999	2:12:58 AM
14	.0510376	9/26/1999	2:17:00 AM
15	.0288593	9/26/1999	2:21:03 AM
16	0	9/26/1999	2:25:05 AM
17	0	9/26/1999	2:29:08 AM

Use the Graph and Trend Options functions to manipulate the display. To zoom in on a particular point, click and drag your mouse over that area; repeat as necessary. Use the Restore State or Zoom Out options from the right-click menu (Display Options) to return to the original display.

7.6.4 Edit Graph Display

Procedure

1. Click the Edit button. The Edit Graph dialog appears.



2. Use the provided attributes and options to change the trend display as desired.
3. Click the OK button to accept your changes and return to the Trend Data dialog.

   Click the Cancel button to abort and return to the Trend Data dialog.
4. The trend display changes as specified.

   Additional display options are available by right-clicking the display area. Display Options for more information.

7.6.5 Changing Cursor Size

To toggle the cursor size from course movement (less accurate) to fine movement (more accurate), click the Cursor button.

7.6.6 Describe Trend

Procedure

1. Click the Desc button. The Edit Description dialog appears.
2. Type the desired statement(s).
3. Press the ENTER key to save this description.

   Use the X button or press the ESC key to exit this dialog without saving your entry.

7.6.7 Print Trend

To print the displayed trend graph, click the Print button.

MON2000 prints the report to your configured printer (Configuring Your Printer).

7.6.8 Save Trend

To save a currently displayed trend to disk,

Procedure

1. Click the  button.
2. Use the provided directory tree to select the desired file location and name, then click the button.

   Note
   The table is saved as a binary file with a .trd extension.

3. MON2000 saves the trend along with its graph settings.

7.6.9 Read Trend Archive

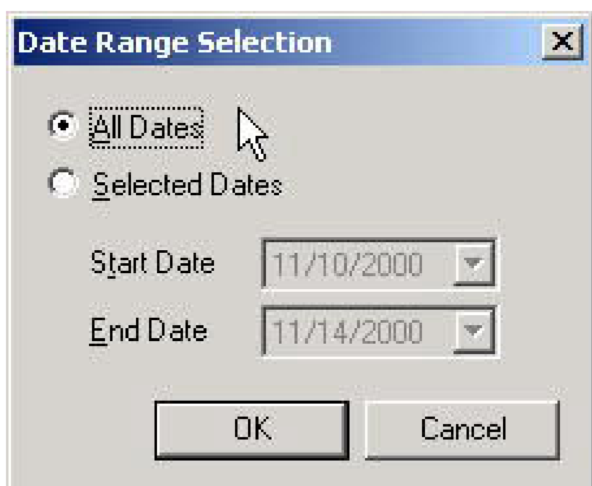
This feature is not available if the corresponding analysis record does not exist in the GC memory or if you are viewing this trend data offline from a file.

To read the Trend Archive,

Procedure

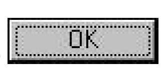
1. Click the  button.

   If you are operating a Product Name or 2350A GC, then an Archive Range Selection dialog displays.

   a) Toggle the appropriate radio button to select either *All Dates* or *Selected Dates*.

      To specify a date range, use the *Start Date* and *End Date* pull-down menus.

   b) Click the  button to continue.

2. The Archive dialog appears.

3. Click the 

button to return to the Trend Data dialog.

7.6.10 Display Options

Right-click the graph area to access these options, or use the corresponding keystroke(s). Options are listed in alphabetical order.

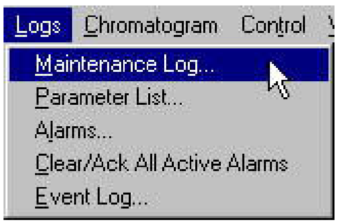
Keystroke	Right-Click Option	Description
CTRL C	Copy to clipboard	allows you to copy this graph to another application such as MS Word or Excel
F8	Cursor to nearest point	snap cursor to nearest point in both the X and Y directions
CTRL V	Paste from clipboard	allows you to plot a range of points from another application such as Meshwork or Excel
CTRL P	Print Plot Area	print currently displayed chromatograph area
CTRL S	Print Series All	print all displayed chromatograms
HOME	Restore State	restore last saved display settings for the selected chromatogram
CTRL HOME	Save State	save current display settings for the selected chromatogram
F4	Toggle Coarse/ Fine	toggle cursor from coarse (less accurate) to fine (more accurate)
F9	Toggle Lines/ Dots	toggle graph from line(s) to dots
CTRL F4	Toggle Mouse Position Tip	graph cursor follows movement of mouse while tooltip displays exact coordinates of the current point
CTRL F9	Toggle Nearest Point Tip	graph cursor follows movement of mouse cursor
NUM +	Zoom In	zoom in on entire graph
NUM –	Zoom Out	zoom out from entire graph
NUM →	Zoom X In	zoom in on X axis
NUM ←	Zoom X Out	zoom out from X axis
NUM ↑	Zoom Y In	zoom in on Y axis
NUM ↓	Zoom Y Out	zoom out from Y axis

8 Logs

The options in the Logs pull-down menu allows you to keep a maintenance record, keep a parameter record, and view the Alarm and Event Logs.

8.1 Maintenance Log

Use this function to track maintenance activities performed on a given GC unit.

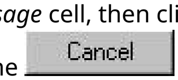


To read and edit the Maintenance Log,

Procedure

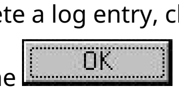
1. Use the *Logs* > *Maintenance Log* menu to access this function.

   MON2000 retrieves the data from the GC unit.

2. The Maintenance Log dialog appears.
3. To add the log entry text,
   a) Click the “Add Message F4” button or click the last ‘Log Message’ cell and press the RETURN key. The Maintenance Log message dialog displays.
   b) Add text in the appropriate *Log Message* cell, then click the  button to apply the changes. Click the  button to discard your changes and return to the Main window.
4. To change the log entry text,

   Note
   A Log Message can contain up to 1000 characters. However, the entire Maintenance Log can contain no more than 1100 characters.

   a) Click the appropriate *Log* Message cell.
   b) Click the  button. The Edit Log Message dialog appears.
   c) Type your edits.
   d) To accept your edits, press the Return key.

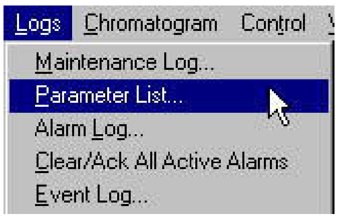
      To cancel your edits, click the  button or press the ESC key.
5. To delete a log entry, click the desired log entry and press the DELETE key.
6. Click the  button to write this data to the GC unit.

Click the 

button to abort and return to the main window.

8.2 Parameter List

Use this function to keep a record of the hardware components and associated parameters for a given GC unit.



To read and edit the Parameter List,

Procedure

1. Use the *Logs* >> *Parameter List* menu to access this function. MON2000 retrieves the data from the GC unit.
2. The Parameter List dialog appears.

Type	Parameter
Operational	SO # PN # Purchaser Location Order # Date Model # Control Serial # Analyzer Serial # Approved by Date Customer Approved by Date
Drawings	Analyzer Flow Sample Conditioning System Interconnect Wiring Outline and Dimensional System Wiring Other
Analysis	Settings Flows in cc/min Sample Loop 1 Sample Loop 2 Detector Valve Part Numbers

Type	Parameter
Sample System	Sample Valve 1 Flow Rate (cc/min) Sample 1 Pressure (PSIG) Sample Valve 2 Flow Rate (cc/min) Sample 2 Pressure (PSIG) SCS Oven Temperature (°C) Solenoid Purge Flow (cc/min/stream)
Column	OD (in.) ID (in.) Length Support Mesh Phase Connected Function

3. To save this data to disk, click the 

button or press the F3 key. The Save Parameter File dialog appears.

   This feature only saves the files in .par format. Use the Save Parameter File dialog to choose the directory location and file name.

4. To open an existing parameter file from disk, click the 

button or press the F4 key.

   Use the Open Parameter File dialog to choose the desired file.

5. Click the 

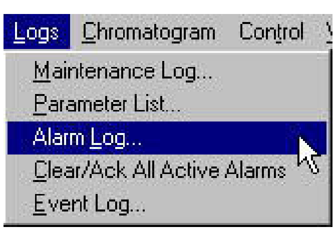
button to write your changes to the GC unit.

   Click the 

button to abort and return to the main window.

8.3 Alarm Log

Use this function to read and/or clear the various entries in the Alarm Log. The Alarm Log is a circular buffer that contains 50 entries.



To clear or acknowledge all active alarms, Clear or Acknowledge Active Alarms.

To view the Alarm Log,

Procedure

1. Use the *Logs* > *Alarm Log* menu to access this function.

   MON2000 retrieves the last 50 alarms from the GC unit.

2. The Alarm Log dialog appears.

Attribute	Description
<acknowledgement>	indicates whether the alarm has been acknowledge U = unacknowledged ? = status unknown
State	indicates whether the alarm is currently active SET = currently active CLEAR = inactive
Date/Time	date and time the alarm condition began
Alarm Message 1 **⚠ CAUTION** If an alarm message is changed (see Limit Alarms and "Discrete Alarms: Discrete Alarms") all affected alarm entries, including those previously recorded, will include that change.	describes the alarm condition
Alarm Message 2	displays the alarm limit and current condition values, as applicable

3. By default, MON2000 displays all recorded alarms.

   To view only the unacknowledged alarms, click the *Unacknowledged alarms only* radio button.

   To view only the active alarms, click the *Active alarms* radio button.

4. To acknowledge a single alarm,

   ⚠ CAUTION

   An alarm triggered by a user-defined value will continue to display as an active alarm until that value is no longer in the alarm state.

   a) Ensure you have selected the correct display option (Step 3).

   b) Select the alarm you want to acknowledge.

   c) Click the 

 button or press the F2 key.

5. To acknowledge all unacknowledged alarms,

   a) Ensure you have selected the correct display option (Step 3).

b) Click the 

button or press the F3 key.

In the Active Alarm view, click the 

button or press the F4 key.

If an alarm is cleared before the condition has been resolved, MON2000 redisplays the alarm entry as an active alarm.

6. Click the 

button to exit and return to the main window.

8.4 Clear or Acknowledge Active Alarms

To clear or acknowledge all alarms, click the Logs pull-down menu and select the *Clear/Ack All Active Alarms* option.

8.5 Event Log

Use this function to track the system and operator events that have occurred with a given GC unit.

To view the Event Log,

Procedure

1. Use the *Logs* > *Event Log* menu to access this function. MON2000 retrieves the last 50 events from the GC unit.
2. The Event Log dialog appears, displaying each system or operator event and the corresponding data.

Attribute	Description
User Id	user name
Date	date event occurred
Time	time event occurred
Event Message	indicates event type (i.e., describes event)

Attribute	Description
Old Value	if applicable, the value before the event
New Value	if applicable, the value after the event

3. Click the 

button to exit and return to the main window.

9 MON2000 Plus Data Collection/Auto-Polling

9.1 Overview

The MON2000 PLUS program provides configurable automatic collection and storage of analysis and calibration data from the gas chromatograph controller.

Note
The Data Collection feature is only available with the MON2000 PLUS program.

Configuration of the specific chromatographs to be polled, timing of polling, and specific data to be collected from each is defined by the user through the setup of polling control files.

An Auto-Sequencing module interprets the commands in a polling control file and performs the collection and storage of data.

Data collected is stored in text files (*.txt) or comma delimited files (*.csv). The emphasis is on the data being in a form suitable for import by standard spreadsheet and/or database programs.

Reports collected are stored in text files (.txt) formatted as ready-to-print or in comma-delimited files (.csv) that reduce white space and the output file size.

Note
The MON2000 PLUS program is not designed to provide database capability for the data collected.

All Model 500 and 1000 GC's with 2350A and older 2350/2360 GC Controllers and Model 700 GC Controllers are supported in the acquisition of the following types of data:

- Alarms - Selection of Alarm Log, Active Alarms, or Unacknowledged Alarms.
- Averages - Direct Access to single averages and/or blocks of averages to include support for acquiring results from most recent averaging period as well as those for previous averaging periods (number limited by number supported by specific model and application). Access to average value, maximum value, minimum value, and number of samples for the period to be supported.
- CGM Archive - Selection of Last Analysis or Last Calibration and Stream number.
- CGM on Alarm - Poll the CGM when an alarm condition is set or cleared.
- Event Log - Selection of Start/End time, Most Recent n Days, Since Last Collected, or Entire Log.
- Maintenance Log - Selection of Start/End Time, Most Recent n Days, Since Last Collected, or Entire Log
- Registers - Both User Modbus and SIM_2251 single and multiple register queries are supported.
- Reports - Archive data accessible via Reports>Archive Data>View Data menu are available (selection based on most recent number of days, date range, single stream or all streams). Selections are based on the various GC model and are consistent with the capabilities of those models and specific applications.

- Condition Start - Start of conditional polls. The poll commands following the Condition Start are run only when the condition is met. The condition is defined through the status change of a Modbus register (SIM_2251 or User_Modbus).
- Condition End - End of conditional polls. The poll commands following the Condition End are run normally.

Use these Data Collection functions to configure a polling control file and start the Auto-Sequencing module:

- Configuration Open File - Open or edit an existing Polling Control file.
- Configuration New File - Create a new Polling Control file and use the Commands to configure the polling settings.
- Start Auto - Initiate the Auto-Sequencing module. During Auto-Sequencing a Status display is maintained on the screen.

9.2 Data Collection Configuration

Use the *Data Collection>Configuration>New File or Data Collection>Configuration>Open File* menu to access the Configuration for Data Collection window and the commands to configure the Polling Control file. This function is performed in the Online or Offline mode.

A Polling Control file contains commands to be executed in order to acquire desired sets of data from one or more gas chromatographs.

Select a desired command from the list of available commands and input the necessary data to complete the command (see Table 1-1 for a list of commands). The completed command is added to the Polling Control file. Continue with the next desired command. This process is continued until all commands are selected and configured for the file. Edit the polling control file by adding, deleting, and inserting commands.

Command	Description
Await	This command instructs the Auto-Sequencing module to await a specific time of day prior to continuing processing the commands in this file. The user enters the desired time of day in hours and minutes.
Connect/Logon Connect/No Logon	The Connect/Logon command instructs the Auto-Sequencing module to establish communications with the indicated GC controller using the communication method and parameters as indicated in the GC directory entry and logon to the GC Controller. After selection of the Connect command the user selects the desired GC controller from a list of the GC directory entries. Another Poll Command is Connect/No Logon which allows the Auto-Sequencing module to execute without logging on to a GC Controller.
Delay (Seconds)	The Delay (Seconds) command instructs the Auto-Sequencing module to Delay for a specified interval of time prior to proceeding. The user enters the time in seconds.
Delay (Hours)	The Delay (Hours) command instructs the Auto-Sequencing module to Delay for a specified interval of time prior to proceeding. The user enters the time in hours.
Disconnect	This command instructs the Auto-Sequencing module to terminate communications with the controller to which it is currently connected. No additional user provided information is necessary for this command. If this command is executed and no GC Controller is connected, then the command is ignored.
End	This command marks the end of the polling control file and signals the Auto-Sequencing module to stop processing.

Command	Description
Poll	The poll command instructs the Auto-Sequencing module to acquire a set of data of a single type from the GC Controller to which it is currently connected. The user first selects the data type to be acquired.
	Poll Data Types • Alarms • Averages • CGM Archive • CGM on Alarm • Event Log • Maintenance Log • Registers • Reports • Condition Start • Condition End
Repeat	The repeat command instructs the Auto-Sequencing module to restart processing of the commands in the polling control file at the beginning of the file. The repeat command can be specified with a count that specifies the number of times to execute the sequence of commands in the file. Without the count (or with a count of zero) the sequence of commands will be re-executed indefinitely until terminated manually by the user.
Run	The run command instructs the Auto-Sequencing module to start execution of a user program. The user specifies whether the Auto-Sequencing module waits for completion of the user program before processing the poll control file commands, or continues immediately thus executing in parallel with the user program. This feature allows you to further process the collected data. As an example, the user program might perform some validity checking on the data, reformat it, and then and store it in an Access database on the MON2000 PLUS PC.

9.2.1 Create a New Polling Control File

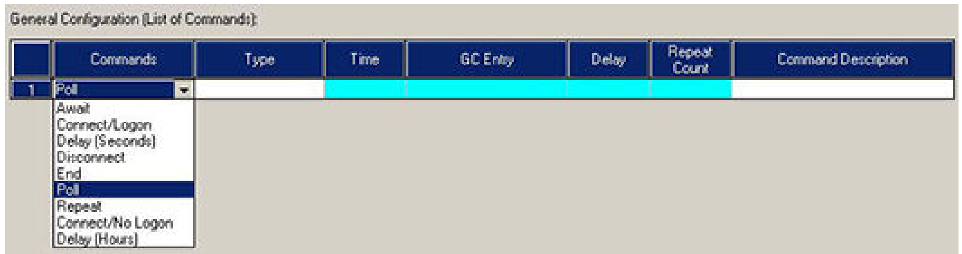
To create and configure a new polling control file,

Procedure

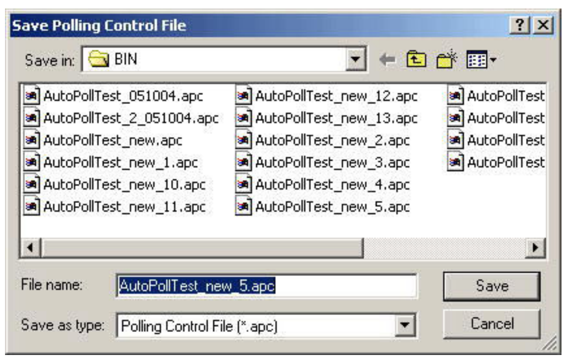
1. Use the *Data Collection* > *Configuration>New File* menu to access this function.

2. MON2000 PLUS displays the Configuration for Data Collection window.
3. From the Polling Output File(s) table select Report and/or Data type by clicking the appropriate check box. Enter the Default Filename field for the chosen selections.

4. From the Commands pull-down list, select a command



5. Enter the necessary data and a description for the command.
6. Use the add, Insert, Delete, and Poll Command buttons to add/edit/modify the configuration.
7. When you have finished adding/editing/modifying the commands, click the Save button.
8. The Save Polling Control File dialog appears. Enter a filename and click the Save button to save the *.apc file.



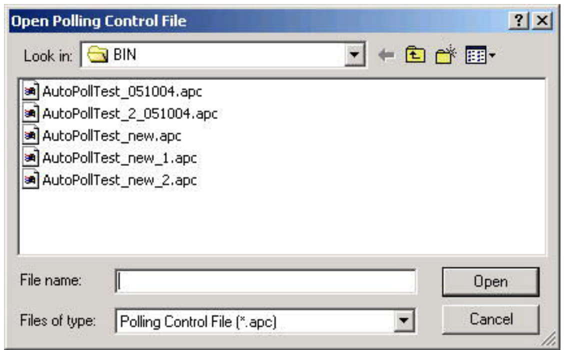
9.2.2 Open an Existing Polling Control File

To edit or modify the configuration of an existing file,

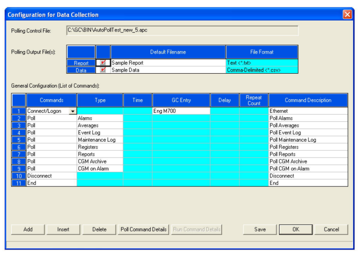
Procedure

1. From the MON2000 PLUS main window, use the *Data Collection*>>*Configuration*>> *Open File* menu.
2. Click the 

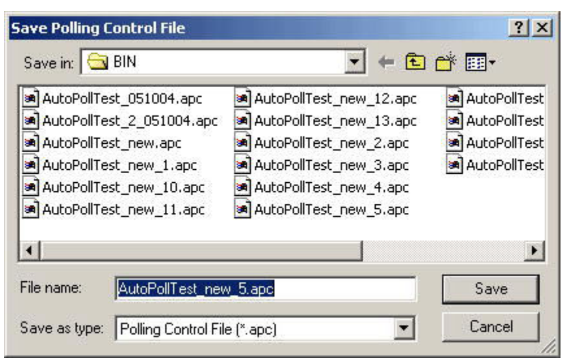
button and the Open Polling Control File window displays



3. Select the desired polling control file, then click the Open button.
4. The Configuration for Data Collection window displays.



5. Use the Add Insert Delete Poll Command Details buttons to modify the Data Collection configuration or Polling Control file.
6. When you have finished modifying the file, click the Save button to apply the changes.
7. The Save Polling Control File dialog appears.



8. A Save Polling Control message prompts you to replace the exiting file or rename the Polling Control file (*.apc) file. Click the Yes button to replace the existing file.

   Or,
9. Click the No button to discard your changes.

9.2.3 Await Command

This command instructs the auto-sequencing module to wait for a specific time of day prior to processing the commands in the file. The user enters the desired time of day in hours and minutes.

To configure the Await Command,

Procedure

1. From the General Configuration Commands pull-down list select the Await command.
2. Press the RIGHT ARROW key on your keyboard or LEFT-CLICK the mouse in the Time field and enter the time.
3. Press the RIGHT ARROW key on your keyboard or LEFT-CLICK the mouse in the Command Description field. Enter a description for the Await command in the Command Description field.

9.2.4 Connect/Logon Command

The Connect/Logon command instructs the Auto-Sequencing module to establish communications with the indicated GC controller, using the communication method and parameters as indicated in the GC directory entry and logon to the GC Controller. After selection of the Connect command the user selects the desired GC controller from a list of the GC directory entries.

To configure the Connect/Logon Command,

Procedure

1. Select Connect/Logon from the General Configuration Commands pull-down list.

Note
Use the communication method and parameters as configured in the *File>>GC Directory* entry.

2. From the GC Entry list that is configured in the File>>GC Directory menu, select the desired GC Controller.
3. Enter a description for the Connect/Logon command in the Command Description field.

9.2.5 Connect/No Logon Command

The Poll Command Connect/No Logon allows the Auto-Sequencing function to execute without logging on to a GC Controller.

To configure the Connect/No Logon Command,

Procedure

1. Select Connect/No Logon from the General Configuration Command pull-down list.

2. From the GC Entry list that is configured in the File>>GC Directory menu, select the desired GC Controller.
3. Enter a description for the Connect/No Logon command in the Command Description field.

9.2.6 Delay (Seconds) Command

Prior to executing the auto-polling function, the Delay (Seconds) Command instructs the Auto-Sequencing module to delay for a specified interval of time. The user enters the time delay in one second increments.

To configure the Delay (Seconds) Command,

Procedure

1. From the General Configuration List of Commands pull-down list, select Delay (Seconds).

2. Enter the time delay, in one second increments, in the Delay field.
3. Enter a description for the Delay (Seconds) command in the Command Description field.

9.2.7 Delay (Hours) Command

Prior to executing the auto-polling function, the Delay(Hours)Command instructs the Auto-Sequencing module to delay for a specified interval of time. The user enters the time delay in one hour increments.

To configure the Delay (Hours) Command,

Procedure

1. From the General Configuration List of Commands pull-down list, select Delay (Hours).

2. Enter the time delay, in one hour increments, in the Delay field.
3. Enter a description for the Delay (Hours) command in the Command Description field.

9.2.8 Disconnect Command

Use the Disconnect Command to terminate communications with a currently connected GC Controller.

To configure the Disconnect command,

Procedure

1. From the General Configuration: List of Commands, use the Commands pull-down list and select Disconnect

2. Enter a description for the Disconnect Command in the Command Description field.

   No additional input parameters are required for this command. Also note, if you are not connected to a GC Controller, this command is ignored.

9.2.9 End Command

The End Command marks the end of the polling control file and signals the Auto-Sequencing module to stop processing.

Procedure

1. From the Configuration for Data Collection window, click the Add button to select another command.
2. Use the Command pull-down list, and select End

3. Enter a description for the End Command in the Command Description field.

9.2.10 Poll Command: Alarms

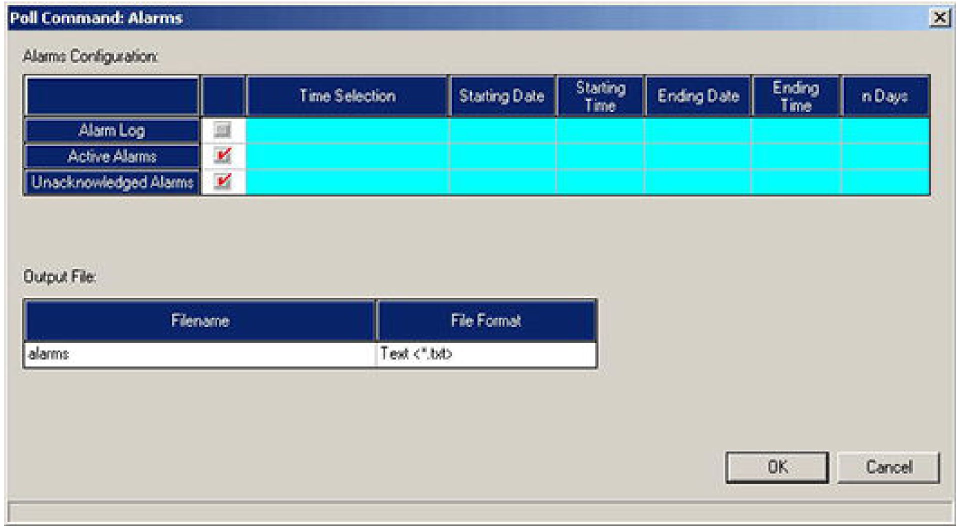
To configure the Alarms Command, from the Configuration for Data Collection window,

Note
Each Poll Command includes the criteria to define acquisition and storage of a single type of data.

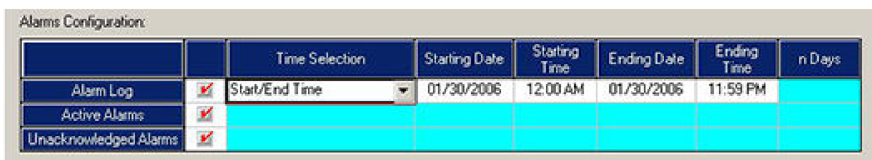
Procedure

1. Select POLL from the General Configuration Commands pull-down list.

2. Press the RIGHT ARROW key on your keyboard or LEFT-CLICK the mouse in the Type field and select Alarms from the pull-down list.
3. In the Command Description field, enter a description for the Alarms command.
4. Click the Poll Command Details button. The Poll Command: Alarms dialog box displays.

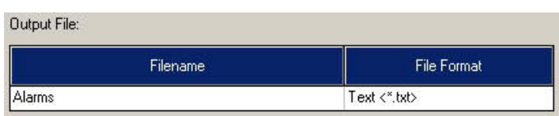


5. To select Alarm Log, click the Alarm Log check box. RIGHT ARROW key on your keyboard or LEFT-CLICK the mouse in the Time Selection field.
6. Use the Time Selection pull-down list and choose one of the following:
    a) Start/End Time
    b) Most Recent
    c) Since Last Collected

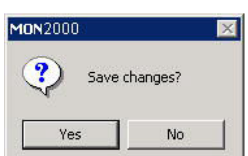
    

    Use the Up and Down arrows and enter the starting date, starting time, ending date and ending time in the appropriate data fields.

7. If Active Alarms or Unacknowledged Alarms is selected, no additional information is necessary and all of the entries of the selected type are returned.
8. From the Output File table, enter/edit a filename and file format for the Alarms Output file.



9. Click the  button to apply the selections.MON2000 PLUS displays the Save Changes dialog.



10. Click the **Yes** button to save the changes and return to the Configuration for Data Collection window.

    Or,

    Click the **No** button to discard your changes.

9.2.11 Poll Command: Averages

To configure the Averages Command, to acquire sets of one or more averages for the most recent averaging period and/or the previous averaging period (any available in the GC Controller),

---

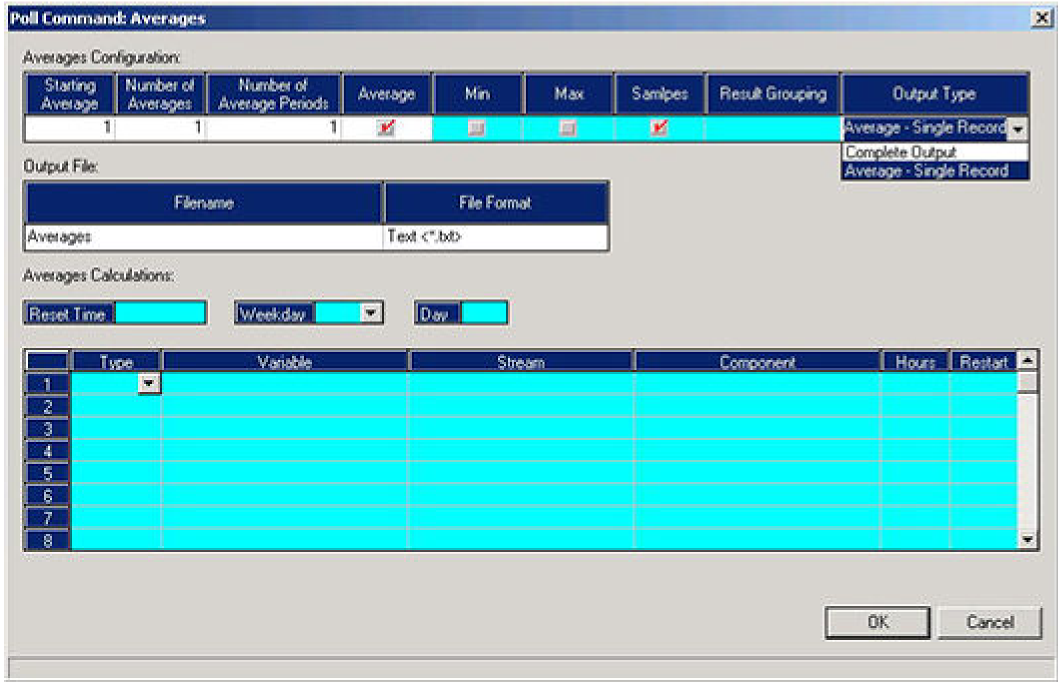
Note
MON2000 PLUS reads all the Averages configuration (set up from the *Applications>>Calculatioins>>Averages* menu) if connected to GC controller.

If you are using a Direct Connection (rather than an Ethernet Connection), the reading process could take a long time.

Procedure

1. From the Configuration for Data Collection window, select the Poll command.

2. Press the RIGHT ARROW key or click in the Type field, then select Averages from the pull-down list.
3. Press the RIGHT ARROW key on your keyboard, or left-click the mouse in the Command Description field. Enter a description for the Averages command.
4. Click the **Poll Command Details** button and the Poll Command: Averages dialog box displays.



5. From the Averages Configuration dialog, for a single record, select Average - Single Record. If the Average - Single Record is selected, only the average values are included in the output file.

Or,

If Complete Output Complete Output is selected, click the check boxes to select Average, Min, Max, or Samples values.

Note
All averages referenced by a single Poll command must be for the same averaging interval (e.g. hourly, daily, weekly, monthly, variable).

Use the Result Grouping pull-down list and select By Period or By Average.

If the number of averages is greater than one, then select whether the results are to be grouped by average, or grouped by period.

a) When grouped by Average, the data from all of the periods of a given average are stored in a single record in the output file with the appropriate time-stamp included with the data for each period.

b) When grouped by Period, a record for each period contains the values from each of the averages for that period and a single time stamp value is included in the record.

6. From the Output File table, enter/edit the filename and file format (*.txt or *.csv) for the Averages Output file.
7. Click the 

button to apply the configuration changes.
8. MON2000 PLUS displays the Save Changes dialog.

9. Click the 

button to write the changes and return to the Configuration for Data Collection window.

   Or,

   Click the 

button to discard your changes.

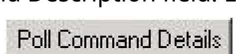
9.2.12 Poll Command: CGM Archive

Use the CGM Archive command to poll either the Last Analysis or Last Calibration CGM Archive for a specific stream. The output file is in *.cgm format and the file name is based on the Analyzer Name, Stream, and Date/Time. The CGM file is stored in the "\GC\SAVE\CGM Archive" folder.

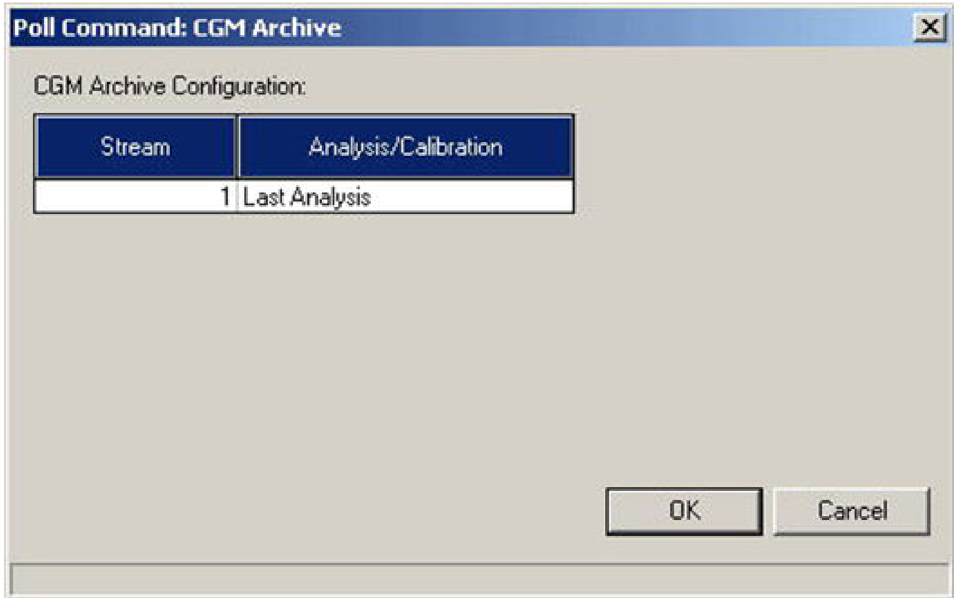
To configure the CGM Archive Command,

Procedure

1. From the Configuration for Data Collection window, click the ADD button to select another command.
2. Next, select the Poll command.

3. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Type field, then select CGM Archive.
4. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Command Description field. Enter a description for the CGM Archive command.
5. Click the 

button and the Poll Command: CGM Archive dialog box appears.



6. Enter the Stream number for data collection.
7. Use the Analysis/Calibration pull-down list and select the CGM Archive for the Last Analysis or Last Calibration.
8. Click the 

button to apply the configuration changes.

   MON2000 PLUS returns you to the Configuration for Data Collection window.

   Or,

9. Click the 

button to discard your changes.

9.2.13 Poll Command: CGM on Alarm

Use the CGM on Alarm command to poll the CGM when an alarm condition is set or cleared. Setup continuous polls so that MON2000 PLUS can determine and retrieve the CGM with the alarm condition. The data is saved to an output file in CGM format and is stored in the "\GC\SAVE\ERRORS" folder. The file name is based on the Date/Time and ends with an 'a'.

To configure the CGM on Alarm Command,

Procedure

1. From the Configuration for Data Collection window, click the 

button to select another command

2. Next, select the Poll command.
3. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Type field, then select CGM on Alarm.
4. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Command Description field. Enter a description for the CGM on Alarm command. No further details are needed.

9.2.14 Poll Command: Condition Start

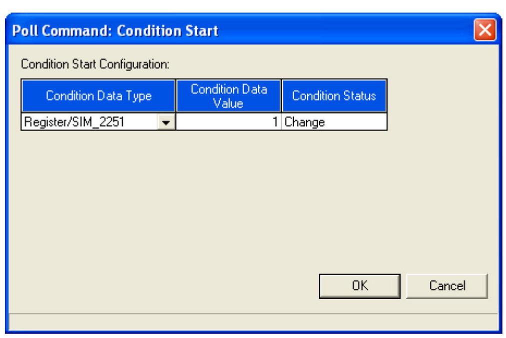
Use the Condition Start command to start conditional polling.

To configure the Condition Start command,

Procedure

1. From the General Configuration (List of Commands) table, select **Poll** from the Command column.

2. Select **Condition Start** from the pull-down list in the Type column.
3. Enter a description in the Command Description column.
4. Select a default output file format by clicking either the **Report** or **Data** checkbox on the Polling Output File(s) table.
5. Enter a default output file name.
6. Click the **Poll Command Details** button located at the bottom of the Configuration for Data Collection window. The Poll Command: Condition Start window appears.



7. Select Register/SIM_2251 or Register/User_Modbus from the Condition Data Type column.
8. Enter the register number in the Condition Data Value column.
9. Select **Change** from the Condition Status column.
10. To apply the configuration changes, click **OK**. To discard your changes and return to the Configuration for Data Collection window, click **Cancel**.

9.2.15 Poll Command: Condition End

Use the Condition End command to stop conditional polling.

To configure the Condition End command,

Procedure

1. From the General Configuration (List of Commands) table, select **Poll** from the Command column.

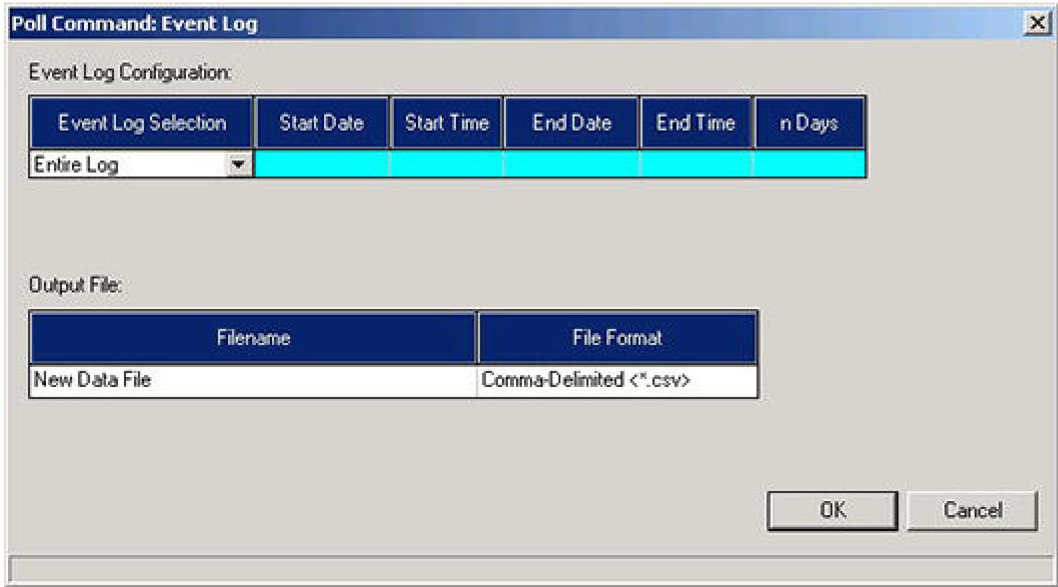
2. Select **Condition End** from the pull-down list in the Type column.
3. Enter a description in the Command Description column.

9.2.16 Poll Command: Event Log

Procedure

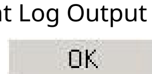
1. From the General Configuration: List of Commands, use the Commands pull-down list and select the POLL command.

2. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse Type field and select Event LOG from the pull-down list.
3. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Command Description field. Enter a description for the Event Log command.
4. Click the Poll Command Details button and the Poll Command: Event Log dialog box displays.



5. From the Event Log Selection pull-down list, choose one of the following:

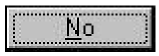
Event Log Selection	**Additional Selections**
Start/End Time	Start Date
	Start Time
	Ending Date
	Ending Time
Most Recent n Days	Enter number of n Days
Since Last Collected	No further information is needed
Entire Log	No further information is needed

6. For each entry in the Event Log which satisfies the selection criteria, a record containing the following information is stored:
   - User ID of user initiating the change (or SYSTEM)
   - Date/time of occurrence
   - Description of the event
   - Parameter value prior to the event (old value)
   - Parameter value after the event (new value)
7. From the Output File table, enter/edit the filename and file format (*.txt or *.csv) for the Event Log Output file.
8. Click the 

button to apply the configuration changes.
9. MON2000 PLUS displays the Save Changes dialog.

10. Click the  button to write the changes and return to the Configuration for Data Collection window.

    Or,

    Click the  button to discard your changes and return to the Configuration for Data Collection window.

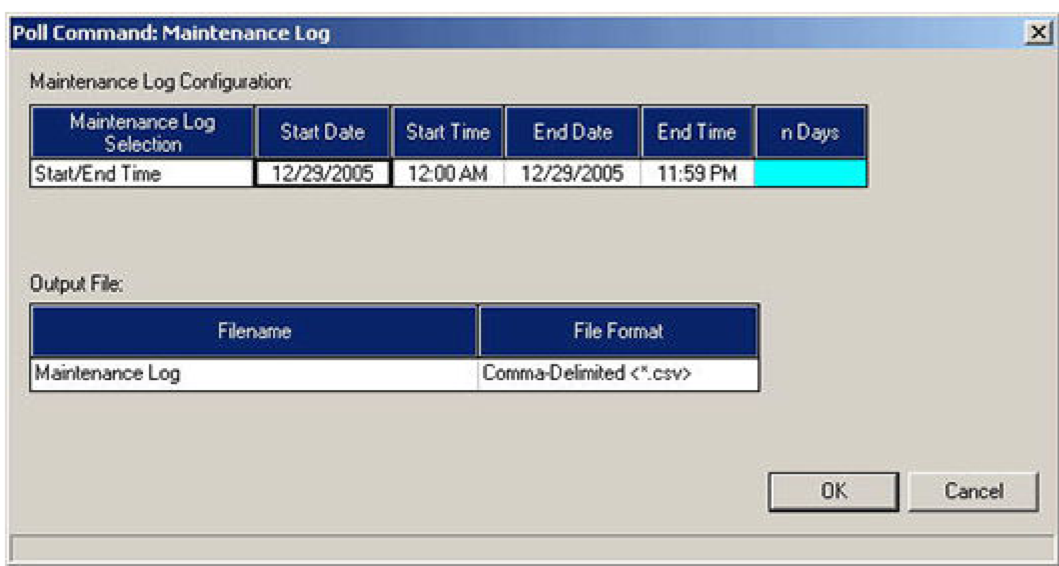
9.2.17 Poll Command: Maintenance Log

To configure the Maintenance Log command,

Procedure

1. From the General Configuration: List of Commands, use the Commands pull-down list and select the POLL command.

2. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse Type field and select Maintenance Log from the pull-down list.
3. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Command Description field. Enter a description for the Maintenance Log command.
4. Click the  button and the Poll Command: Maintenance Log dialog box displays.



5. From the Maintenance Log Configuration Selection table, choose one of the following:

Maintenance Log Selection	Additional Selections
Start/End Time	• Start Date • Start Time • End Date • End Time
Most Recent n Days	• Enter number of n Days
Since Last Collected	• No further information is needed
Entire Log	• No further information is needed

6. From the Output File table, enter/edit the filename and file format (*.txt or *.csv) for the Maintenance Log Output file.
7. Click the 

button to apply the configuration changes.

   Or,
8. Click the 

button to discard your changes and return to the Configuration for Data Collection window.

9.2.18 Poll Command: Registers

Blocks of Modbus Register data can be specified for collection.

To configure the Registers Command,

Procedure

1. From the General Configuration: List of Commands, use the Commands pull-down list and select the POLL command.

2. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse Type field and select Registers from the pull-down list.

Note

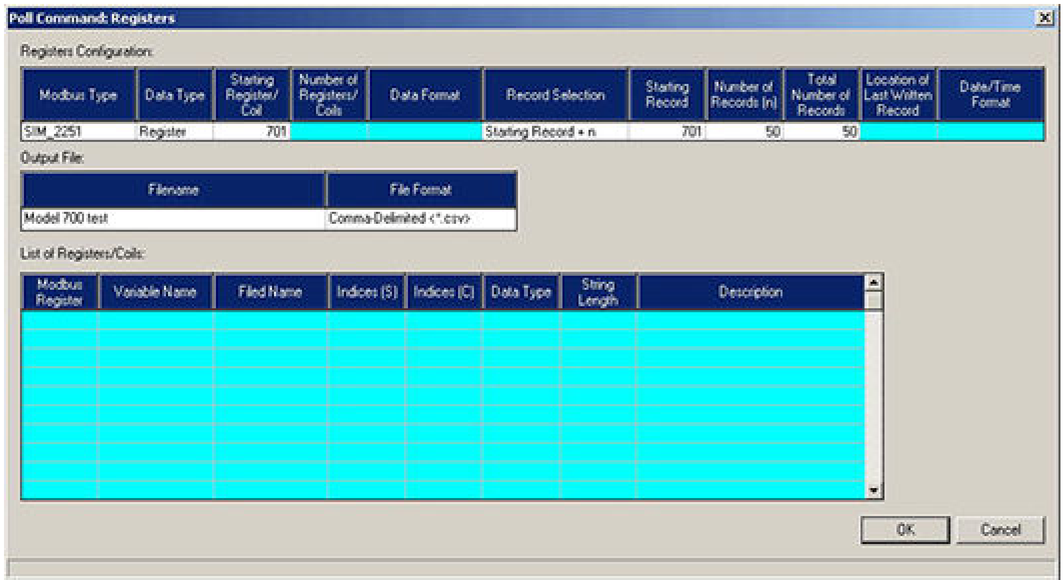
MON2000 PLUS reads all the configured Registers associated with the Modbus Type (Sim_2251 or User_Modbus) if you are connected to a GC Controller.

If you are using a direct connection (rather than an Ethernet connection), the reading process could take a long time.

When initially building a “polling control” file, you may want to use the MON2000 PLUS “Offline Edit” function with an “as configured” version of the application open to avoid these delays.

3. Press the RIGHT ARROW key on your keyboard, or LEFT-CLICK the mouse in the Command Description field. Enter a description for the Registers command.

4. Click the Poll Command Details button and the Poll Command: Registers dialog appears.



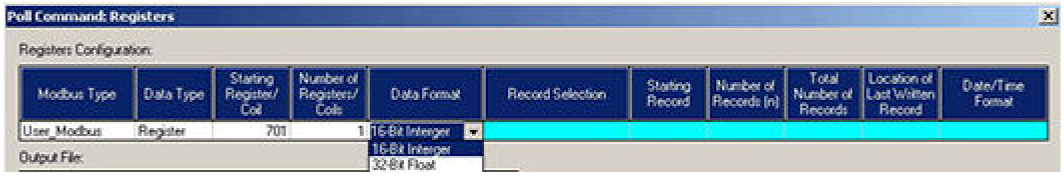
The basic configuration includes the following:

- Modbus Type - SIM_2251 or USER MODBUS
- Data Type Register or Coil
- Starting Register/Coil
- Number of Registers/ Coils

a) If SIM_2251 is selected and the Starting Register is in the range 701 - 999, then Record Selection includes the following:

Record Selection	**Additional Selections**
Starting Record + n	Starting Record number
	Number of Records (n)
	Total Number of Records
Most Recent n Records	Number of Records (n)
	Total Number of Records
	Location of Last Written Record
Since Last Collection	Total Number of Records
	Location of Last Written Record
	Date/Time Format

b) If USER MODBUS is selected, and Data Type is Register, then the user must enter a Data Format string to define for each parameter being requested (an integer 16-bit or floating-point 32-bit value). Floating-point values use two consecutive registers for storage.



c) For the standard registers, the values returned are stored in a single record in the output file, following the Date and Time when the registers are polled, the Starting Register, and Number of Registers.

d) For SIM_2251 registers 701-999, one record is stored in the output file for each record retrieved with fields within the record, starting the date and time when the record is polled, starting Register (701-999), Record Number, and the data for the record.

5. From the Output File table, enter/edit the filename and file format (*.txt, *.dat or *.csv) for the Registers Output file. The DAT file format is for customized chroma data.
6. Click the  button to apply the configuration changes.
7. MON2000 PLUS displays the Save Changes dialog.

8. Click the  button to write the changes and return to the Configuration for Data Collection window.

   Or,

9. Click the  button to discard your changes and return to the Configuration for Data Collection window.

9.2.19 Poll Command: Reports

The archived analysis reports (as viewable under MON2000 when connected to a controller, from the *Reports>>Archived Data>>View Data* menu) can be retrieved and stored.

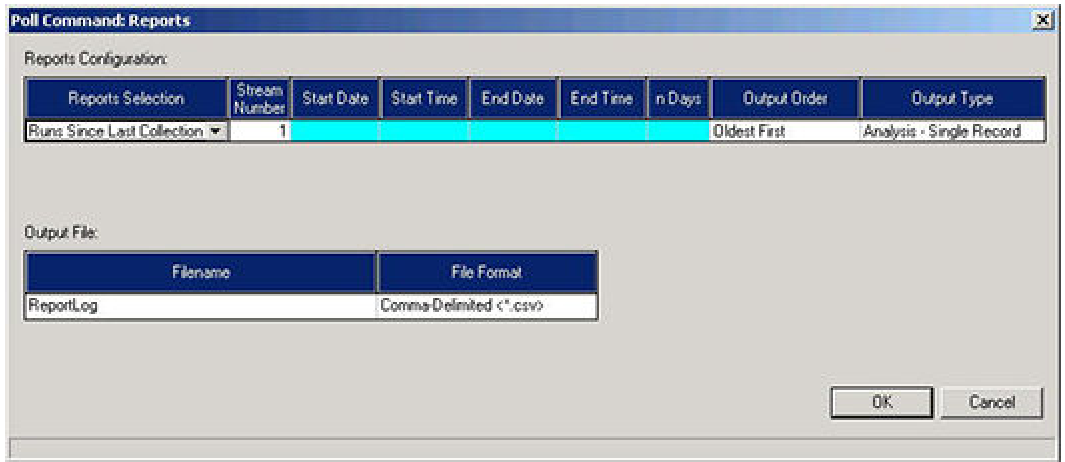
To configure the Reports Command,

Procedure

1. From the Configuration for Data Collection window, click the ADD button to select another command

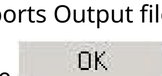
2. Next, select the Poll command.

3. Press the RIGHT ARROW on your keyboard, or LEFT-CLICK the mouse in the Type field, then select Reports from the pull-down list.
4. Press the right arrow on your keyboard, or left-click the mouse in the Command Description field. Enter a description for the Reports command.
5. Click the  button and the Poll Command: Reports dialog box appears.

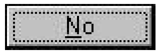


6. Use the following selection criteria and then enter appropriate data:

Reports Selection	Additional Selections
Start/End Time	• Stream Number (0 - indicate all streams) • Start Date • Start Time • End Date • End Time
Most Recent n Days	• Stream Number (0 - indicate all streams) • Enter number of n Days
Runs Since Last Collection	• Stream Number (0 - indicate all streams)

7. Regardless of the selection criteria method used above, choose the order of returned reports in the Output Order (with Most Recent First or with Oldest First).
8. Next, select the Output Type, as a Complete Report or an Analysis - Single Record.
9. From the Output File table, enter/edit the filename and file format (*.txt or *.csv) for the Reports Output file.
10. Click the  button to apply the configuration changes.

    Or,

11. Click the 

button to discard your changes and return to the Configuration for Data Collection window.

9.2.20 Repeat Command

Use the Repeat command to instruct the Auto-Sequencing module to restart processing of the commands in the polling control file (from the beginning of the file). Specify a count for the number of times to execute the sequence of commands in the file. Without a specified count (or with a count of zero) the sequence of commands will be re-executed indefinitely until terminated manually by the user.

To configure the Repeat command,

Procedure

1. From the General Configuration List of Commands pull-down list, select Repeat

2. Enter the number of times to repeat the Auto-Sequencing process, in the Repeat Count field.
3. Enter a description for the Repeat Command in the Command Description field.

9.2.21 Run Command

The run command (future release) instructs the Auto-Sequencing module to start execution of a user program. The user specifies whether the Auto-Sequencing module waits for completion of the user program before processing the poll control file commands, or continues immediately thus executing in parallel with the user program. This feature allows you to further process the collected data. As an example, the user program might perform some validity checking on the data, reformat it, and then and store it in an Access database on the MON2000 PLUS PC.

9.3 Data Collection

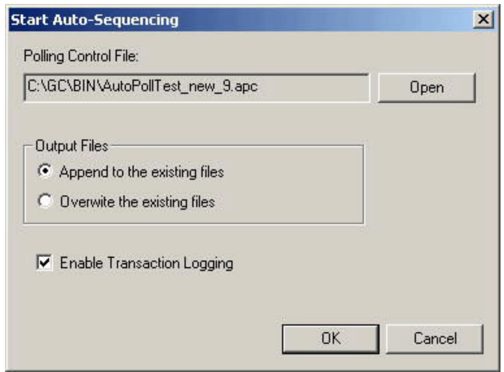
The Data Collection Start Auto function allows you to open an existing polling control file, select to append or overwrite the existing output files, select whether to enable Transaction Logging, and start the automatic data collection.

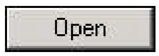
9.3.1 Start Auto-Sequencing

To initiate Auto-Sequencing, use the *Data Collection>>Start Auto* menu,

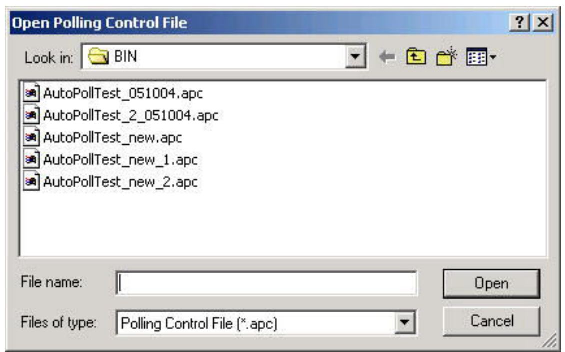
Procedure

1. Click START AUTO and the Start Auto-Sequencing dialog appears.



2. Click the 

button and the Open Polling Control File dialog appears.



3. Select the desired polling control file, and then click the 

button.
4. From the Output Files selection, click the desired radio button:
    - Append to the existing file
    - Overwrite the existing file
5. In the check box, select Enable Transaction Logging (if desired).
6. Click the 

button to confirm the start of automatic operation. MON2000 PLUS begins the Auto-Sequencing process and displays the Auto-Sequencing Status window.
7. The Auto-Sequencing module begins with the first command in the selected polling control file and performs the requested operation. Processing continues sequentially through the file performing the operations requested by each command.
    a) If a Repeat command is encountered, then the processing is restarted at the beginning of the file.
    b) If an End command (or the end-of-file) is encountered, the module ends the command processing.

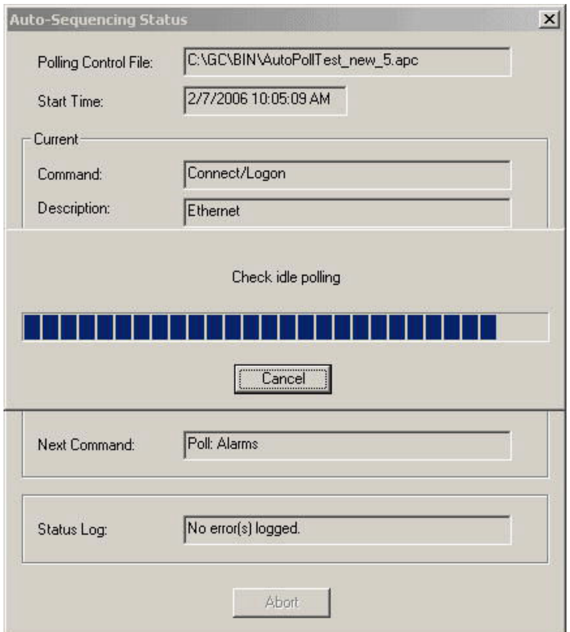
9.3.2 Transaction Log

To enable the Transaction Logging functions, select the check box on the Start Auto-Sequencing dialog. If this option is chosen, one or more entries are made to the AutoPollCommsLog.txt file each time a command is executed.

Transaction Log entries include a time stamp and a description of the command being executed. If the command results in Modbus messages being exchanged between the PC and the controller, the poll message from the PC and the response from the controller are recorded.

9.3.3 Auto-Sequencing Status

During Auto-Sequencing a status display is maintained on the screen.



As each command is processed the following general information is displayed (depending on the command being processed, the details of the exact data included will vary:

- Polling Control file in use
- Start time of operation
- Command being processed
- Description of command being processed
- Status of completion of the command (level detail appropriate to the individual command)
- Next Command to be processed
- Status Log

Auto-Sequencing must be stopped before other MON2000 PLUS menu selections can be chosen.

Terminate Auto-Sequencing at any time by clicking the Abort button on the Auto-Sequencing status display screen. If this occurs, the Auto-Sequencing module will close all open output files and return to normal operation of the MON2000 PLUS program.

9.3.4 Status Log

When MON2000 PLUS detects connection or polling errors, the error condition is logged and a Status Log file is saved as:

AutoPollStatusLog.txt.

The Status Log field on the Auto-Sequencing Status dialog indicates the error condition.

10 Modbus Test

The Modbus Test Program (WinMB) enables you to test the operation of the serial port communications, and determine Modbus register and log contents. Use this program as an aid to software debugging or for special installations. Via WinMB, you can troubleshoot with any device including the GC Controller, an ultrasonic meter, or a flow computer.

⚠ CAUTION

FUNCTION NOT REQIURED FOR NORMAL GC OPERATION

The Modbus test is reserved for advanced functions.

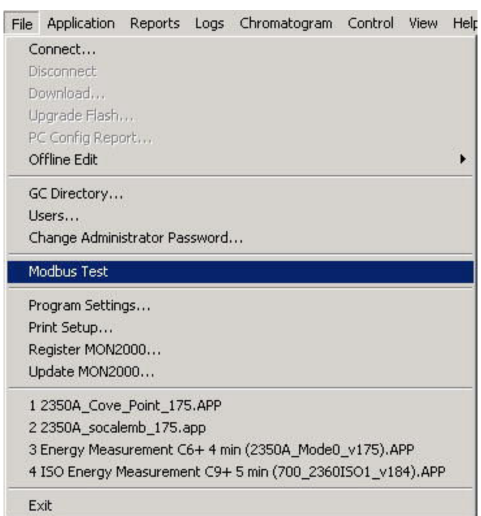
The Modbus Test function is not required for normal GC operation. Skip this section unless you are developing software, engaging in a software debugging process, or designing a custom installation that directly accesses the GC Controller Modbus registers.

Traditionally, Modbus registers are polled by using a data collection system (DCS). To facilitate installation and debugging, the WinMB program emulates a DCS.

This section provides detailed instructions for using the WinMB program. Use this program only if you are familiar with Modbus communication protocol and the operation of the MON2000 software.

10.1 Starting WinMB

To start WinMB from MON2000, pull down the File menu and click the *Modbus Test* option.



If MON2000 displays an error, verify the installation directory via the Program Settings function (Select Program Settings).

The Modbus Test Program main window appears.

10.2 Establishing Communications

Use the following instructions to configure the desired communications settings.

If you are accessing WinMB via MON2000, WinMB defaults to the same communications and serial port settings as those set for MON2000. To set up a WinMB-specific configuration, Set Up Port via WinMB.

10.2.1 Comparison of Modbus Protocols

MON2000 software and the WinMB program accommodate two different Modbus protocols: SIM_2251 and User_Modbus. For each protocol, separate Modbus registers are reserved.

Thus some settings for MON2000 and WinMB depend on which Modbus protocol is used.

The protocol you need depends, ultimately, on the hardware used for data acquisition from the GC Controller Modbus register contents.

The following comparison should help clarify the differences between these protocols as well as the utility of each.

SIM_2251	User_Modbus
serial slave port	serial slave port
modified protocol that allows floating point numbers to be transmitted over Modbus via 2251 emulation slave type	standard Gould protocol that accommodates PLC Emulation LO-HI (PLC-LH)
most register contents are predefined; some registers can be user-defined	predefined Boolean (coils) user-defined Numeric (registers)
data types are predefined for registers 1000 to 9000	data types are user-defined
variables assigned to registers can be listed in the PC Config Report (for instructions, Generate PC Config Report; for an example report, see PC Config Report). See A Modbus Reg. List for 2350A GC for more detail about individual registers.	variables assigned to registers can be listed in the PC Config Report (for instructions, Generate PC Config Report; for example report, see PC Config Report)
When using WinMB, set *Register Mode* to “ROSEMOUNT” to view register contents.	When using WinMB, set *Register Mode* to “PLC- LH” or “PLC-HL” to view register contents.
It is not necessary to assign scales to registers.	It may be necessary to assign scales to registers, to convert floating point values to whole integer representations.

10.2.2 Set GC Com Parameters via MON2000

Set the communication parameters for the GC Controller serial port to which your PC, or other device, is connected.

To determine or reset the communications parameters at the GC Controller,

Procedure

1. Use the *Application* >> *Serial Ports* menu to access the Serial Ports function. The Serial Ports dialog appears.
2. Verify the MON2000 serial port Usage setting.
    a) Determine the GC Controller serial port to which you are directly connected.

Note
Consult accurate documentation of the GC installation or visually inspect the serial line connection at the GC Controller Terminal Board.

b) In the Serial Ports dialog, ensure that the Usage setting for the port is either "SIM-2251" or "User_Modbus".

   If the setting is incorrect, change it by using the provided combo box.

3. Verify the *Baud Rate* setting.

   WinMB accepts the following baud rates: 300, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200.

4. Ensure the remaining serial port parameters are correct. Revise as required and record for future reference.

   Typical settings are:

Parameter	RTU Setting	ASCII Setting
Data Bits	8	7
Stop Bits	1	1
Parity	None	Even
Handshake	None	None
RTS On **Note** RTS On/Off settings are required only when line settling is needed before data transmission begins.	0	0
RTS Off	0	0
Ptrcl	RTU	ASCII

   Note that the RTU protocol permits a more efficient data transmission for it uses significantly less bits than ASCII.

5. Check the *Com ID* setting. The Com ID is the slave address defined by MON2000.

   Note
   Record the true Device ID number for future use.

6. Verify that the *RW* setting is either "R" or "RW".

7. Click the 

   button to accept your input and return to the main screen.

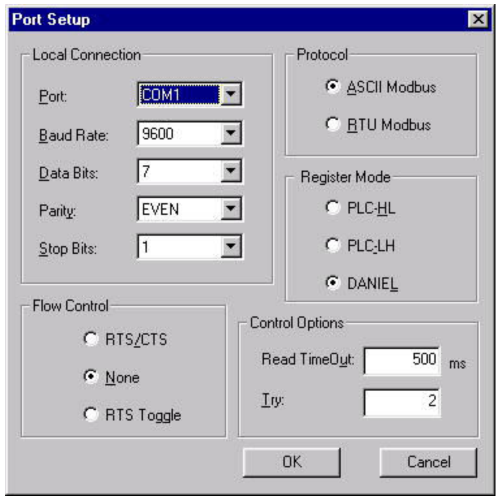
10.2.3 Set Up Port via WinMB

To determine or reset the communications parameters used by WinMB,

Procedure

1. Click the 

   button to access the Port Setup function. The Port Setup dialog appears.



2. Define the WinMB serial port setup options.

   Note
   The serial port settings displayed are for the serial communication parameters at the PC. These settings must match the GC Controller settings (to verify, see Set GC Com Parameters via MON2000). For direct connection to the GC Controller, ensure that the Port setting is the same as the Com ID number of the serial port used.

Parameter	Typical Setting
Port	COM1 or COM2
Baud Rate	9600
Data Bits	7 or 8
Parity	Even or None
Stop Bits	1
Flow Control	None
Control Options	Read Timeout, 500 ms Try, 2
Register Mode	Rosemount (for SIM_2251): PLC-LH (for User_Modbus) PLC-LH
Protocol	ASCII Modbus RTU Modbus

3. Click the 

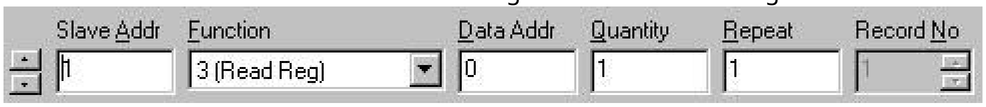
button to accept your input and return to the main screen.

10.3 Getting Modbus Data

Use the following steps to read or write register contents to the GC Controller (or any other device). See the following subsections for additional details.

Note
To access previous settings, use the spin arrows to view and select.

Before retrieving data, print a PC Config Report (Generate PC Config Report) and check the Communication data for variable names assigned to the Modbus registers.



Procedure

1. In the *Slave Addr* data field, type the Comm ID of the GC unit (or other device). WinMB will accept a slave address of 1 to 247.

   Enter “0” to use the broadcast mode. In the broadcast mode, WinMB polls all known devices. Each device interprets this message as an instruction to read and take action; however, a response message may not be received by WinMB.

   Note
   Any change is applied to the corresponding register value at each device. Table 1-4 shows which function codes support the broadcast mode.

2. Use the *Function* pull-down menu to select the desired read or write option.

Function Code	Description	Broadcast
1 (Read Coil)	read one or more coil values	
3 (Read Reg)	read one or more register values	
5 (Set Single Coil)	set (write) one coil value	✓
5 (Set Single Reg)	set (write) one register value	✓
15 (Set Multiple Coils)	set (write) multiple coil values	✓
16 (Set Multiple Regs)	set (write) multiple register values	✓

3. In the *Data Addr* data field, type the starting register.

   Note that the data type is set automatically by WinMB, per the specified data address. Use the `Data Type` pull-down menu to select a different data type for these registers.

   Note
   To ensure best data type assignments, review a PC Config Report (Generate PC Config Report to view a live report; Report Display to view a report file; PC Config Report for a sample report).

Register Range	Default Type
1000 – 2999	Boolean
3000 – 4999	Integer
5000 – 6900	Long
7000 – 8999	Float

   To select data types for SIM_2251 registers 1000 to 9000, Use Template (Mixed Data Types).

4. In the *Quantity* data field, type the number of registers to be retrieved (range from 1 to 2016).

Note that the requested number of registers cannot exceed the amount contained by the selected message block but you can retrieve a partial block. You cannot cross a message block boundary.

Also note that in Standard Modbus mode each register is 16 bits. Therefore, integers (SHORT) consist of 1 register while floats (FLOAT) and long integers (LONG) consist of 2 registers.

Note

Boolean registers are not user-defined (for either SIM_2251 or User_Modbus) and primarily contain alarm flags useful for debugging. To view the contents of Boolean registers, select the “1 (Read Coil)” function code.

Numeric registers for User_Modbus can be user-defined (see Registers). To view the contents of Numeric registers, select the “3 (Read Regs)” function code.

---

5. Type the desired repeat count (how many times WinMB will read or set the specified registers before ceasing transmission) in the Repeat data box.

   You can repeat the poll from 1 to 9999 times. A Repeat value of “–1” produces an infinite polling loop that can be terminated by clicking the Stop button.

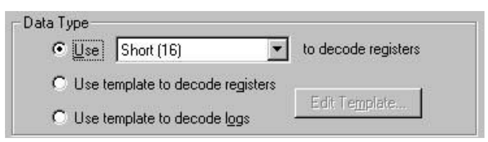
10.3.1 Use Single Data Type

Use this function to assign a data type to a group of registers you will read or edit.

To poll a group of registers with the same user-defined data type,

Procedure

1. Follow Steps 1 through 5 in Getting Modbus Data.
2. Click the *Use <<Type>> to decode registers* radio button to choose this option.



3. Use the Data Type pull-down menu to assign a data type to the selected registers (Getting Modbus Data, Steps 3 and 4).
4. Click the Transmit button to retrieve the selected registers (i.e., the specified data addresses) from the GC Controller (or other device).

   Click the Stop button to cease transmission and return to the Modbus Function Selection options.

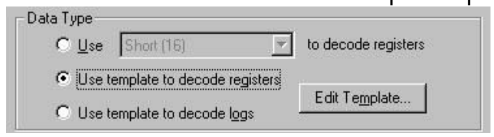
   Note that the transmitted/received packet displays in the Packet Input-Output window.

10.3.2 Use Template (Mixed Data Types)

Use this function to create a new template or use an existing template file to directly decode Modbus register data retrieved from the GC Controller (or other device). Via the configuration of a given template, WinMB imposes the specified data types, etc., onto the incoming registers. The Template function is best used when decoding mixed data types.

To create a new template or use an existing template,

Procedure

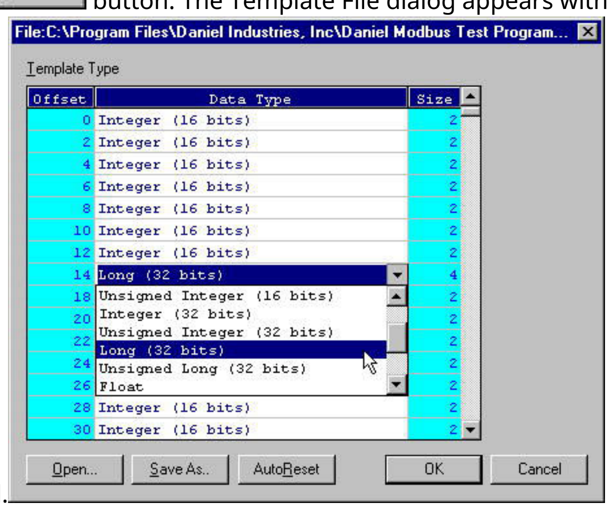
1. Follow Steps 1 through 5 in Getting Modbus Data.
2. Use the Data Type radio buttons to select the desired template option, to *decode registers* or *decode logs*. 

3. Note that the *Record No*. setting is now available. Enter the desired record by typing in the provided data field or using the scroll arrows.


Data Type Setting	Other Setting(s)	Result
register template	• Enter *Data Addr* value. • Enter *Record No.* value. • Enter *Quantity* value.	Read Quantity fields (i.e., the number of fields specified by the Quantity setting) from the specified Record No. of the register (Data Addr).
log template	• Enter *Record No.* value.	Read all fields associated with the Record No.
	• Enter *Data Addr* value. • Enter “0” for the *Record No.* value.	Read all fields in all records for the specified log register (Data Addr).

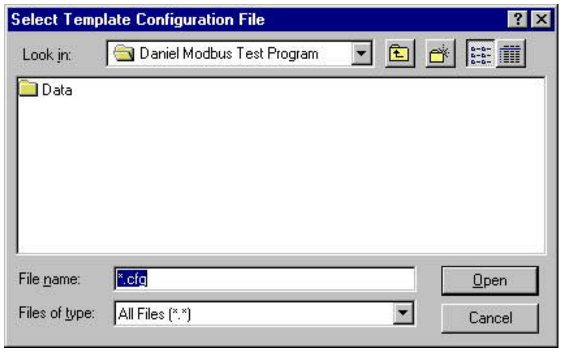
To verify which record number should be entered, consult the Modbus specifications for your device. For more information on GC Modbus registers, PC Config Report.

4. Click the 

button. The Template File dialog appears with a new template displayed. 

5. To open an existing template file, click the 

button. The Select Template Configuration File dialog appears.



Use the directory tree to locate the desired file (e.g., temp1.cfg), highlight it, and then click the 

button.

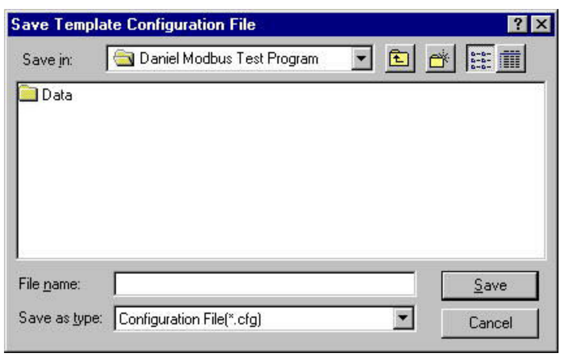
6. To edit the displayed file,

 - Use the provided combo boxes to select a different data type. The Offset and Size values change to accommodate the data type.
 - Click the 

button to change all template data types to the type last selected.

7. To save the displayed file to disk, click the 

button. The Select Template Configuration File dialog appears.



Use the directory tree to specify the desired location. Either select an existing file or type the new file name (e.g., temp2.cfg) in the *File name* data field. Then click the button.

8. Click the 

button to apply your selections and return to the main window.

Click the 

button to return to the main window without applying your selections.

10.4 Using Modbus Data

Use WinMB to poll the GC Controller Modbus registers (or, registers from another device), confirming that data is being accurately relayed from the GC Controller to the PC. Then, as necessary, assign data types to the returned data (Assign Scale Ranges for User_Modbus). You can save all settings to file for future reference.

To launch the WinMB program from MON2000, use the *File* >> *Modbus Test* menu (Starting WinMB for additional options).

10.4.1 Set Log Parameters

The Log Data function allows you to log the polled data to a specified file.

To set the log parameters for WinMB,

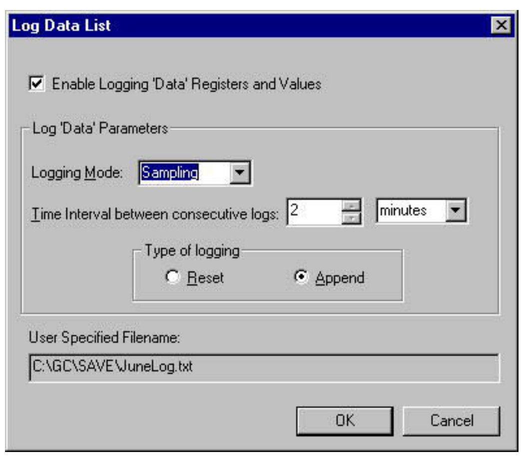
Note

The Log Data function is not required for transmission of Modbus data. To disable this function, deselect the *Enable Logging* check box.

Procedure

1. Click the 

button to access the Log Data function. The Log Data List dialog appears.
2. Click the *Enable Logging* check box to turn this function ON and to access the Log Data Parameters.
3. Use the *Logging Mode* pull-down menu to select either a Sampling or Continuous mode.



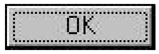
Continuous mode records the polled data continuously until the connection is terminated or the Log Data function is disabled (Step 2).

Sampling mode records the polled data per the user-defined Time Interval (e.g., every 2 minutes).

4. Select the desired logging type.

Append adds this log to the file specified, preserving previously logged data.

Reset deletes the previously logged data and saves only this new log.

5. Click the 

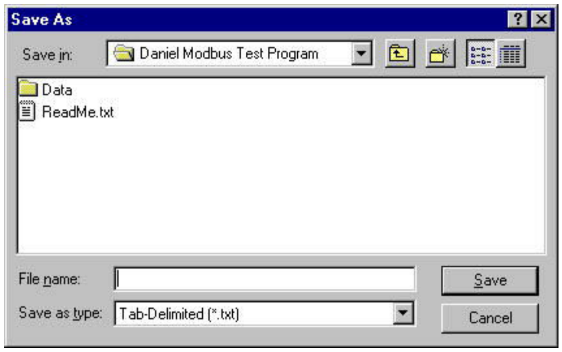
button to apply your selections and return to the main window.

   Go to Step 6.

   Click the 

button to return to the main window without applying your selections.

6. The Save As dialog appears.



   Use the directory tree to specify the desired location and choose a format type. Either select an existing file or type the new file name in the *File name* data field.

   Note
   You can save log data in any of these formats: .txt (ASCII tab-deliminated), .xls (Excel), .htm (HTML).

7. Click the  button to create this log file, apply your selections, and return to the main window.

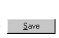
   Click the 

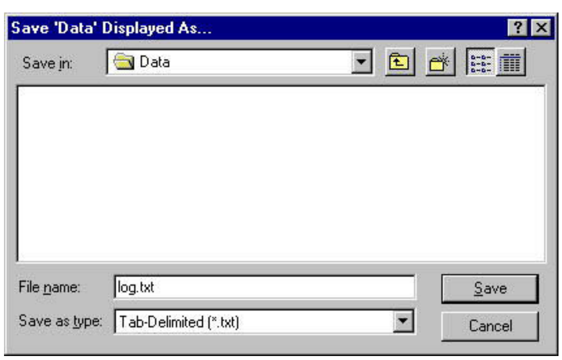
button to abort and return to the main window.

10.4.2 Save Modbus Data

To save the data table in a separate file,

Procedure

1. Click the  button to access the Save Data function. The Save Data Displayed dialog appears.



2. Use the directory tree to specify the desired location and either select an existing file or type the new file name in the *File name* data field.

   Note
   You can save log data in any of these formats: .txt (ASCII tab-deliminated), .xls (Excel), .htm (HTML).

3. Click the button to save this data and return to the main window.

   Click the 

   button to return to the main window without saving this data.

10.4.3 Assign Scale Ranges for User_Modbus

This is an optional task that applies to applications using the User_Modbus protocol. By assigning scale ranges, floating point data can be converted to integer values.

Use the Serial Ports, Edit Register List function to assign scale ranges. Registers for detailed instructions. PC Config Report for more information regarding GC Modbus registers.

10.4.4 Print Modbus Data

To print the transmitted data, click the 

button. The standard Windows® print dialog appears.

MON2000 prints the report to your configured printer (Configuring Your Printer).

10.5 Troubleshooting Communication Errors

The WinMB Communication Error Log is maintained in a circular buffer that holds up to 512 entries.

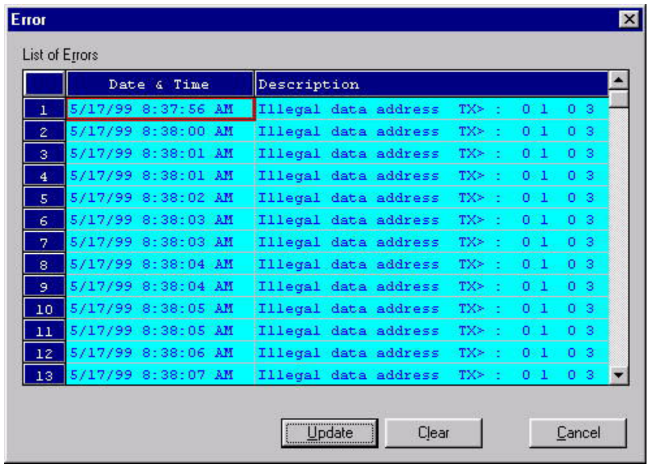
WinMB tracks the errors for a given session but does not store them. When you exit WinMB, all errors are cleared.

To view any communication errors that occurred during the data transfer, from the *File>>Modbus Test* menu,

Procedure

1. Click the 

   button to access the Communication Error Log function. The Error dialog appears.



Note
Double-click a Description cell to “scroll through” the displayed text.

2. To view all errors that have occurred in this session, click the  button.

   To delete all entries to date, click the  button.

3. Click the  button to return to the main window.

10.6 Using Modbus Test Online Help

Use the WinMB online help file to quickly access reference terminology, function descriptions, and other related information.

See the following sections for more information.

10.6.1 How to Access

To access online help, use the *File>>Modbus Test* menu to display the Modbus Help test dialog, then,

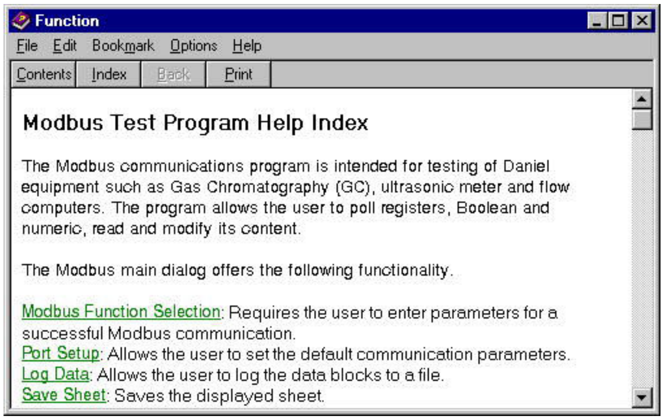
Procedure

1. Press F1 on your PC keyboard

   Or,

2. Click the  button located on the toolbar.

The Modbus Test Program Help Index displays.



10.6.2 How to Navigate

To navigate within this help file,

Procedure

1. Click the Contents button to display an index, a topic-tree contents menu, and a search function.
2. Click the Index button to display an index where you can select a specific term.
3. Click the Back button to return to the last topic viewed.
4. Click the Print button to print the current topic.

Use the scroll bars and arrows to display more of a topic. You can also resize and/or move the topic window for better viewing convenience.

When applicable, a topic will contain links to other related topics. Use these links as you need.

A PC Config Report

This appendix explains how to print a PC Config Report and provides an example for reference.

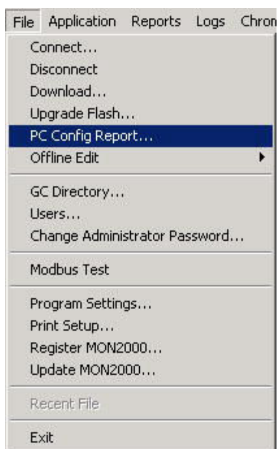
A.1 How to Print

Use the following instructions to print the current application settings for the online GC. To view a PC Config Report already saved to disk, View Report from File.

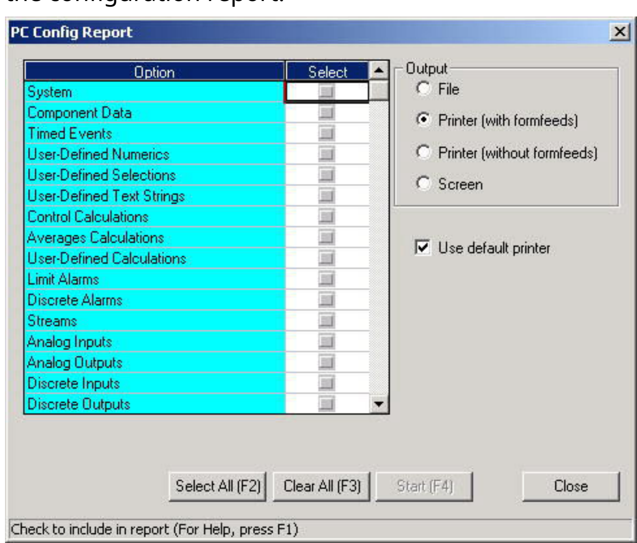
Note
Output data for the PC Config Report depends on the GC Controller and its application.

Procedure

1. Use the *File* >> *PC Config Report* menu to access this function. The PC Config Report window appears.



2. Click the check boxes (see *Select* column) to choose the option you want included in the configuration report.



Click the Select All (F2) button or press the F2 key to select all options.

Click the Clear All (F3) button or press F3 to deselect (i.e., clear) all checked options.

3. Use the *Output* radio buttons to either save the report to disk, print the report with or without form feeds, or display on screen.

Note

If you are online with the GC Controller, a PC Config Report that includes all options can require up to 20 minutes to generate and save. Printing a full report can take longer.

If you press the ESC key, MON2000 will stop after the current option is completed.

If you want to use the standard Windows® Print dialog to select a printer, uncheck the Use *default printer* option.

4. Click Start (F4) the button or press the F4 key to generate your customized PC Config Report and print or save this file.

   By default, if a print option is selected, MON2000 will print the report to your configured printer (Configuring Your Printer).

A.2 Example Report

This example PC Config Report, on the following pages, represents a typical report that includes all sections. It is provided for reference only.

```
System Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

Description                Value

-----------------------------------------------------------------------
---------

Stream Sequence            1

Aux. Stream Sequence

Analyzer Name              2350_001

Unit Type                  2350

System Description         2350 Standard 1 - 64 avgs

Chromatogram Buffers Size  21000

Max Peaks                   64

Number of Valves             5

Daylight Saving Time       Normal

CGM Analog Output Config     0

Baseline Offset             12
```

```
CFG Baseline Number         1

Metric Base Conditions    Off

Max. Archive Averages      64

Max. Archive Avg. Records  64

CFG Revision Level        150

CFG Base Name             USASTD1

***********************************************************************
*********

Component Data Table Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

Component Data Table #1

No.  Component       U/S DetID RetTime  Resp Factor F/V        CalConc
AnalMthd

-----------------------------------------------------------------------
---------

1 C6+ 47/35/17     STD     1    30.2      2013490 VAR       0.0289
%     AREA

2 PROPANE          STD     1    50.2      1316330 VAR          1.0
%     AREA

3 i-BUTANE         STD     1    65.7      1520820 VAR          0.3
%     AREA

4 n-BUTANE         STD     1    73.6      1545350 VAR          0.3
%     AREA

5 NEOPENTANE       STD     1    86.3      1651260 VAR          0.1
%     AREA

6 i-PENTANE        STD     1   109.4      1715050 VAR       0.0993
%     AREA

7 n-PENTANE        STD     1   121.6      1793230 VAR       0.0999
%     AREA

8 NITROGEN         STD     1   149.5       782820 VAR          2.5
%     AREA

9 METHANE          STD     1   153.1       637330 VAR      89.5719
%     AREA

10 CARBON DIOXIDE   STD     1   179.2       953088 VAR          1.0
%    AREA

11 ETHANE           STD     1   200.6      1060440 VAR          5.0
%    AREA


No.  Component       RTDev  SecDev Updt   RFDev  GRSBTU  NETBTU
MolWgt  AGA8
```

```
---------------------------------------------------------------------------
---------

1 C6+ 47/35/17          3       2 CAL       10  5288.7  4900.5   95.96
C6mix1

2 PROPANE               3       2 CAL       10  2521.9  2320.3    44.1
PROPANE

3 i-BUTANE              3       2 CAL       10  3259.4  3007.3   58.12
i-BUTANE

4 n-BUTANE              3       2 CAL       10  3269.8  3017.4   58.12
n-BUTANE

5 NEOPENTANE            3       3 CAL       10  3993.9  3691.4   72.15
i-PENTANE

6 i-PENTANE             3       4 CAL       10  4010.2  3707.6   72.15
i-PENTANE

7 n-PENTANE             3       4 CAL       10  4018.2  3715.5   72.15
n-PENTANE

8 NITROGEN              3       2 CAL       10       0       0   28.01
NITROGEN

9 METHANE               3       3 CAL       10  1012.3   911.5   16.04
METHANE

10 CARBON DIOXIDE        3       4 CAL       10       0       0
44.01 CO2

11 ETHANE                3       5 CAL       10  1773.7  1622.4
30.07 ETHANE


No.  Component             Lb/Gal  GPMFactor Reid Vapor  RelDenGas
RelDenLqd

---------------------------------------------------------------------------
---------

1 C6+ 47/35/17          5.6681     0.4462     3.0194     3.3132
0.68

2 PROPANE                4.227     0.2756     188.64     1.5226
0.507

3 i-BUTANE               4.693     0.3271     72.591     2.0068
0.5629

4 n-BUTANE               4.869     0.3153     51.709     2.0068
0.584

5 NEOPENTANE             4.975      0.383       35.9     2.4911
0.5967

6 i-PENTANE              5.206     0.3661     20.445     2.4912
0.6244

7 n-PENTANE              5.261     0.3622     15.574     2.4912
0.6311
```

```
8 NITROGEN                6.748     0.1096          0     0.9672
0.8094

9 METHANE                   2.5     0.1695       5000
0.5539        0.3

10 CARBON DIOXIDE          6.82     0.1704          0     1.5196
0.818

11 ETHANE                  2.97     0.2675        800     1.0382
0.3562



No. Component        HVSupMJ/m3 HVInfMJ/m3 HVSupMJ/kg HVInfMJ/kg
M_RelDens

----------------------------------------------------------------------
---------

1 C6+ 47/35/17          196.98     182.52     48.557      44.99
0.6803

2 PROPANE               93.936      86.42     50.368      46.34
0.5078

3 i-BUTANE              121.41     112.01     49.388      45.57
0.5635

4 n-BUTANE              121.79      112.4     49.546      45.72
0.5846

5 NEOPENTANE            148.76     137.49      48.75
45.06          0

6 i-PENTANE             149.36     138.09     48.949      45.25
0.6249

7 n-PENTANE             149.66     138.38     49.045      45.35
0.6316

8 NITROGEN                   0          0          0          0
0.8093

9 METHANE               37.708     33.948     55.575     50.034
0.3

10 CARBON DIOXIDE            0          0          0          0
0.8227

11 ETHANE                66.065      60.43      51.95      47.52
0.3581

**********************************************************************
*********

Timed Event Table Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49



  Timed Event Table #1
```

```
 Analysis Time 225  Cycle Time  240  Sample Valve Y N N N N
------------------------------------------------------------------------
---------

 Valve #  2       ON     @    0.0

 Inhibit          ON  1  @    0.0

 Valve #  3       ON     @    2.0

 Slope Sens         8 1  @    3.0

 Detector  1          6  @    4.0

 Valve #  1       ON     @    5.0

 Strm Switch             @    7.0

 Peak Width         4 1  @    8.0

 Valve #  1       OFF    @   10.0

 Valve #  2       OFF    @   23.0

 Inhibit          OFF 1  @   26.0

 Inhibit          ON  1  @   36.0

 Valve #  3       OFF    @   42.0

 Inhibit          OFF 1  @   46.0
```

```
  Inhibit          ON  1  @   97.0


  Peak Width         8 1  @  100.0


  Inhibit          OFF 1  @  101.0


  Inhibit          ON  1  @  139.0


  Detector  1          1  @  140.0


  Valve #  3       ON     @  142.0


  Peak Width         3 1  @  143.0


  Inhibit          OFF 1  @  146.0


  Detector  1          5  @  169.0


  Inhibit          ON  1  @  170.0


  Peak Width         8 1  @  173.0


  Inhibit          OFF 1  @  174.0


  Inhibit          ON  1  @  223.0
**********************************************************************
*********
User-Defined Numeric Report from 2350_001 2350_001.BIN
6/2/2000 15:02:49
No. Name             Type                    Value
----------------------------------------------------------------------
---------


  No entries found.
```

```
*************************************************************************
*********
User-Defined Selection Report from 2350_001 2350_001.BIN
6/2/2000 15:02:49
No.   Name           Options
-------------------------------------------------------------------------
---------
1    EnableCalMan         2
2    EnableComAlm         2
4    Maint_mode           1
5    Run_Aux_Seq          1


         Options for EnableCalMan
         ---------------------------

         No. Name
         ----------------------


         1   DISABLE


         2   ENABLE


         Options for EnableComAlm
        ---------------------------


         No. Name
        ----------------------


         1   DISABLE


         2   ENABLE_NC


         3   ENABLE_NO


         Options for Maint_mode
        ---------------------------
```

```
        No. Name
      ----------------------


        1   OFF


        2   ON


        Options for Run_Aux_Seq
      ---------------------------


        No. Name
      ----------------------

        1   OFF

        2   ON
***********************************************************************
*********
User-Defined Text Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No. Name          Size Text

-----------------------------------------------------------------------
---------

1 rpt_header1      50 Company: Industries

2 rpt_header2      50

***********************************************************************
*********
Calculation Control Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

Description                                 1  2  3  4  5  6  7  8

-----------------------------------------------------------------------
---------

Avg Limit Alarm Test                        Y  Y  Y  Y  Y  Y  Y  Y

Mole Percent                                Y  Y  Y  Y  Y  Y  Y  Y

Liquid Volume                               N  N  N  N  N  N  N  N

Weight Percent                              N  N  N  N  N  N  N  N

Normalize Results                           N  N  N  N  N  N  N  N
```

Gas Density	N	N	N	N	N	N	N	N
Liquid Density	N	N	N	N	N	N	N	N
Relative Density Gas	N	N	N	N	N	N	N	N
Relative Density Lqd	N	N	N	N	N	N	N	N
Compressibility	N	N	N	N	N	N	N	N
Dry Gross Heating BTU	N	N	N	N	N	N	N	N
Sat Gross Heating BTU	N	N	N	N	N	N	N	N
Actual Gross Heating BTU	N	N	N	N	N	N	N	N
Dry Net Heating BTU	N	N	N	N	N	N	N	N
Sat Net Heating BTU	N	N	N	N	N	N	N	N
Actual Net Heating BTU	N	N	N	N	N	N	N	N
Wobbe Index	N	N	N	N	N	N	N	N
Reid Vapor Pressure	N	N	N	N	N	N	N	N
Gallons/1000 SCF C2+	N	N	N	N	N	N	N	N
Gallons/1000 SCF C3+	N	N	N	N	N	N	N	N
Gallons/1000 SCF C4+	N	N	N	N	N	N	N	N
Gallons/1000 SCF C5+	N	N	N	N	N	N	N	N
Gallons/1000 SCF C6+	N	N	N	N	N	N	N	N
User Flag 1	N	N	N	N	N	N	N	N
Average Molecular Wgt	N	N	N	N	N	N	N	N
HeatVal Sup Dry MJ/m3	N	N	N	N	N	N	N	N
HeatVal Sup Sat MJ/m3	N	N	N	N	N	N	N	N
HeatVal Sup Act MJ/m3	N	N	N	N	N	N	N	N
HeatVal Inf Dry MJ/m3	N	N	N	N	N	N	N	N
HeatVal Inf Sat MJ/m3	N	N	N	N	N	N	N	N
HeatVal Inf Act MJ/m3	N	N	N	N	N	N	N	N
HeatVal Sup Dry MJ/kg	N	N	N	N	N	N	N	N
HeatVal Inf Dry MJ/kg	N	N	N	N	N	N	N	N
HeatVal Sup Dry Kc/m3	N	N	N	N	N	N	N	N
HeatVal Sup Sat Kc/m3	N	N	N	N	N	N	N	N
HeatVal Sup Act Kc/m3	N	N	N	N	N	N	N	N
HeatVal Inf Dry Kc/m3	N	N	N	N	N	N	N	N
HeatVal Inf Sat Kc/m3	N	N	N	N	N	N	N	N

```
HeatVal Inf Act Kc/m3                      N  N  N  N  N  N  N  N

HeatVal Sup Dry Kc/kg                      N  N  N  N  N  N  N  N

HeatVal Inf Dry Kc/kg                      N  N  N  N  N  N  N  N

Metric Rel Dens Lqd                        N  N  N  N  N  N  N  N

Metric Gas Density                         N  N  N  N  N  N  N  N

Metric Lqd Density                         N  N  N  N  N  N  N  N

***********************************************************************
*********

Calculation Average Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49


  Resets


  Time: 00:00


  Weekday: Sun


  Day of Month: 1

No. Variable Name                 S  C

-----------------------------------------------------------------------
---------

Hourly

  No entries found.

24 Hour

  No entries found.

Weekly

  No entries found.

Monthly

  No entries found.

Variable

  No entries found.

***********************************************************************
*********

Calculation User-Defined Report from 2350_001 2350_001.BIN
```

```
6/2/2000 15:02:49

No.  Variable                       S     C

-----------------------------------------------------------------------
---------
   1 label 1
       Avg. Molecular Weight          1     1
     + Gallons/1000 SCF               1     1
     * Gas Density lbm/1000 ft3       1     1
     / Heating Value Gross BTU Dry    1     1
     - Mole Percent                   1     1
   2 label 2
       Gallons/1000 SCF               1     2
     + Gallons/1000 SCF               1     3
     + User Calc Result               1     1
     + Value  1: 16.2                 1     1

***********************************************************************
*********

Limit Alarms Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No. Variable                            S   C  DO  Type

-----------------------------------------------------------------------
---------



  No entries found.

***********************************************************************
*********

Discrete Alarms Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

   Alarm    Discrete   Discrete     Alarm Message
    No.     Input      Output

-----------------------------------------------------------------------
---------
     1        0        0
     2        0        0
     3        0        0
     4        0        0
     5        0        0

***********************************************************************
*********

Streams Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49
                                          Cal Data              Base
Condition

No.    Name        Use Det  CD  TE Tot Avg Start    Int Auto
PSIA         °F
```

```
----------------------------------------------------------------------
---------

1 Stream 1        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

2 Stream 2        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

3 Stream 3        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

4 Stream 4        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

5 Stream 5        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

6 Stream 6        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

7 Stream 7        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

8 Stream 8        ANL Det1  1  1   5   3 07:00     24 Y  Y
14.73        60

No calibration streams defined

Optional Base Pressures

No. Name           Op Base Pres 1  Op Base Pres 2  Op Base Pres 3

----------------------------------------------------------------------
---------

1  Stream 1                  0               0               0

2  Stream 2                  0               0               0

3  Stream 3                  0               0               0

4  Stream 4                  0               0               0

5  Stream 5                  0               0               0

6  Stream 6                  0               0               0

7  Stream 7                  0               0               0

8  Stream 8                  0               0               0

**********************************************************************
*********

Analog Input Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No. Label                  Zero Scale   Full Scale F/V  Fixed Value

----------------------------------------------------------------------
---------

1  AI 1                          0          100 VAR            0
```

```
************************************************************************
*********

Analog Output Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.     Variable                           S          C

------------------------------------------------------------------------
---------

1      Mole Percent                       1          1

No.    Zero Scale    Full Scale F/V   Fixed Value

------------------------------------------------------------------------
---------

1             0           100  VAR           0

Bargraph

No. Variable                          Streams
Component

------------------------------------------------------------------------
---------

1  Mole Percent                      1
1

2  Not Used
1

3  Not Used
1

4  Not Used
1

5  Not Used
1

6  Not Used
1

7  Not Used
1

8  Not Used
1

9  Not Used
1

10  Not
Used                                                            1

11  Not
Used                                                            1

12  Not
Used                                                            1
```

```
13  Not
Used                                                            1

14  Not
Used                                                            1

15  Not
Used                                                            1

16  Not
Used                                                            1

Scaling Values

No.        Zero Scale     Full Scale

-----------------------------------------------------------------------
---------

1                  0          100

2                  0          100

3                  0          100

4                  0          100

5                  0          100

6                  0          100

7                  0          100

8                  0          100

9                  0          100

10                  0          100

11                  0             0

12                  0             0

13                  0             0

14                  0             0

15                  0             0

16                  0             0

***********************************************************************
*********

Discrete Input Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.     Label           Switch

-----------------------------------------------------------------------
---------

1      DI 1            AUTO
```

```
2      DI 2            AUTO

3      DI 3            AUTO

4      DI 4            AUTO

5      AUX_STRM_SEQ    AUTO

***********************************************************************
*********

Discrete Output Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.     Label           Switch  On-Time   Off-Time

-----------------------------------------------------------------------
---------

1      DO 1            AUTO    00:00     00:00

2      DO 2            AUTO    00:00     00:00

3      DO 3            AUTO    00:00     00:00

4      Common_Alarm    AUTO    00:00     00:00

5      Calib-Maint     AUTO    00:00     00:00

***********************************************************************
*********

Valve Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.     Label           Switch

-----------------------------------------------------------------------
---------

1      Valve 1         AUTO

2      Valve 2         AUTO

3      Valve 3         AUTO

4      Valve 4         AUTO

5      Valve 5         AUTO

***********************************************************************
*********

Serial Port Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49
                    Baud Data Stop        Hand-     RTS  RTS
Comm Read

Port Usage          Rate Bits Bits Parity shaking   ON   OFF Protocol
ID   Write
```

```
-----------------------------------------------------------------------
---------

1   USER_MODBUS    9600    8    1  None  None       0    0 RTU
0    RW

2   SIM_2251       9600    8    1  None  None       0    0 RTU
3    RW

3   PC             9600    8    1  None  None       0    0 RTU
0    RW

4   PC             9600    8    1  None  None       0    0 RTU
0    RW

***********************************************************************
*********

Global Data Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.   Variable name          Indices   Type      No. of Chars.
                              S    C

-----------------------------------------------------------------------
---------

  1   cal_run_num             1    1   Integer

  2   sim_abtu                1    1   Float

  3   sim_alarm              16    1   Integer

  4   sim_anlytime            1    1   Integer

  5   sim_cal                 1    1   Integer

  6   sim_cal_abtu            1    1   Float

  7   sim_cal_comp            1    1   Float

  8   sim_cal_dbtu            1    1   Float

  9   sim_cal_gpm             1    1   Float

 10   sim_cal_rden            1    1   Float

 11   sim_cal_sbtu            1    1   Float

 12   sim_cal_unno            1    1   Float

 13   sim_cal_wobb            1    1   Float

 14   sim_calcycle            1    1   Long

 15   sim_char                1    1   Char          1

 16   sim_compno             16    4   Integer

 17   sim_compress            1    1   Float

 18   sim_cycday              1    1   Integer

 19   sim_cychour             1    1   Integer
```

```
 20   sim_cycmin               1    1   Integer
 21   sim_cycmonth             1    1   Integer
 22   sim_cyctime              1    1   Long
 23   sim_cycyear              1    1   Integer
 24   sim_day                  1    1   Integer
 25   sim_dbtu                 1    1   Float
 26   sim_dummy                4    1   Float
 27   sim_gpmwt               16    4   Float
 28   sim_hour                 1    1   Integer
 29   sim_min                  1    1   Integer
 30   sim_molpct              16    4   Float
 31   sim_month                1    1   Integer
 32   sim_newdata              1    1   Integer
 33   sim_rden_gas             1    1   Float
 34   sim_rf                  16    4   Float
 35   sim_sbtu                 1    1   Float
 36   sim_smask                1    1   Integer
 37   sim_stream               1    1   Integer
 38   sim_totgpm               1    1   Float
 39   sim_unnormal             1    1   Float
 40   sim_wobbe                1    1   Float
 41   sim_year                 1    1   Integer
************************************************************************
*********
Streams Data Report from 2350_001 2350_001.BIN
6/2/2000 15:02:49
No. Structure Name No. of Streams
------------------------------------------------------------------------
---------

  No entries found.
************************************************************************
*********
Component Data Report from 2350_001 2350_001.BIN
```

```
6/2/2000 15:02:49

No. Structure Name No. of Streams No. of Components
                                    per Stream

-----------------------------------------------------------------------
---------



  No entries found.

***********************************************************************
*********

Data Files Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49

No.   File Name       No. of Records

-----------------------------------------------------------------------
---------



  1   Event_Log        240



         File Name Event_Log
        ---------------------------



  No.  Field Name        Type    No. of Chars.

--------------------------------------------------
    1  date              Float
    2  time              Float
    3  operator_id       Char       4
    4  event_id          Float
    5  ASCII_text        Char      60
    6  prev_value        Float
    7  curr_value        Float

***********************************************************************
*********

Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49



  No.     Name         Page    Page    Left   Right    Top    Bottom
                       Width  Length  Margin  Margin  Margin  Margin

-----------------------------------------------------------------------
---------

    1     Analysis      150     55      0       0       0       0
    2     Raw Data       80     55      1       0       0       0
    3     Calibration    80     55      1       0       0       0
```

```
    4     Final Calib    80     55       1       0       0       0
    5     Hourly Avg     80     55       0       0       0       0
    6     24 Hour Avg    80     55       0       0       0       0
    7     Weekly Avg     80     55       0       0       0       0
    8     Monthly Avg    80     55       0       0       0       0
    9     Variable Avg   80     55       0       0       0       0


      Field List used in Analysis
     --------------------------------

      Type            Variable SubField Name         Indices
CP Flag

----------------------------------------------------------------------
--

STRING                                                              0

STRING                                                              0
      DATE
      DATE

STRING                                                              0
      VARIABLE stream_data   anly_time      STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   cycl_time      STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   stream_num     STREAM_NO
1          0
      VARIABLE strms         name           STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   run_mode       STREAM_NO
1          0

STRING                                                              0
      TIME VAR stream_data   cycl_strt_tm   STREAM_NO
1          0

STRING                                                              0
      VARIABLE anlyzr_name                         1
1          0

STRING                                                              0
      VARIABLE seqtxt                          DET NO
1          0

      VARIABLE rpt_header1                         1
1          0
      VARIABLE rpt_header2                         1
1          0

TABLE                                                               2
        TVAR   cdt           stdusr        CDT_TBL_NO
1*         0
        TVAR   cdt           compnam       CDT_TBL_NO
1*         0
        TVAR   analysis      molpct         STREAM_NO
1*        25
```

```
        TVAR   analysis      wtpct          STREAM_NO
1*        26
        TVAR   analysis      liqvolpct      STREAM_NO
1*        27
        TVAR   analysis      gpm            STREAM_NO
1*        28
        TVAR   analysis      btu_gross      STREAM_NO
1*        29
        TVAR   analysis      btu_net        STREAM_NO
1*        30
        TVAR   analysis      rel_den_gas    STREAM_NO
1*        31
        TVAR   analysis      superior_m3    STREAM_NO
1*        54
        TVAR   analysis      inferior_m3    STREAM_NO
1*        55
        TVAR   analysis      superior_kg    STREAM_NO
1*        56
        TVAR   analysis      inferior_kg    STREAM_NO
1*        57

STRING                                                                  0
      VARIABLE stream_data   totl_mole      STREAM_NO
1          0
      VARIABLE stream_data   totl_molwgt    STREAM_NO
1          0
      VARIABLE stream_data   totl_liqvol    STREAM_NO
1          0
      VARIABLE stream_data   totl_gpmc2     STREAM_NO
1          0
      VARIABLE stream_data   totl_btugros   STREAM_NO
1          0
      VARIABLE stream_data   totl_btu_net   STREAM_NO
1          0
      VARIABLE stream_data   totl_rd_gas    STREAM_NO
1          0
      VARIABLE stream_data   totl_sm3_dry   STREAM_NO
1          0
      VARIABLE stream_data   totl_im3_dry   STREAM_NO
1          0
      VARIABLE stream_data   totl_skg_dry   STREAM_NO
1          0
      VARIABLE stream_data   totl_ikg_dry   STREAM_NO
1          0

STRING                                                                  0

STRING                                                                 32
      VARIABLE strms         base_pres      STREAM_NO
1          0

STRING                                                                250

STRING                                                                251

      VARIABLE strms         base_temp      STREAM_NO
1          0

STRING                                                                 32

STRING                                                                250

STRING                                                                251

STRING                                                                 32
```

```
      VARIABLE stream_data   z_factor       STREAM_NO
1          0

STRING                                                               0
      VARIABLE strms         base_pres      STREAM_NO
1          0
      VARIABLE op_pressures                 STREAM_NO
1          0
      VARIABLE op_pressures                 STREAM_NO
2          0
      VARIABLE op_pressures                 STREAM_NO
3          0

STRING                                                               0

STRING                                                              81

STRING                                                              82

STRING                                                              83

STRING                                                              29

STRING                                                              29
      VARIABLE stream_data   btudry_gross   STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
13          0
      VARIABLE op_pres_calc                 STREAM_NO
25          0

STRING                                                              43

STRING                                                              39

STRING                                                              39
      VARIABLE stream_data   btusat_gross   STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
2          0
      VARIABLE op_pres_calc                 STREAM_NO
14          0
      VARIABLE op_pres_calc                 STREAM_NO
26          0

STRING                                                              44

STRING                                                              40

STRING                                                              40
      VARIABLE stream_data   btuact_gross   STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
3          0

      VARIABLE op_pres_calc                 STREAM_NO
15          0
      VARIABLE op_pres_calc                 STREAM_NO
27          0

STRING                                                              52

STRING                                                              30
```

```
STRING                                                                30
      VARIABLE stream_data   btu_dry_net    STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
4          0
      VARIABLE op_pres_calc                 STREAM_NO
16          0
      VARIABLE op_pres_calc                 STREAM_NO
28          0

STRING                                                                45

STRING                                                                41

STRING                                                                41
      VARIABLE stream_data   btu_sat_net    STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
5          0
      VARIABLE op_pres_calc                 STREAM_NO
17          0
      VARIABLE op_pres_calc                 STREAM_NO
29          0

STRING                                                                46

STRING                                                                42

STRING                                                                42
      VARIABLE stream_data   btu_act_net    STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
6          0
      VARIABLE op_pres_calc                 STREAM_NO
18          0
      VARIABLE op_pres_calc                 STREAM_NO
30          0

STRING                                                                53

STRING                                                                47
      VARIABLE stream_data   totl_gpmc2     STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
8          0
      VARIABLE op_pres_calc                 STREAM_NO
20          0
      VARIABLE op_pres_calc                 STREAM_NO
32          0

STRING                                                                48
      VARIABLE stream_data   totl_gpmc3     STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
9          0
      VARIABLE op_pres_calc                 STREAM_NO
21          0

      VARIABLE op_pres_calc                 STREAM_NO
33          0

STRING                                                                49
      VARIABLE stream_data   totl_gpmc4     STREAM_NO
1          0
```

```
      VARIABLE op_pres_calc                  STREAM_NO
10          0
      VARIABLE op_pres_calc                  STREAM_NO
22          0
      VARIABLE op_pres_calc                  STREAM_NO
34          0

STRING                                                         50
      VARIABLE stream_data   totl_gpmc5      STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
11          0
      VARIABLE op_pres_calc                  STREAM_NO
23          0
      VARIABLE op_pres_calc                  STREAM_NO
35          0

STRING                                                         51
      VARIABLE stream_data   totl_gpmc6      STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
12          0
      VARIABLE op_pres_calc                  STREAM_NO
24          0
      VARIABLE op_pres_calc                  STREAM_NO
36          0

STRING                                                         59
      VARIABLE stream_data   sup_m3_dry      STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
13          0
      VARIABLE op_pres_calc                  STREAM_NO
25          0

STRING                                                        156

STRING                                                         60
      VARIABLE stream_data   sup_m3_sat      STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
2          0
      VARIABLE op_pres_calc                  STREAM_NO
14          0
      VARIABLE op_pres_calc                  STREAM_NO
26          0

STRING                                                        157

STRING                                                         61
      VARIABLE stream_data   sup_m3_act      STREAM_NO
1          0
      VARIABLE op_pres_calc                  STREAM_NO
3          0
      VARIABLE op_pres_calc                  STREAM_NO
15          0
      VARIABLE op_pres_calc                  STREAM_NO
28          0


STRING                                                        158

STRING                                                         62
```

```
      VARIABLE stream_data   inf_m3_dry     STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
4          0
      VARIABLE op_pres_calc                 STREAM_NO
16         0
      VARIABLE op_pres_calc                 STREAM_NO
28         0

STRING                                                        159

STRING                                                         63
      VARIABLE stream_data   inf_m3_sat     STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
5          0
      VARIABLE op_pres_calc                 STREAM_NO
17         0
      VARIABLE op_pres_calc                 STREAM_NO
29         0

STRING                                                        181

STRING                                                         64
      VARIABLE stream_data   inf_m3_act     STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
6          0
      VARIABLE op_pres_calc                 STREAM_NO
18         0
      VARIABLE op_pres_calc                 STREAM_NO
30         0

STRING                                                        182

STRING                                                         65
      VARIABLE stream_data   sup_kg_dry     STREAM_NO
1          0

STRING                                                        182

STRING                                                         66
      VARIABLE stream_data   inf_kg_dry     STREAM_NO
1          0

STRING                                                        184

STRING                                                         67
      VARIABLE stream_data   sdry_kcal_m3   STREAM_NO
1          0
      VARIABLE op_pres_calc                 STREAM_NO
9          0
      VARIABLE op_pres_calc                 STREAM_NO
21         0
      VARIABLE op_pres_calc                 STREAM_NO
33         0

STRING                                                        185

STRING                                                         68
      VARIABLE stream_data   ssat_kcal_m3   STREAM_NO
1          0

      VARIABLE op_pres_calc                 STREAM_NO
7          0
```

```
      VARIABLE op_pres_calc                STREAM_NO
19          0
      VARIABLE op_pres_calc                STREAM_NO
31          0

STRING                                                        186

STRING                                                         69
      VARIABLE stream_data   sact_kcal_m3   STREAM_NO
1          0
      VARIABLE op_pres_calc                STREAM_NO
8          0
      VARIABLE op_pres_calc                STREAM_NO
20          0
      VARIABLE op_pres_calc                STREAM_NO
32          0

STRING                                                        187

STRING                                                         70
      VARIABLE stream_data   idry_kcal_m3   STREAM_NO
1          0
      VARIABLE op_pres_calc                STREAM_NO
10          0
      VARIABLE op_pres_calc                STREAM_NO
22          0
      VARIABLE op_pres_calc                STREAM_NO
34          0

STRING                                                        188

STRING                                                         71
      VARIABLE stream_data   isat_kcal_m3   STREAM_NO
1          0
      VARIABLE op_pres_calc                STREAM_NO
11          0
      VARIABLE op_pres_calc                STREAM_NO
23          0
      VARIABLE op_pres_calc                STREAM_NO
35          0

STRING                                                        189


STRING                                                         72
      VARIABLE stream_data   iact_kcal_m3   STREAM_NO
1          0
      VARIABLE op_pres_calc                STREAM_NO
12          0
      VARIABLE op_pres_calc                STREAM_NO
24          0
      VARIABLE op_pres_calc                STREAM_NO
36          0

STRING                                                        190

STRING                                                         73
      VARIABLE stream_data   sdry_kcal_kg   STREAM_NO
1          0

STRING                                                        191

STRING                                                         74
      VARIABLE stream_data   idry_kcal_kg   STREAM_NO
1          0
```

```
STRING                                                                  192

STRING                                                                   31
      VARIABLE stream_data   real_rd_gas    STREAM_NO
1          0

STRING                                                                   34
      VARIABLE stream_data   real_rd_lqd    STREAM_NO
1          0

STRING                                                                   58
      VARIABLE stream_data   rden_lqd_15    STREAM_NO
1          0

STRING                                                                   58

STRING                                                                   33
      VARIABLE stream_data   totl_unrml     STREAM_NO
1          0

STRING                                                                   77
      VARIABLE stream_data   avg_molwgt     STREAM_NO
1          0

STRING                                                                   35

STRING                                                                   35
      VARIABLE stream_data   wobbe          STREAM_NO
1          0

STRING                                                                   36

STRING                                                                   36
      VARIABLE stream_data   gas_density    STREAM_NO
1          0

STRING                                                                   36

STRING                                                                   75
      VARIABLE stream_data   gas_dens_m3    STREAM_NO
1          0

STRING                                                                   75


STRING                                                                   37
      VARIABLE stream_data   lqd_density    STREAM_NO
1          0

STRING                                                                   37

STRING                                                                   76
      VARIABLE stream_data   lqd_dens_m3    STREAM_NO
1          0

STRING                                                                   76

STRING                                                                   38
      VARIABLE stream_data   reid_vapor     STREAM_NO
1          0

STRING                                                                   38

TABLE                                                                   200
```

```
        TVAR   anlin         label                  1*
1          0
        TVAR   aincur                               1*
1          0

STRING                                                             160

TABLE                                                              160
        TVAR   calcs         label                  1*
1          0
        TVAR   calcval                              1*
1          0
      * indicates index is incremented.
      Field List used in Raw Data
     ---------------------------------
      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                               0

STRING                                                               0
      DATE
      DATE

STRING                                                               0
      VARIABLE stream_data   anly_time      STREAM_NO
1          0

STRING                                                               0
      VARIABLE stream_data   cycl_time      STREAM_NO
1          0

STRING                                                               0
      VARIABLE stream_data   stream_num     STREAM_NO
1          0
      VARIABLE strms         name           STREAM_NO
1          0


STRING                                                               0
      VARIABLE stream_data   run_mode       STREAM_NO
1          0

STRING                                                               0
      TIME VAR stream_data   cycl_strt_tm   STREAM_NO
1          0

STRING                                                               0
      VARIABLE anlyzr_name                         1
1          0

STRING                                                               0
      VARIABLE seqtxt                          DET NO
1          0
      VARIABLE rpt_header1                         1
1          0
      VARIABLE rpt_header2                         1
1          0

TABLE                                                               50
        TVAR   raw_data      peak_num       STREAM_NO
1*        21
```

```
        TVAR   raw_data      rt             STREAM_NO
1*        21
        TVAR   raw_data      area           STREAM_NO
1*        21
        TVAR   raw_data      height         STREAM_NO
1*        21
        TVAR   raw_data      detector       STREAM_NO
1*        21
        TVAR   raw_data2     method         STREAM_NO
1*        21
        TVAR   raw_data3     startint       STREAM_NO
1*        21
        TVAR   raw_data3     endint         STREAM_NO
1*        21
        TVAR   raw_data3     half_height    STREAM_NO
1*        21
      * indicates index is incremented.
      Field List used in Calibration

---------------------------------
      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                                0

STRING                                                                0
      VARIABLE cal_run_num                         1
1          0

STRING                                                                0
      VARIABLE strms         nrun           STREAM_NO
1          0

STRING                                                                0
      DATE

      DATE

STRING                                                                0
      VARIABLE stream_data   anly_time      STREAM_NO
1          0

STRING                                                                0
      VARIABLE stream_data   cycl_time      STREAM_NO
1          0

STRING                                                                0
      VARIABLE stream_data   stream_num     STREAM_NO
1          0
      VARIABLE strms         name           STREAM_NO
1          0

STRING                                                                0
      VARIABLE stream_data   run_mode       STREAM_NO
1          0

STRING                                                                0
      TIME VAR stream_data   cycl_strt_tm   STREAM_NO
1          0

STRING                                                                0
      VARIABLE anlyzr_name                         1
```

```
1          0

STRING                                                              0
      VARIABLE seqtxt                         DET NO
1          0
      VARIABLE rpt_header1                        1
1          0
      VARIABLE rpt_header2                        1
1          0

TABLE                                                               2
        TVAR   cdt           compnam       CDT_TBL_NO
1*         0
        TVAR   cdt           cal_conc      CDT_TBL_NO
1*         0
        TVAR   cal_avgs      raw            STREAM_NO
1*         0
        TVAR   cal_avgs      rf             STREAM_NO
1*         0
        TVAR   cal_avgs      rfdev          STREAM_NO
1*         0
        TVAR   cal_avgs      rt             STREAM_NO
1*         0
        TVAR   cal_avgs      rtdev          STREAM_NO
1*         0

ALARMS                                                              0
      * indicates index is incremented.
      Field List used in Final Calib

---------------------------------
      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--


STRING                                                              0

STRING                                                              0
      DATE
      DATE

STRING                                                              0
      VARIABLE stream_data   anly_time      STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   cycl_time      STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   stream_num     STREAM_NO
1          0
      VARIABLE strms         name           STREAM_NO
1          0

STRING                                                              0
      VARIABLE stream_data   run_mode       STREAM_NO
1          0

STRING                                                              0
      TIME VAR stream_data   cycl_strt_tm   STREAM_NO
1          0
```

```
STRING                                                                0
      VARIABLE anlyzr_name                         1
1          0

STRING                                                                0
      VARIABLE seqtxt                          DET NO
1          0
      VARIABLE rpt_header1                         1
1          0
      VARIABLE rpt_header2                         1
1          0

TABLE                                                                 2
        TVAR   cdt            compnam       CDT_TBL_NO
1*         0
        TVAR   cdt            cal_conc      CDT_TBL_NO
1*         0
        TVAR   cal_results    oldrf          STREAM_NO
1*         0
        TVAR   cal_results    newrf          STREAM_NO
1*         0
        TVAR   cal_results    updated        STREAM_NO
1*         0
        TVAR   cal_results    rfdev          STREAM_NO
1*         0
        TVAR   cal_results    oldrt          STREAM_NO
1*         0
        TVAR   cal_results    newrt          STREAM_NO
1*         0
        TVAR   cal_results    updated        STREAM_NO
1*         0
        TVAR   cal_results    rtdev          STREAM_NO
1*         0

ALARMS                                                                0

* indicates index is incremented.
      Field List used in Hourly Avg
     ---------------------------------
      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                                0

STRING                                                                0
      VARIABLE anlyzr_name                         1
1          0
      VARIABLE rpt_header1                         1
1          0
      VARIABLE rpt_header2                         1
1          0
      VARIABLE avg_data      number                1*
1          0
      VARIABLE avg_data      label                 1*
1          0

STRING                                                                0
      VARIABLE avg_data      s                     1*
1          0

STRING                                                              129
```

```
      VARIABLE avg_data      c                      1*
1          0

STRING                                                               0

STRING                                                               0

STRING                                                               0

STRING                                                               0

STRING                                                               0

STRING                                                               0

STRING                                                               0
      VARIABLE avg_archive1  avg                    1*
1          0
      VARIABLE avg_archive1  minimum                1*
1          0
      VARIABLE avg_archive1  maximum                1*
1          0
      VARIABLE avg_archive2                         1*
1          0

STRING                                                               0
      VARIABLE avg_archive1  avg                    1*
2          0
      VARIABLE avg_archive1  minimum                1*
2          0
      VARIABLE avg_archive1  maximum                1*
2          0
      VARIABLE avg_archive2                         1*
2          0

STRING                                                               0

      VARIABLE avg_archive1  avg                    1*
3          0
      VARIABLE avg_archive1  minimum                1*
3          0
      VARIABLE avg_archive1  maximum                1*
3          0
      VARIABLE avg_archive2                         1*
3          0
      * indicates index is incremented.
      Field List used in 24 Hour Avg
     ---------------------------------
      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                               0

STRING                                                               0
      VARIABLE anlyzr_name                          1
1          0
      VARIABLE rpt_header1                          1
1          0
      VARIABLE rpt_header2                          1
1          0
      VARIABLE avg_data      number                 1*
1          0
```

```
      VARIABLE avg_data      label                 1*
1          0

STRING                                                          0
      VARIABLE avg_data      s                     1*
1          0

STRING                                                        129
      VARIABLE avg_data      c                     1*
1          0

STRING                                                          0

STRING                                                          0

STRING                                                          0

STRING                                                          0

STRING                                                          0

STRING                                                          0

STRING                                                          0
      VARIABLE avg_archive1  avg                   1*
1          0
      VARIABLE avg_archive1  minimum               1*
1          0
      VARIABLE avg_archive1  maximum               1*
1          0
      VARIABLE avg_archive2                        1*
1          0

STRING                                                          0
      VARIABLE avg_archive1  avg                   1*
2          0
      VARIABLE avg_archive1  minimum               1*
2          0
      VARIABLE avg_archive1  maximum               1*
2          0
      VARIABLE avg_archive2                        1*
2          0


STRING                                                          0
      VARIABLE avg_archive1  avg                   1*
3          0
      VARIABLE avg_archive1  minimum               1*
3          0
      VARIABLE avg_archive1  maximum               1*
3          0
      VARIABLE avg_archive2                        1*
3          0
      * indicates index is incremented.
      Field List used in Weekly Avg
     ---------------------------------
      Type           Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                          0

STRING                                                          0
```

```
      VARIABLE anlyzr_name                         1
1          0
      VARIABLE rpt_header1                         1
1          0
      VARIABLE rpt_header2                         1
1          0
      VARIABLE avg_data      number                1*
1          0
      VARIABLE avg_data      label                 1*
1          0

STRING                                                              0
      VARIABLE avg_data      s                     1*
1          0

STRING                                                            129
      VARIABLE avg_data      c                     1*
1          0

STRING                                                              0

STRING                                                              0

STRING                                                              0

STRING                                                              0

STRING                                                              0

STRING                                                              0

STRING                                                              0
      VARIABLE avg_archive1  avg                   1*
1          0
      VARIABLE avg_archive1  minimum               1*
1          0
      VARIABLE avg_archive1  maximum               1*
1          0

      VARIABLE avg_archive2                        1*
1          0

STRING                                                              0
      VARIABLE avg_archive1  avg                   1*
2          0
      VARIABLE avg_archive1  minimum               1*
2          0
      VARIABLE avg_archive1  maximum               1*
2          0
      VARIABLE avg_archive2                        1*
2          0

STRING                                                              0
      VARIABLE avg_archive1  avg                   1*
3          0
      VARIABLE avg_archive1  minimum               1*
3          0
      VARIABLE avg_archive1  maximum               1*
3          0
      VARIABLE avg_archive2                        1*
3          0
      * indicates index is incremented.
      Field List used in Monthly Avg
     ---------------------------------
      Type            Variable SubField Name         Indices
```

```
CP Flag

-----------------------------------------------------------------------
--

STRING                                                                0

STRING                                                                0
      VARIABLE anlyzr_name                     1
1          0
      VARIABLE rpt_header1                     1
1          0
      VARIABLE rpt_header2                     1
1          0
      VARIABLE avg_data      number            1*
1          0
      VARIABLE avg_data      label             1*
1          0

STRING                                                                0
      VARIABLE avg_data      s                 1*
1          0

STRING                                                              129
      VARIABLE avg_data      c                 1*
1          0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0


STRING                                                                0

STRING                                                                0
      VARIABLE avg_archive1  avg               1*
1          0
      VARIABLE avg_archive1  minimum           1*
1          0
      VARIABLE avg_archive1  maximum           1*
1          0
      VARIABLE avg_archive2                    1*
1          0

STRING                                                                0
      VARIABLE avg_archive1  avg               1*
2          0
      VARIABLE avg_archive1  minimum           1*
2          0
      VARIABLE avg_archive1  maximum           1*
2          0
      VARIABLE avg_archive2                    1*
2          0

STRING                                                                0
      VARIABLE avg_archive1  avg               1*
3          0
      VARIABLE avg_archive1  minimum           1*
3          0
```

```
      VARIABLE avg_archive1  maximum                1*
3          0
      VARIABLE avg_archive2                         1*
3          0
      * indicates index is incremented.
      Field List used in Variable Avg
     ---------------------------------

      Type            Variable SubField Name         Indices
CP Flag

-----------------------------------------------------------------------
--

STRING                                                                0

STRING                                                                0
      VARIABLE anlyzr_name                          1
1          0
      VARIABLE rpt_header1                          1
1          0
      VARIABLE rpt_header2                          1
1          0
      VARIABLE avg_data      number                 1*
1          0
      VARIABLE avg_data      label                  1*
1          0

STRING                                                                0
      VARIABLE avg_data      s                      1*
1          0

STRING                                                              129
      VARIABLE avg_data      c                      1*
1          0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0

STRING                                                                0
      VARIABLE avg_archive1  avg                    1*
1          0
      VARIABLE avg_archive1  minimum                1*
1          0
      VARIABLE avg_archive1  maximum                1*
1          0
      VARIABLE avg_archive2                         1*
1          0

STRING                                                                0
      VARIABLE avg_archive1  avg                    1*
2          0
      VARIABLE avg_archive1  minimum                1*
2          0
      VARIABLE avg_archive1  maximum                1*
2          0
```

```
      VARIABLE avg_archive2                        1*
2          0

STRING                                                            0
      VARIABLE avg_archive1  avg                   1*
3          0
      VARIABLE avg_archive1  minimum               1*
3          0
      VARIABLE avg_archive1  maximum               1*
3          0
      VARIABLE avg_archive2                        1*
3          0
      * indicates index is incremented.

***********************************************************************
*********

Communication Report from 2350_001 2350_001.BIN

6/2/2000 15:02:49



  Slave Name     Slave ID        Slave Type

-----------------------------------------------------------------------
------------



  USER_MODBUS      0             PLC Emulation - Low-Hi



  SIM_2251         3              2500 Emulation



  USER_MODBUS

-------------

Modbus   Variable      Field     Indices   Data
String                  Override

Reg.     Name          Name       S   C    Type
Length                    Keylock?

-----------------------------------------------------------------------
------------



  Boolean(Coils)
    0  sysalarm_set              1   1    Application Checksum
Failure             No
    1  sysalarm_set              2   1    ROM Checksum
Failure                     No
    2  sysalarm_set              3   1    RAM Diagnostics
Failure                  No
    3  sysalarm_set              4   1    A/D Converter
Failure                    No
    4  sysalarm_set              5   1    Detector Oven
Failure                    No
    5  sysalarm_set              6   1    Liquid Sample Valve Heater
```

```
Failure        No
    6  sysalarm_set              7   1    Sample System Oven
Failure                No
    7  sysalarm_set              8   1    Catalytic Converter
Failure               No
    8  sysalarm_set              9   1    Heater 5
Failure                          No
    9  sysalarm_set             10   1    Heater 6
Failure                          No
   10  sysalarm_set             11   1    Heater 1 Controller
Failure               No
   11  sysalarm_set             12   1    Heater 2 Controller
Failure               No
   12  sysalarm_set             13   1    Heater 3 Controller
Failure               No
   13  sysalarm_set             14   1    Heater 4 Controller
Failure               No
   14  sysalarm_set             15   1    Heater 5 Controller
Failure               No
   15  sysalarm_set             16   1    Heater 6 Controller
Failure               No
   16  sysalarm_set             17   1    FID Flame
out                             No
   17  sysalarm_set             18   1    Warmstart Calibration
Failure             No
   18  sysalarm_set             19   1    Valve Timing
Failure                      No
   19  sysalarm_set             20   1    Excess Response Factor
Deviation          No
   20  sysalarm_set             21   1    M200 Invalid Non-Volatile
Data            No
   21  sysalarm_set             22   1    M200 Invalid A Module
Data                No
   22  sysalarm_set             23   1    M200 Invalid B Module
Data                No
   23  sysalarm_set             24   1    M200 Bad
Options                          No
   24  sysalarm_set             25   1    M200 Stack
Overflow                       No
   25  sysalarm_set             26   1    M200 Hardware
Shutdown                    No
   26  sysalarm_set             27   1    M200 Synchronization
Failure              No
   27  sysalarm_set             28   1    Preamp Input 1 Out of Range
- DET1        No
   28  sysalarm_set             29   1    Preamp Input 2 Out of Range
- DET1        No
   29  sysalarm_set             30   1    Preamp Input 3 Out of Range
- DET1        No
   30  sysalarm_set             31   1    Preamp Input 4 Out of Range
- DET1        No
   31  sysalarm_set             32   1    Preamp Failure -
DET1                     No
   32  sysalarm_set             33   1    Analog Output 1
HIGH                      No
   33  sysalarm_set             34   1    Analog Output 2
HIGH                      No
   34  sysalarm_set             35   1    Analog Output 3
HIGH                      No
   35  sysalarm_set             36   1    Analog Output 4
HIGH                      No
   36  sysalarm_set             37   1    Analog Output 5
HIGH                      No
   37  sysalarm_set             38   1    Analog Output 6
HIGH                      No
```

```
   38  sysalarm_set                 39   1    Analog Output 7
HIGH                        No
   39  sysalarm_set                 40   1    Analog Output 8
HIGH                        No
   40  sysalarm_set                 41   1    Analog Output 9
HIGH                        No
   41  sysalarm_set                 42   1    Analog Output 10
HIGH                       No
   42  sysalarm_set                 43   1    Analog Output 11
HIGH                       No
   43  sysalarm_set                 44   1    Analog Output 12
HIGH                       No
   44  sysalarm_set                 45   1    Analog Output 13
HIGH                       No
   45  sysalarm_set                 46   1    Analog Output 14
HIGH                       No
   46  sysalarm_set                 47   1    Analog Output 15
HIGH                       No
   47  sysalarm_set                 48   1    Analog Output 16
HIGH                       No
   48  sysalarm_set                 49   1    Analog Output 1
LOW                         No
   49  sysalarm_set                 50   1    Analog Output 2
LOW                         No
   50  sysalarm_set                 51   1    Analog Output 3
LOW                         No
   51  sysalarm_set                 52   1    Analog Output 4
LOW                         No
   52  sysalarm_set                 53   1    Analog Output 5
LOW                         No
   53  sysalarm_set                 54   1    Analog Output 6
LOW                         No
   54  sysalarm_set                 55   1    Analog Output 7
LOW                         No
   55  sysalarm_set                 56   1    Analog Output 8
LOW                         No
   56  sysalarm_set                 57   1    Analog Output 9
LOW                         No
   57  sysalarm_set                 58   1    Analog Output 10
LOW                        No
   58  sysalarm_set                 59   1    Analog Output 11
LOW                        No
   59  sysalarm_set                 60   1    Analog Output 12
LOW                        No
   60  sysalarm_set                 61   1    Analog Output 13
LOW                        No
   61  sysalarm_set                 62   1    Analog Output 14
LOW                        No
   62  sysalarm_set                 63   1    Analog Output 15
LOW                        No
   63  sysalarm_set                 64   1    Analog Output 16
LOW                        No
   64  sysalarm_set                 65   1    Analyzer
Failure                             No
   65  sysalarm_set                 66   1    Power
Failure                                No
   66  sysalarm_set                 67   1    Fused Peak Overflow - Noisy
Baseline      No
   67  sysalarm_set                 68   1    CPU Battery
Low                             No
   68  sysalarm_set                 69   1    GC
Idle                                      No
   69  sysalarm_set                 70   1    Real-Time Clock
Failure                     No
   70  sysalarm_set                 71   1    Analog Input 1
```

```
HIGH                       No
   71  sysalarm_set             72   1    Analog Input 2
HIGH                       No
   72  sysalarm_set             73   1    Analog Input 3
HIGH                       No
   73  sysalarm_set             74   1    Analog Input 4
HIGH                       No
   74  sysalarm_set             75   1    Analog Input 1
LOW                        No
   75  sysalarm_set             76   1    Analog Input 2
LOW                        No
   76  sysalarm_set             77   1    Analog Input 3
LOW                        No
   77  sysalarm_set             78   1    Analog Input 4
LOW                        No
   78  sysalarm_set             79   1    Preamp Input 1 Out of Range
- DET2          No
   79  sysalarm_set             80   1    Preamp Input 2 Out of Range
- DET2          No
   80  sysalarm_set             81   1    Preamp Input 3 Out of Range
- DET2          No
   81  sysalarm_set             82   1    Preamp Input 4 Out of Range
- DET2          No
   82  sysalarm_set             83   1    Preamp Failure -
DET2                     No
   83  sysalarm_set             84   1
NA                                       No
   84  sysalarm_set             85   1
NA                                       No
   85  lmtalarm_set              1
1                                             No
   86  lmtalarm_set              2
1                                             No
   87  lmtalarm_set              3
1                                             No
   88  lmtalarm_set              4
1                                             No
   89  lmtalarm_set              5
1                                             No
   90  lmtalarm_set              6
1                                             No
   91  lmtalarm_set              7
1                                             No
   92  lmtalarm_set              8
1                                             No
   93  lmtalarm_set              9
1                                             No
   94  lmtalarm_set             10
1                                             No
   95  lmtalarm_set             11
1                                             No
   96  lmtalarm_set             12
1                                             No
   97  lmtalarm_set             13
1                                             No
   98  lmtalarm_set             14
1                                             No
   99  lmtalarm_set             15
1                                             No
  100  lmtalarm_set             16
1                                             No
  101  lmtalarm_set             17
1                                             No
  102  lmtalarm_set             18
1                                             No
```

```
  103  lmtalarm_set              19
1                                             No
  104  lmtalarm_set              20
1                                             No
  105  stream_data  stream_togg   1   1    Stream
1                                  No
  106  stream_data  stream_togg   2   1    Stream
2                                  No
  107  stream_data  stream_togg   3   1    Stream
3                                  No
  108  stream_data  stream_togg   4   1    Stream
4                                  No
  109  stream_data  stream_togg   5   1    Stream
5                                  No
  110  stream_data  stream_togg   6   1    Stream
6                                  No
  111  stream_data  stream_togg   7   1    Stream
7                                  No
  112  stream_data  stream_togg   8   1    Stream
8                                  No
  113  doutcur                    1
1                                             No
  114  doutcur                    2
1                                             No
  115  doutcur                    3
1                                             No
  116  doutcur                    4
1                                             No
  117  doutcur                    5
1                                             No

Numeric(Registers)
    0  stream_data  avg_molwgt    1   1    Char     4     Stream
1                   No
    2  analysis     molpct        1   1    Char     4     C6+
47/35/17     0 - 1      No
    3  analysis     molpct        1   2 Integer
PROPANE          0 - 1      No
    4  analysis     molpct        1   3 Integer           i-
BUTANE         0 - 1      No
    5  analysis     molpct        1   4 Integer           n-
BUTANE         0 - 1      No
    6  analysis     molpct        1   5   Float
NEOPENTANE                  No
    8  analysis     molpct        1   6   Float           i-
PENTANE                   No
   10  analysis     molpct        1   7   Float           n-
PENTANE                   No
   12  analysis     molpct        1   8   Float
NITROGEN                    No
   14  analysis     molpct        1   9   Float
METHANE                     No
   16  analysis     molpct        2   9   Float
METHANE                     No
   18  analysis     molpct        3   9   Float
METHANE                     No
   20  analysis     molpct        4   9   Float
METHANE                     No
   22  analysis     molpct        5   9   Float
METHANE                     No
   24  analysis     molpct        5  10   Float           CARBON
DIOXIDE             No
   26  analysis     molpct        5  11   Float
ETHANE                      No
   28  analysis     molpct        6  11   Float
```

```
ETHANE                     No
   30  analysis     molpct        7  11   Float
ETHANE                     No
   32  analysis     molpct        8  11   Float
ETHANE                     No



  SIM_2251

-------------

Modbus   Variable      Field
Indices                                     Override

Reg.     Name          Name       S
C                                       Keylock?

-----------------------------------------------------------------------
------------

Boolean(Coils)

16-Bit Integer

3001  sim_compno                 1
1                                        No

3002  sim_compno                 2
1                                        No

3003  sim_compno                 3
1                                        No

3004  sim_compno                 4
1                                        No

3005  sim_compno                 5
1                                        No

3006  sim_compno                 6
1                                        No

3007  sim_compno                 7
1                                        No

3008  sim_compno                 8
1                                        No

3009  sim_compno                 9
1                                        No

3010  sim_compno                10
1                                        No

3011  sim_compno                11
1                                        No

3012  sim_compno                12
1                                        No

3013  sim_compno                13
1                                        No

3014  sim_compno                14
```

```
1                                                      No

3015  sim_compno                    15
1                                                      No

3016  sim_compno                    16
1                                                      No

3017  sim_compno                     1
1                                                      No

3018  sim_compno                     2
1                                                      No

3019  sim_compno                     3
1                                                      No

3020  sim_compno                     4
1                                                      No

3021  sim_compno                     5
1                                                      No

3022  sim_compno                     6
1                                                      No

3023  sim_compno                     7
1                                                      No

3024  sim_compno                     8
1                                                      No

3025  sim_compno                     9
1                                                      No

3026  sim_compno                    10
1                                                      No

3027  sim_compno                    11
1                                                      No

3028  sim_compno                    12
1                                                      No

3029  sim_compno                    13
1                                                      No

3030  sim_compno                    14
1                                                      No

3031  sim_compno                    15
1                                                      No

3032  sim_compno                    16
1                                                      No

3033  sim_anlytime                   1
1                                                      No

3034  sim_stream                     1
1                                                      No

3035  sim_smask                      1
1                                                      No
```

```
3036  sim_month                   1
1                                              No

3037  sim_day                     1
1                                              No

3038  sim_year                    1
1                                              No

3039  sim_hour                    1
1                                              No

3040  sim_min                     1
1                                              No

3041  sim_cycmonth                1
1                                              No

3042  sim_cycday                  1
1                                              No

3043  sim_cycyear                 1
1                                              No

3044  sim_cychour                 1
1                                              No

3045  sim_cycmin                  1
1                                              No

3046  sim_alarm                   1
1                                              No

3047  sim_alarm                   2
1                                              No

3048  sim_alarm                   3
1                                              No

3049  sim_alarm                   4
1                                              No

3050  sim_alarm                   5
1                                              No

3051  sim_alarm                   6
1                                              No

3052  sim_alarm                   7
1                                              No

3053  sim_alarm                   8
1                                              No

3054  sim_alarm                   9
1                                              No

3055  sim_alarm                  10
1                                              No

3056  sim_alarm                  11
1                                              No

3057  sim_alarm                  12
1                                              No
```

```
3058  sim_newdata                 1
1                                              No

3059  sim_cal                     1
1                                              No

32-Bit Integer

5001  sim_cyctime                 1
1                                              No

5002  sim_calcycle                1
1                                              No

Floating-Point

7001  sim_molpct                  1
1                                              No

7002  sim_molpct                  2
1                                              No

7003  sim_molpct                  3
1                                              No

7004  sim_molpct                  4
1                                              No

7005  sim_molpct                  5
1                                              No

7006  sim_molpct                  6
1                                              No

7007  sim_molpct                  7
1                                              No

7008  sim_molpct                  8
1                                              No

7009  sim_molpct                  9
1                                              No

7010  sim_molpct                 10
1                                              No

7011  sim_molpct                 11
1                                              No

7012  sim_molpct                 12
1                                              No

7013  sim_molpct                 13
1                                              No

7014  sim_molpct                 14
1                                              No

7015  sim_molpct                 15
1                                              No

7016  sim_molpct                 16
1                                              No
```

```
7017  sim_gpmwt                    1
1                                              No

7018  sim_gpmwt                    2
1                                              No

7019  sim_gpmwt                    3
1                                              No

7020  sim_gpmwt                    4
1                                              No

7021  sim_gpmwt                    5
1                                              No

7022  sim_gpmwt                    6
1                                              No

7023  sim_gpmwt                    7
1                                              No

7024  sim_gpmwt                    8
1                                              No

7025  sim_gpmwt                    9
1                                              No

7026  sim_gpmwt                   10
1                                              No

7027  sim_gpmwt                   11
1                                              No

7028  sim_gpmwt                   12
1                                              No

7029  sim_gpmwt                   13
1                                              No

7030  sim_gpmwt                   14
1                                              No

7031  sim_gpmwt                   15
1                                              No

7032  sim_gpmwt                   16
1                                              No

7033  sim_dbtu                     1
1                                              No

7034  sim_sbtu                     1
1                                              No

7035  sim_rden_gas                 1
1                                              No

7036  sim_compress                 1
1                                              No

7037  sim_wobbe                    1
1                                              No

7038  sim_unnormal                 1
1                                              No
```

```
7039  sim_totgpm                  1
1                                              No

7040  calcval                     1   1    label
1                                    No

7041  calcval                     2   1    label
2                                    No

7042  calcval                     3
1                                              No

7043  calcval                     4
1                                              No

7044  calcval                     5
1                                              No

7045  sim_dummy                   1
1                                              No

7046  sim_dummy                   1
1                                              No

7047  sim_dummy                   1
1                                              No

7048  sim_dummy                   1
1                                              No

7049  sim_dummy                   1
1                                              No

7050  sim_dummy                   1
1                                              No

7051  sim_dummy                   1
1                                              No

7052  sim_dummy                   1
1                                              No

7053  sim_dummy                   1
1                                              No

7054  sim_abtu                    1
1                                              No

7055  avgs         avg            1   1    Not
Used                                   No

7056  avgs         avg            2   1    Not
Used                                   No

7057  avgs         avg            3   1    Not
Used                                   No

7058  avgs         avg            4   1    Not
Used                                   No

7059  avgs         avg            5   1    Not
Used                                   No

7060  avgs         avg            6   1    Not
```

```
Used                                       No

7061  avgs         avg           7    1    Not
Used                                       No

7062  avgs         avg           8    1    Not
Used                                       No

7063  avgs         avg           9    1    Not
Used                                       No

7064  avgs         avg          10    1    Not
Used                                       No

7065  avgs         avg          11    1    Not
Used                                       No

7066  avgs         avg          12    1    Not
Used                                       No

7067  avgs         avg          13    1    Not
Used                                       No

7068  avgs         avg          14    1    Not
Used                                       No

7069  avgs         avg          15    1    Not
Used                                       No

7070  avg_archive1 avg           1    1    Not
Used                                       No

7071  avg_archive1 avg           2    1    Not
Used                                       No

7072  avg_archive1 avg           3    1    Not
Used                                       No

7073  avg_archive1 avg           4    1    Not
Used                                       No

7074  avg_archive1 avg           5    1    Not
Used                                       No

7075  avg_archive1 avg           6    1    Not
Used                                       No

7076  avg_archive1 avg           7    1    Not
Used                                       No

7077  avg_archive1 avg           8    1    Not
Used                                       No

7078  avg_archive1 avg           9    1    Not
Used                                       No

7079  avg_archive1 avg          10    1    Not
Used                                       No

7080  avg_archive1 avg          11    1    Not
Used                                       No

7081  avg_archive1 avg          12    1    Not
Used                                       No
```

```
7082  avg_archive1 avg          13   1    Not
Used                                  No

7083  avg_archive1 avg          14   1    Not
Used                                  No

7084  avg_archive1 avg          15   1    Not
Used                                  No

7085  aincur                     1   1    AI
1                                       No

7086  aincur                     2
1                                              No

7087  sim_cal_abtu               1
1                                              No

7088  sim_cal_dbtu               1
1                                              No

7089  sim_cal_sbtu               1
1                                              No

7090  sim_cal_wobb               1
1                                              No

7091  sim_cal_rden               1
1                                              No

7092  sim_cal_comp               1
1                                              No

7093  sim_cal_gpm                1
1                                              No

7094  sim_cal_unno               1
1                                              No

7095  sim_rf                     1
1                                              No

7096  sim_rf                     2
1                                              No

7097  sim_rf                     3
1                                              No

7098  sim_rf                     4
1                                              No

7099  sim_rf                     5
1                                              No

7100  sim_rf                     6
1                                              No

7101  sim_rf                     7
1                                              No

7102  sim_rf                     8
1                                              No

7103  sim_rf                     9
1                                              No
```

```
7104  sim_rf                    10
1                                             No

7105  sim_rf                    11
1                                             No

7106  sim_rf                    12
1                                             No

7107  sim_rf                    13
1                                             No

7108  sim_rf                    14
1                                             No

7109  sim_rf                    15
1                                             No

7110  sim_rf                    16
1                                             No

7111  sim_rf                     1
1                                             No

7112  sim_rf                     2
1                                             No

7113  sim_rf                     3
1                                             No

7114  sim_rf                     4
1                                             No

7115  sim_rf                     5
1                                             No

7116  sim_rf                     6
1                                             No

7117  sim_rf                     7
1                                             No

7118  sim_rf                     8
1                                             No

7119  sim_rf                     9
1                                             No

7120  sim_rf                    10
1                                             No

7121  sim_rf                    11
1                                             No

7122  sim_rf                    12
1                                             No

7123  sim_rf                    13
1                                             No

7124  sim_rf                    14
1                                             No

7125  sim_rf                    15
```

```
1                                              No

7126  sim_rf                     16
1                                              No

7127  avgs          avg           1   1    Not
Used                                No

7128  avgs          avg           2   1    Not
Used                                No

7129  avgs          avg           3   1    Not
Used                                No

7130  avgs          avg           4   1    Not
Used                                No

7131  avgs          avg           5   1    Not
Used                                No

7132  avgs          avg           6   1    Not
Used                                No

7133  avgs          avg           7   1    Not
Used                                No

7134  avgs          avg           8   1    Not
Used                                No

7135  avgs          avg           9   1    Not
Used                                No

7136  avgs          avg          10   1    Not
Used                                No

7137  avgs          avg          11   1    Not
Used                                No

7138  avgs          avg          12   1    Not
Used                                No

7139  avgs          avg          13   1    Not
Used                                No

7140  avgs          avg          14   1    Not
Used                                No

7141  avgs          avg          15   1    Not
Used                                No

7142  avgs          avg          16   1    Not
Used                                No

7143  avgs          avg          17   1    Not
Used                                No

7144  avgs          avg          18   1    Not
Used                                No

7145  avgs          avg          19   1    Not
Used                                No

7146  avgs          avg          20   1    Not
Used                                No
```

```
7147  avgs          avg           21   1    Not
Used                                    No

7148  avgs          avg           22   1    Not
Used                                    No

7149  avgs          avg           23   1    Not
Used                                    No

7150  avgs          avg           24   1    Not
Used                                    No

7151  avgs          avg           25   1    Not
Used                                    No

7152  avgs          avg           26   1    Not
Used                                    No

7153  avgs          avg           27   1    Not
Used                                    No

7154  avgs          avg           28   1    Not
Used                                    No

7155  avgs          avg           29   1    Not
Used                                    No

7156  avgs          avg           30   1    Not
Used                                    No

7157  avgs          avg           31   1    Not
Used                                    No

7158  avgs          avg           32   1    Not
Used                                    No

7159  avgs          avg           33   1    Not
Used                                    No

7160  avgs          avg           34   1    Not
Used                                    No

7161  avgs          avg           35   1    Not
Used                                    No

7162  avgs          avg           36   1    Not
Used                                    No

7163  avgs          maximum        1   1    Not
Used                                    No

7164  avgs          maximum        2   1    Not
Used                                    No

7165  avgs          maximum        3   1    Not
Used                                    No

7166  avgs          maximum        4   1    Not
Used                                    No

7167  avgs          maximum        5   1    Not
Used                                    No

7168  avgs          maximum        6   1    Not
Used                                    No
```

```
7169  avgs          maximum       7    1    Not
Used                                    No

7170  avgs          maximum       8    1    Not
Used                                    No

7171  avgs          maximum       9    1    Not
Used                                    No

7172  avgs          maximum      10    1    Not
Used                                    No

7173  avgs          maximum      11    1    Not
Used                                    No

7174  avgs          maximum      12    1    Not
Used                                    No

7175  avgs          maximum      13    1    Not
Used                                    No

7176  avgs          maximum      14    1    Not
Used                                    No

7177  avgs          maximum      15    1    Not
Used                                    No

7178  avgs          maximum      16    1    Not
Used                                    No

7179  avgs          maximum      17    1    Not
Used                                    No

7180  avgs          maximum      18    1    Not
Used                                    No

7181  avgs          maximum      19    1    Not
Used                                    No

7182  avgs          maximum      20    1    Not
Used                                    No

7183  avgs          maximum      21    1    Not
Used                                    No

7184  avgs          maximum      22    1    Not
Used                                    No

7185  avgs          maximum      23    1    Not
Used                                    No

7186  avgs          maximum      24    1    Not
Used                                    No

7187  avgs          maximum      25    1    Not
Used                                    No

7188  avgs          maximum      26    1    Not
Used                                    No

7189  avgs          maximum      27    1    Not
Used                                    No

7190  avgs          maximum      28    1    Not
```

```
Used                                  No

7191  avgs         maximum      29   1    Not
Used                                  No

7192  avgs         maximum      30   1    Not
Used                                  No

7193  avgs         maximum      31   1    Not
Used                                  No

7194  avgs         maximum      32   1    Not
Used                                  No

7195  avgs         maximum      33   1    Not
Used                                  No

7196  avgs         maximum      34   1    Not
Used                                  No

7197  avgs         maximum      35   1    Not
Used                                  No

7198  avgs         maximum      36   1    Not
Used                                  No

7199  avgs         minimum       1   1    Not
Used                                  No

7200  avgs         minimum       2   1    Not
Used                                  No

7201  avgs         minimum       3   1    Not
Used                                  No

7202  avgs         minimum       4   1    Not
Used                                  No

7203  avgs         minimum       5   1    Not
Used                                  No

7204  avgs         minimum       6   1    Not
Used                                  No

7205  avgs         minimum       7   1    Not
Used                                  No

7206  avgs         minimum       8   1    Not
Used                                  No

7207  avgs         minimum       9   1    Not
Used                                  No

7208  avgs         minimum      10   1    Not
Used                                  No

7209  avgs         minimum      11   1    Not
Used                                  No

7210  avgs         minimum      12   1    Not
Used                                  No

7211  avgs         minimum      13   1    Not
Used                                  No
```

```
7212  avgs          minimum       14   1    Not
Used                                 No

7213  avgs          minimum       15   1    Not
Used                                 No

7214  avgs          minimum       16   1    Not
Used                                 No

7215  avgs          minimum       17   1    Not
Used                                 No

7216  avgs          minimum       18   1    Not
Used                                 No

7217  avgs          minimum       19   1    Not
Used                                 No

7218  avgs          minimum       20   1    Not
Used                                 No

7219  avgs          minimum       21   1    Not
Used                                 No

7220  avgs          minimum       22   1    Not
Used                                 No

7221  avgs          minimum       23   1    Not
Used                                 No

7222  avgs          minimum       24   1    Not
Used                                 No

7223  avgs          minimum       25   1    Not
Used                                 No

7224  avgs          minimum       26   1    Not
Used                                 No

7225  avgs          minimum       27   1    Not
Used                                 No

7226  avgs          minimum       28   1    Not
Used                                 No

7227  avgs          minimum       29   1    Not
Used                                 No

7228  avgs          minimum       30   1    Not
Used                                 No

7229  avgs          minimum       31   1    Not
Used                                 No

7230  avgs          minimum       32   1    Not
Used                                 No

7231  avgs          minimum       33   1    Not
Used                                 No

7232  avgs          minimum       34   1    Not
Used                                 No

7233  avgs          minimum       35   1    Not
Used                                 No
```

```
7234  avgs         minimum      36   1    Not
Used                                  No

7235  avg_archive1 avg           1   1    Not
Used                                  No

7236  avg_archive1 avg           2   1    Not
Used                                  No

7237  avg_archive1 avg           3   1    Not
Used                                  No

7238  avg_archive1 avg           4   1    Not
Used                                  No

7239  avg_archive1 avg           5   1    Not
Used                                  No

7240  avg_archive1 avg           6   1    Not
Used                                  No

7241  avg_archive1 avg           7   1    Not
Used                                  No

7242  avg_archive1 avg           8   1    Not
Used                                  No

7243  avg_archive1 avg           9   1    Not
Used                                  No

7244  avg_archive1 avg          10   1    Not
Used                                  No

7245  avg_archive1 avg          11   1    Not
Used                                  No

7246  avg_archive1 avg          12   1    Not
Used                                  No

7247  avg_archive1 avg          13   1    Not
Used                                  No

7248  avg_archive1 avg          14   1    Not
Used                                  No

7249  avg_archive1 avg          15   1    Not
Used                                  No

7250  avg_archive1 avg          16   1    Not
Used                                  No

7251  avg_archive1 avg          17   1    Not
Used                                  No

7252  avg_archive1 avg          18   1    Not
Used                                  No

7253  avg_archive1 avg          19   1    Not
Used                                  No

7254  avg_archive1 avg          20   1    Not
Used                                  No

7255  avg_archive1 avg          21   1    Not
```

```
Used                                 No

7256  avg_archive1 avg          22   1    Not
Used                                 No

7257  avg_archive1 avg          23   1    Not
Used                                 No

7258  avg_archive1 avg          24   1    Not
Used                                 No

7259  avg_archive1 avg          25   1    Not
Used                                 No

7260  avg_archive1 avg          26   1    Not
Used                                 No

7261  avg_archive1 avg          27   1    Not
Used                                 No

7262  avg_archive1 avg          28   1    Not
Used                                 No

7263  avg_archive1 avg          29   1    Not
Used                                 No

7264  avg_archive1 avg          30   1    Not
Used                                 No

7265  avg_archive1 avg          31   1    Not
Used                                 No

7266  avg_archive1 avg          32   1    Not
Used                                 No

7267  avg_archive1 avg          33   1    Not
Used                                 No

7268  avg_archive1 avg          34   1    Not
Used                                 No

7269  avg_archive1 avg          35   1    Not
Used                                 No

7270  avg_archive1 avg          36   1    Not
Used                                 No

7271  avg_archive1 maximum       1   1    Not
Used                                 No

7272  avg_archive1 maximum       2   1    Not
Used                                 No

7273  avg_archive1 maximum       3   1    Not
Used                                 No

7274  avg_archive1 maximum       4   1    Not
Used                                 No

7275  avg_archive1 maximum       5   1    Not
Used                                 No

7276  avg_archive1 maximum       6   1    Not
Used                                 No
```

```
7277  avg_archive1 maximum       7   1    Not
Used                                  No

7278  avg_archive1 maximum       8   1    Not
Used                                  No

7279  avg_archive1 maximum       9   1    Not
Used                                  No

7280  avg_archive1 maximum      10   1    Not
Used                                  No

7281  avg_archive1 maximum      11   1    Not
Used                                  No

7282  avg_archive1 maximum      12   1    Not
Used                                  No

7283  avg_archive1 maximum      13   1    Not
Used                                  No

7284  avg_archive1 maximum      14   1    Not
Used                                  No

7285  avg_archive1 maximum      15   1    Not
Used                                  No

7286  avg_archive1 maximum      16   1    Not
Used                                  No

7287  avg_archive1 maximum      17   1    Not
Used                                  No

7288  avg_archive1 maximum      18   1    Not
Used                                  No

7289  avg_archive1 maximum      19   1    Not
Used                                  No

7290  avg_archive1 maximum      20   1    Not
Used                                  No

7291  avg_archive1 maximum      21   1    Not
Used                                  No

7292  avg_archive1 maximum      22   1    Not
Used                                  No

7293  avg_archive1 maximum      23   1    Not
Used                                  No

7294  avg_archive1 maximum      24   1    Not
Used                                  No

7295  avg_archive1 maximum      25   1    Not
Used                                  No

7296  avg_archive1 maximum      26   1    Not
Used                                  No

7297  avg_archive1 maximum      27   1    Not
Used                                  No

7298  avg_archive1 maximum      28   1    Not
Used                                  No
```

```
7299  avg_archive1 maximum      29   1    Not
Used                                  No

7300  avg_archive1 maximum      30   1    Not
Used                                  No

7301  avg_archive1 maximum      31   1    Not
Used                                  No

7302  avg_archive1 maximum      32   1    Not
Used                                  No

7303  avg_archive1 maximum      33   1    Not
Used                                  No

7304  avg_archive1 maximum      34   1    Not
Used                                  No

7305  avg_archive1 maximum      35   1    Not
Used                                  No

7306  avg_archive1 maximum      36   1    Not
Used                                  No

7307  avg_archive1 minimum       1   1    Not
Used                                  No

7308  avg_archive1 minimum       2   1    Not
Used                                  No

7309  avg_archive1 minimum       3   1    Not
Used                                  No

7310  avg_archive1 minimum       4   1    Not
Used                                  No

7311  avg_archive1 minimum       5   1    Not
Used                                  No

7312  avg_archive1 minimum       6   1    Not
Used                                  No

7313  avg_archive1 minimum       7   1    Not
Used                                  No

7314  avg_archive1 minimum       8   1    Not
Used                                  No

7315  avg_archive1 minimum       9   1    Not
Used                                  No

7316  avg_archive1 minimum      10   1    Not
Used                                  No

7317  avg_archive1 minimum      11   1    Not
Used                                  No

7318  avg_archive1 minimum      12   1    Not
Used                                  No

7319  avg_archive1 minimum      13   1    Not
Used                                  No

7320  avg_archive1 minimum      14   1    Not
```

```
Used                                     No

7321  avg_archive1 minimum      15   1    Not
Used                                     No

7322  avg_archive1 minimum      16   1    Not
Used                                     No

7323  avg_archive1 minimum      17   1    Not
Used                                     No

7324  avg_archive1 minimum      18   1    Not
Used                                     No

7325  avg_archive1 minimum      19   1    Not
Used                                     No

7326  avg_archive1 minimum      20   1    Not
Used                                     No

7327  avg_archive1 minimum      21   1    Not
Used                                     No

7328  avg_archive1 minimum      22   1    Not
Used                                     No

7329  avg_archive1 minimum      23   1    Not
Used                                     No

7330  avg_archive1 minimum      24   1    Not
Used                                     No

7331  avg_archive1 minimum      25   1    Not
Used                                     No

7332  avg_archive1 minimum      26   1    Not
Used                                     No

7333  avg_archive1 minimum      27   1    Not
Used                                     No

7334  avg_archive1 minimum      28   1    Not
Used                                     No

7335  avg_archive1 minimum      29   1    Not
Used                                     No

7336  avg_archive1 minimum      30   1    Not
Used                                     No

7337  avg_archive1 minimum      31   1    Not
Used                                     No

7338  avg_archive1 minimum      32   1    Not
Used                                     No

7339  avg_archive1 minimum      33   1    Not
Used                                     No

7340  avg_archive1 minimum      34   1    Not
Used                                     No

7341  avg_archive1 minimum      35   1    Not
Used                                     No
```

```
7342  avg_archive1 minimum      36   1    Not
Used                                  No

7343  avg_archive1 avg           1   2    Not
Used                                  No

7344  avg_archive1 avg           2   2    Not
Used                                  No

7345  avg_archive1 avg           3   2    Not
Used                                  No

7346  avg_archive1 avg           4   2    Not
Used                                  No

7347  avg_archive1 avg           5   2    Not
Used                                  No

7348  avg_archive1 avg           6   2    Not
Used                                  No

7349  avg_archive1 avg           7   2    Not
Used                                  No

7350  avg_archive1 avg           8   2    Not
Used                                  No

7351  avg_archive1 avg           9   2    Not
Used                                  No

7352  avg_archive1 avg          10   2    Not
Used                                  No

7353  avg_archive1 avg          11   2    Not
Used                                  No

7354  avg_archive1 avg          12   2    Not
Used                                  No

7355  avg_archive1 avg          13   2    Not
Used                                  No

7356  avg_archive1 avg          14   2    Not
Used                                  No

7357  avg_archive1 avg          15   2    Not
Used                                  No

7358  avg_archive1 avg          16   2    Not
Used                                  No

7359  avg_archive1 avg          17   2    Not
Used                                  No

7360  avg_archive1 avg          18   2    Not
Used                                  No

7361  avg_archive1 avg          19   2    Not
Used                                  No

7362  avg_archive1 avg          20   2    Not
Used                                  No

7363  avg_archive1 avg          21   2    Not
Used                                  No
```

```
7364  avg_archive1 avg          22   2    Not
Used                                  No

7365  avg_archive1 avg          23   2    Not
Used                                  No

7366  avg_archive1 avg          24   2    Not
Used                                  No

7367  avg_archive1 avg          25   2    Not
Used                                  No

7368  avg_archive1 avg          26   2    Not
Used                                  No

7369  avg_archive1 avg          27   2    Not
Used                                  No

7370  avg_archive1 avg          28   2    Not
Used                                  No

7371  avg_archive1 avg          29   2    Not
Used                                  No

7372  avg_archive1 avg          30   2    Not
Used                                  No

7373  avg_archive1 avg          31   2    Not
Used                                  No

7374  avg_archive1 avg          32   2    Not
Used                                  No

7375  avg_archive1 avg          33   2    Not
Used                                  No

7376  avg_archive1 avg          34   2    Not
Used                                  No

7377  avg_archive1 avg          35   2    Not
Used                                  No

7378  avg_archive1 avg          36   2    Not
Used                                  No

7379  avg_archive1 maximum       1   2    Not
Used                                  No

7380  avg_archive1 maximum       2   2    Not
Used                                  No

7381  avg_archive1 maximum       3   2    Not
Used                                  No

7382  avg_archive1 maximum       4   2    Not
Used                                  No

7383  avg_archive1 maximum       5   2    Not
Used                                  No

7384  avg_archive1 maximum       6   2    Not
Used                                  No

7385  avg_archive1 maximum       7   2    Not
```

```
Used                                 No

7386  avg_archive1 maximum       8   2    Not
Used                                 No

7387  avg_archive1 maximum       9   2    Not
Used                                 No

7388  avg_archive1 maximum      10   2    Not
Used                                 No

7389  avg_archive1 maximum      11   2    Not
Used                                 No

7390  avg_archive1 maximum      12   2    Not
Used                                 No

7391  avg_archive1 maximum      13   2    Not
Used                                 No

7392  avg_archive1 maximum      14   2    Not
Used                                 No

7393  avg_archive1 maximum      15   2    Not
Used                                 No

7394  avg_archive1 maximum      16   2    Not
Used                                 No

7395  avg_archive1 maximum      17   2    Not
Used                                 No

7396  avg_archive1 maximum      18   2    Not
Used                                 No

7397  avg_archive1 maximum      19   2    Not
Used                                 No

7398  avg_archive1 maximum      20   2    Not
Used                                 No

7399  avg_archive1 maximum      21   2    Not
Used                                 No

7400  avg_archive1 maximum      22   2    Not
Used                                 No

7401  avg_archive1 maximum      23   2    Not
Used                                 No

7402  avg_archive1 maximum      24   2    Not
Used                                 No

7403  avg_archive1 maximum      25   2    Not
Used                                 No

7404  avg_archive1 maximum      26   2    Not
Used                                 No

7405  avg_archive1 maximum      27   2    Not
Used                                 No

7406  avg_archive1 maximum      28   2    Not
Used                                 No
```

```
7407  avg_archive1 maximum      29   2    Not
Used                                  No

7408  avg_archive1 maximum      30   2    Not
Used                                  No

7409  avg_archive1 maximum      31   2    Not
Used                                  No

7410  avg_archive1 maximum      32   2    Not
Used                                  No

7411  avg_archive1 maximum      33   2    Not
Used                                  No

7412  avg_archive1 maximum      34   2    Not
Used                                  No

7413  avg_archive1 maximum      35   2    Not
Used                                  No

7414  avg_archive1 maximum      36   2    Not
Used                                  No

7415  avg_archive1 minimum       1   2    Not
Used                                  No

7416  avg_archive1 minimum       2   2    Not
Used                                  No

7417  avg_archive1 minimum       3   2    Not
Used                                  No

7418  avg_archive1 minimum       4   2    Not
Used                                  No

7419  avg_archive1 minimum       5   2    Not
Used                                  No

7420  avg_archive1 minimum       6   2    Not
Used                                  No

7421  avg_archive1 minimum       7   2    Not
Used                                  No

7422  avg_archive1 minimum       8   2    Not
Used                                  No

7423  avg_archive1 minimum       9   2    Not
Used                                  No

7424  avg_archive1 minimum      10   2    Not
Used                                  No

7425  avg_archive1 minimum      11   2    Not
Used                                  No

7426  avg_archive1 minimum      12   2    Not
Used                                  No

7427  avg_archive1 minimum      13   2    Not
Used                                  No

7428  avg_archive1 minimum      14   2    Not
Used                                  No
```

```
7429  avg_archive1 minimum      15   2    Not
Used                                  No

7430  avg_archive1 minimum      16   2    Not
Used                                  No

7431  avg_archive1 minimum      17   2    Not
Used                                  No

7432  avg_archive1 minimum      18   2    Not
Used                                  No

7433  avg_archive1 minimum      19   2    Not
Used                                  No

7434  avg_archive1 minimum      20   2    Not
Used                                  No

7435  avg_archive1 minimum      21   2    Not
Used                                  No

7436  avg_archive1 minimum      22   2    Not
Used                                  No

7437  avg_archive1 minimum      23   2    Not
Used                                  No

7438  avg_archive1 minimum      24   2    Not
Used                                  No

7439  avg_archive1 minimum      25   2    Not
Used                                  No

7440  avg_archive1 minimum      26   2    Not
Used                                  No

7441  avg_archive1 minimum      27   2    Not
Used                                  No

7442  avg_archive1 minimum      28   2    Not
Used                                  No

7443  avg_archive1 minimum      29   2    Not
Used                                  No

7444  avg_archive1 minimum      30   2    Not
Used                                  No

7445  avg_archive1 minimum      31   2    Not
Used                                  No

7446  avg_archive1 minimum      32   2    Not
Used                                  No

7447  avg_archive1 minimum      33   2    Not
Used                                  No

7448  avg_archive1 minimum      34   2    Not
Used                                  No

7449  avg_archive1 minimum      35   2    Not
Used                                  No

7450  avg_archive1 minimum      36   2    Not
```

```
Used                                 No

7451  avg_archive1 avg          1   3    Not
Used                                 No

7452  avg_archive1 avg          2   3    Not
Used                                 No

7453  avg_archive1 avg          3   3    Not
Used                                 No

7454  avg_archive1 avg          4   3    Not
Used                                 No

7455  avg_archive1 avg          5   3    Not
Used                                 No

7456  avg_archive1 avg          6   3    Not
Used                                 No

7457  avg_archive1 avg          7   3    Not
Used                                 No

7458  avg_archive1 avg          8   3    Not
Used                                 No

7459  avg_archive1 avg          9   3    Not
Used                                 No

7460  avg_archive1 avg         10   3    Not
Used                                 No

7461  avg_archive1 avg         11   3    Not
Used                                 No

7462  avg_archive1 avg         12   3    Not
Used                                 No

7463  avg_archive1 avg         13   3    Not
Used                                 No

7464  avg_archive1 avg         14   3    Not
Used                                 No

7465  avg_archive1 avg         15   3    Not
Used                                 No

7466  avg_archive1 avg         16   3    Not
Used                                 No

7467  avg_archive1 avg         17   3    Not
Used                                 No

7468  avg_archive1 avg         18   3    Not
Used                                 No

7469  avg_archive1 avg         19   3    Not
Used                                 No

7470  avg_archive1 avg         20   3    Not
Used                                 No

7471  avg_archive1 avg         21   3    Not
Used                                 No
```

```
7472  avg_archive1 avg          22   3    Not
Used                                  No

7473  avg_archive1 avg          23   3    Not
Used                                  No

7474  avg_archive1 avg          24   3    Not
Used                                  No

7475  avg_archive1 avg          25   3    Not
Used                                  No

7476  avg_archive1 avg          26   3    Not
Used                                  No

7477  avg_archive1 avg          27   3    Not
Used                                  No

7478  avg_archive1 avg          28   3    Not
Used                                  No

7479  avg_archive1 avg          29   3    Not
Used                                  No

7480  avg_archive1 avg          30   3    Not
Used                                  No

7481  avg_archive1 avg          31   3    Not
Used                                  No

7482  avg_archive1 avg          32   3    Not
Used                                  No

7483  avg_archive1 avg          33   3    Not
Used                                  No

7484  avg_archive1 avg          34   3    Not
Used                                  No

7485  avg_archive1 avg          35   3    Not
Used                                  No

7486  avg_archive1 avg          36   3    Not
Used                                  No

7487  avg_archive1 maximum       1   3    Not
Used                                  No

7488  avg_archive1 maximum       2   3    Not
Used                                  No

7489  avg_archive1 maximum       3   3    Not
Used                                  No

7490  avg_archive1 maximum       4   3    Not
Used                                  No

7491  avg_archive1 maximum       5   3    Not
Used                                  No

7492  avg_archive1 maximum       6   3    Not
Used                                  No

7493  avg_archive1 maximum       7   3    Not
Used                                  No
```

```
7494  avg_archive1 maximum       8   3    Not
Used                                  No

7495  avg_archive1 maximum       9   3    Not
Used                                  No

7496  avg_archive1 maximum      10   3    Not
Used                                  No

7497  avg_archive1 maximum      11   3    Not
Used                                  No

7498  avg_archive1 maximum      12   3    Not
Used                                  No

7499  avg_archive1 maximum      13   3    Not
Used                                  No

7500  avg_archive1 maximum      14   3    Not
Used                                  No

7501  avg_archive1 maximum      15   3    Not
Used                                  No

7502  avg_archive1 maximum      16   3    Not
Used                                  No

7503  avg_archive1 maximum      17   3    Not
Used                                  No

7504  avg_archive1 maximum      18   3    Not
Used                                  No

7505  avg_archive1 maximum      19   3    Not
Used                                  No

7506  avg_archive1 maximum      20   3    Not
Used                                  No

7507  avg_archive1 maximum      21   3    Not
Used                                  No

7508  avg_archive1 maximum      22   3    Not
Used                                  No

7509  avg_archive1 maximum      23   3    Not
Used                                  No

7510  avg_archive1 maximum      24   3    Not
Used                                  No

7511  avg_archive1 maximum      25   3    Not
Used                                  No

7512  avg_archive1 maximum      26   3    Not
Used                                  No

7513  avg_archive1 maximum      27   3    Not
Used                                  No

7514  avg_archive1 maximum      28   3    Not
Used                                  No

7515  avg_archive1 maximum      29   3    Not
```

```
Used                                 No

7516  avg_archive1 maximum      30   3    Not
Used                                 No

7517  avg_archive1 maximum      31   3    Not
Used                                 No

7518  avg_archive1 maximum      32   3    Not
Used                                 No

7519  avg_archive1 maximum      33   3    Not
Used                                 No

7520  avg_archive1 maximum      34   3    Not
Used                                 No

7521  avg_archive1 maximum      35   3    Not
Used                                 No

7522  avg_archive1 maximum      36   3    Not
Used                                 No

7523  avg_archive1 minimum       1   3    Not
Used                                 No

7524  avg_archive1 minimum       2   3    Not
Used                                 No

7525  avg_archive1 minimum       3   3    Not
Used                                 No

7526  avg_archive1 minimum       4   3    Not
Used                                 No

7527  avg_archive1 minimum       5   3    Not
Used                                 No

7528  avg_archive1 minimum       6   3    Not
Used                                 No

7529  avg_archive1 minimum       7   3    Not
Used                                 No

7530  avg_archive1 minimum       8   3    Not
Used                                 No

7531  avg_archive1 minimum       9   3    Not
Used                                 No

7532  avg_archive1 minimum      10   3    Not
Used                                 No

7533  avg_archive1 minimum      11   3    Not
Used                                 No

7534  avg_archive1 minimum      12   3    Not
Used                                 No

7535  avg_archive1 minimum      13   3    Not
Used                                 No

7536  avg_archive1 minimum      14   3    Not
Used                                 No
```

```
7537  avg_archive1 minimum      15   3    Not
Used                                  No

7538  avg_archive1 minimum      16   3    Not
Used                                  No

7539  avg_archive1 minimum      17   3    Not
Used                                  No

7540  avg_archive1 minimum      18   3    Not
Used                                  No

7541  avg_archive1 minimum      19   3    Not
Used                                  No

7542  avg_archive1 minimum      20   3    Not
Used                                  No

7543  avg_archive1 minimum      21   3    Not
Used                                  No

7544  avg_archive1 minimum      22   3    Not
Used                                  No

7545  avg_archive1 minimum      23   3    Not
Used                                  No

7546  avg_archive1 minimum      24   3    Not
Used                                  No

7547  avg_archive1 minimum      25   3    Not
Used                                  No

7548  avg_archive1 minimum      26   3    Not
Used                                  No

7549  avg_archive1 minimum      27   3    Not
Used                                  No

7550  avg_archive1 minimum      28   3    Not
Used                                  No

7551  avg_archive1 minimum      29   3    Not
Used                                  No

7552  avg_archive1 minimum      30   3    Not
Used                                  No

7553  avg_archive1 minimum      31   3    Not
Used                                  No

7554  avg_archive1 minimum      32   3    Not
Used                                  No

7555  avg_archive1 minimum      33   3    Not
Used                                  No

7556  avg_archive1 minimum      34   3    Not
Used                                  No

7557  avg_archive1 minimum      35   3    Not
Used                                  No

7558  avg_archive1 minimum      36   3    Not
Used                                  No
```

```
**********************************************************************
***********

**********************************************************************
*********

TCP/IP Report from Model 2350A

4/28/2005 2:00:51 PM

----------------------------------------------------------------------
---------

Usage                              PC

Comm ID                            0

Host Name                          GC

Use DHCP/Specify an IP address     Specify an IP Address

IP Address                         172.16.23.128

Subnet Mask                        255.255.240.0

Gateway                            172.16.16.2

Read/Write                         RW

**********************************************************************
*********

Temperature Control Report from Model 2350A

4/28/2005 2:00:52 PM

Loop                1                 2                 3                 4

----------------------------------------------------------------------
---------

Mode                Automatic         Automatic         Automatic
Automatic

Prop Gain           60                60                60                60

Reset               600               600               600               600

Rate                1                 1                 1                 1

D Filter            5                 5                 5                 5

Setpoint            82                84                40                350

**********************************************************************
*********

End of Report
```

B Component Data Table

This appendix provides a sample standard component data table as well as a table of the ISO-related components.

- Table B-1
- Table B-2

All values depend on a base pressure of 14.73 PSIA and a base temperature of 60 °F (15.56 °C).

BTU components that are listed in Table B-1 reference *GPA Standard 2145-09*. The ISO component data table references *ISO Standard 6976: 1995(E)*.

Note
An asterisk (*) denotes components that are assigned temporary I.D. codes, starting with 150, as they are used.

Table B-1: Example Standard Component Data Table (Continued)

Component Name	MolWt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
Acetylene	26.04	0	0.899	0.615	0	0	1476.9	1426.5	Ethane	22
Air	28.9625	0	1	0.87586	7.3022	0.104759	0	0	Airmix 1	26
Argon	39.95	0	1.3792	0	0	0	0	0	Argon	46
Ammonia	17.03	212	0.588	0.6173	5.15	0.0874	435.4	359.8	None	*
Benzene	78.11	3.224	2.6969	0.8844	7.373	0.2798	3750.5	3599.2	n-Hexane	*
Butanes	58.1222	62.1055	2.0068	0.573515	4.78155	0.32117	3264.64	3012.45	n-Butane	33
Butene-1	56.11	63.05	1.9372	0.6013	5.013	0.2956	3087	2885.4	n-Butane	28
Butenes	56.11	55.448	1.9372	0.6097	5.0833	0.2916	3077.4	2875.73	n-Butane	32
1,2-Butadiene	54.09	20	1.8676	0.658	5.486	0.2604	2946.7	2795.5	n-Butane	35
1,3-Butadiene	54.09	60	1.8676	0.6272	5.229	0.2732	2886.6	2735.3	n-Butane	34
C3+	44.0956	188.62	1.5225	0.50719	4.2285	0.275429	2521.92	2320.36	Propane	47

Table B-1: Example Standard Component Data Table (Continued) *(continued)*

Component Name	MolWt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
C4+	58.1222	51.567	2.0068	0.5842	4.8706	0.315183	3269.85	3017.97	n-Butane	48
C4=1	56.11	63.05	1.9372	0.6013	5.013	0.2956	3087	2885.4	n-Butane	29
C5+	72.1488	15.576	2.4911	0.63071	5.2584	0.362396	4017.97	3715.58	n-Pentane	49
C6+ 47/35/17	95.9558	3.01891	3.31309	0.679907	5.66853	0.446214	5288.71	4900.62	C6mix1	08
C6+ 50/50/00	93.1887	3.29	3.21755	0.676145	5.63715	0.43619	5141.12	4762.99	C6mix2	09
C6+ Gpa 2261-99	93.1887	3.51579	3.21755	0.67556	5.63228	0.436267	5141.09	4762.99	C6mix3	10
C6+ 57/28/14	94.1904	3.37386	3.25214	0.677036	5.64458	0.439881	5194.53	4812.82	C6mix4	11
Carbon Monoxide	28.01	0	0.9671	0.801	6.68	0	321.2	321.2	CO	15
Carbon Dioxide	44.0095	0	1.5195	0.81716	6.8129	0.170618	0	0	CO2	17
Cis-2-Butene	56.11	45.54	1.9372	0.6271	5.228	0.2835	3079.3	2877.6	n-Butane	31
COS	60.08	0	0	0	0	0	0	0	None	42
CS2	76.14	0	2.6298	0	0	0	1267	1267	None	41
Cyclohexane	84.16	3.264	2.9057	0.7834	6.531	0.3403	4492.1	4189.4	n-Hexane	*
Cyclopentane	70.14	9.914	2.4215	0.7504	6.256	0.2961	3772.4	3520.2	n-Pentane	*
Diisobutyl	114.23	1.101	3.9439	0.6979	5.819	0.5185	6247.9	5793.9	n-Octane	*
2,3-Dimethbutan	86.18	7.404	2.9753	0.6664	5.556	0.4096	4756	4403.1	n-Hexane	*
2,2-Dimethpenta	100.21	3.492	3.4596	0.6782	5.654	0.4682	5494.6	5091.4	n-Heptane	*
2,4-Dimethpenta	100.21	3.292	3.4596	0.6773	5.647	0.4686	5499.4	5096	n-Heptane	*

Table B-1: Example Standard Component Data Table (Continued) *(continued)*

Component Name	MolWt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
3,3-Dimethpenta	100.2	2.773	3.4596	0.6976	5.816	0.455	5501.5	5098.2	n-Heptane	*
Ethane	30.069	800	1.0382	0.35628	2.9704	0.267369	1773.79	1622.75	Ethane	01
Ethyl Alcohol	46.07	2.3	1.5906	0.794	6.62	0.1839	1602.8	1451.5	None	*
Ethylbenzene	106.17	0.371	3.6655	0.8718	7.268	0.3858	5234.3	4982	n-Octane	*
Ethylene	28.0532	0	0.9686	0	0	0	1603.4	1502.47	Ethane	21
Ethylene Oxide	44.05	0	1.49	0	0	0	1459.4	1410.2	None	36
3-Ethylpentane	100.21	2.012	3.4596	0.7028	5.859	0.4517	5513.4	5110.1	n-Heptane	*
H2S	34.0809	395	1.1767	0.79886	6.6602	0.135156	638.57	588.15	H2S	40
HCL	36.46	925	1.2588	0.8558	7.135	0.1349	0	0	None	*
Helium	4.0026	0	0.1382	0.12486	1.041	0.101559	0	0	Helium	13
Hydrogen	2.02	0	0.0696	0.07	0	0	325	274.4	Hydrogen	12
i-Butane	58.1222	72.644	2.0068	0.56283	4.6925	0.327158	3259.42	3006.94	i-Butane	03
i-Butene	56.11	63.4	1.9372	0.6004	5.006	0.296	3068.2	2866.5	n-Butane	27
i-Pentane	72.1488	20.474	2.4911	0.62514	5.212	0.365621	4010.16	3707.56	i-Pentane	05
i-Propylbenzene	120.19	0.188	4.1498	0.8663	7.223	0.4396	5976.6	5674	n-Nonane	*
i-Octane	114.23	1.708	3.9439	0.6962	5.804	0.5199	6246.1	5792.2	n-Octane	*
Methane	16.0425	5000	0.5539	0.3	2.5	0.169487	1012.34	911.5	Methane	00
Methyl Alcohol	32.04	4.63	1.1063	0.796	6.64	0.1275	868.7	767.9	None	*

Table B-1: Example Standard Component Data Table (Continued) *(continued)*

Component Name	MolWt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
Methylcyclo C5	84.16	4.503	2.9057	0.7536	6.283	0.3538	4511.6	4209.1	n-Hexane	*
Methylcyclo C6	98.19	1.609	3.39	0.774	6.453	0.4019	5228	4874.9	n-Heptane	*
2-Methylhexane	100.21	2.271	3.4596	0.683	5.694	0.4647	5507.3	5104	n-Heptane	*
3-Methylhexane	100.21	2.13	3.4596	0.6917	5.767	0.4589	5511.3	5107.8	n-Heptane	*
m-Xylene	106.17	0.326	3.6655	0.8687	7.243	0.3871	5219.9	4967.8	n-Octane	*
n-Butane	58.1222	51.567	2.0068	0.5842	4.8706	0.315183	3269.85	3017.97	n-Butane	04
n-Decane	142.2817	0.06148	4.9126	0.73458	6.1244	0.613636	7760.81	7206.63	n-Decane	*
n-Heptane	100.2019	1.619	3.4597	0.68823	5.7379	0.461258	5515.33	5111.8	n-Heptane	45
n-Hexane	86.1754	4.961	2.9754	0.66406	5.5364	0.411121	4766.9	4414.19	n-Hexane	39
n-Nonane	128.2551	0.1809	4.4283	0.72224	6.0215	0.562592	7012.49	6508.02	n-Nonane	38
n-Octane	114.2285	0.5349	3.944	0.70655	5.8907	0.512168	6263.46	5809.41	n-Octane	20
n-Pentane	72.1488	15.576	2.4911	0.63071	5.2584	0.362396	4017.97	3715.58	n-Pentane	06
Neohexane	86.18	9.856	2.9753	0.654	5.453	0.4175	4747.2	4394.1	n-Hexane	*
Neopentane	72.15	35.9	2.4911	0.5967	4.975	0.383	3993.9	3691.4	i-Pentane	07
Nitrogen	28.0134	0	0.9672	0.80687	6.7271	0.10999	0	0	Nitrogen	14
NO2	46	0	0	0	0	0	0	0	None	19

Table B-1: Example Standard Component Data Table (Continued) *(continued)*

Component Name	MolWt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
NO	30.01	0	0	0	0	0	0	0	None	*
N2O	44.02	0	0	0	0	0	0	0	None	18
o-Xylene	106.2	0.264	3.6655	0.8848	7.377	0.3801	5222	4969.7	n-Octane	*
Oxygen	31.9988	0	1.1048	1.1423	9.5238	0.088739	0	0	Oxygen	16
1-Pentene	70.14	19.115	2.4215	0.6457	5.383	0.3441	3835.4	3583.3	n-Pentane	37
Propane	44.0956	188.62	1.5225	0.50719	4.2285	0.275429	2521.92	2320.36	Propane	02
Propadiene	40.07	0	1.411	0	0	0	2254.2	2254.2	Propane	24
Propylene	42.0797	227.3	1.4529	0.5226	4.3571	0.255087	2338.4	2187.05	Propane	23
Propyne	40.07	0	1.411	0	0	0	2246.2	2246.2	Propane	25
p-Xylene	106.17	0.342	3.6655	0.8657	7.218	0.3885	5220.8	4968.6	n-Octane	*
Sulfur Dioxide	64.06	88	2.2117	1.397	11.65	0.1453	0	0	CO2	43
Styrene	104.15	0.24	3.5959	0.911	7.595	0.3622	5042.7	4841	n-Octane	*
Toluene	92.14	1.032	3.1812	0.8718	7.268	0.3348	4485.4	4283.5	n-Heptane	*
Trans-2-Butene	56.11	49.8	1.9372	0.61	5.086	0.2914	3075.1	2873.4	n-Butane	30
Triptane	100.21	3.374	3.4596	0.6946	5.791	0.4571	5496.2	5093	n-Heptane	*
Water	18.0153	0.9505	0.62202	1	8.3372	0.057072	50.43	0	Water	44

Table B-2: ISO Component Data Table

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Acetylene	26.038	0.0949	0.0837	0.0837	1301.86	1301.37	1301.21	1301.05	1256.79	1256.94	1256.98	1257.03
Air	28.9625	0	0	0	0	0	0	0	0	0	0	0
Argon	39.948	0.0316	0.0283	0.0265	0	0	0	0	0	0	0	0
Ammonia	17.0306	0.1225	0.1095	0.1049	384.57	383.51	383.16	382.81	316.96	316.86	316.82	316.79
Benzene	78.114	0.3017	0.272	0.253	3305.03	3302.86	3302.15	3301.43	3169.81	3169.56	3169.48	3169.38
Butanes	58.1222	0.2059	0.183	0.1743	2879.01	2875.17	2873.98	2872.8	2653.64	2653.01	2652.86	2652.72
Butene-1	56.108	0.1871	0.1732	0.1673	2721.55	2718.7	2717.75	2716.82	2541.25	2540.97	2540.86	2540.76
Butenes	56.108	0.1923	0.176	0.1717	2713.09	2710.23	2709.31	2708.36	2532.79	2532.49	2532.42	2532.27
1,2-Butadiene	54.092	0.2121	0.1924	0.1871	2597.13	2595.12	2594.45	2593.79	2461.91	2461.82	2461.78	2461.74
1,3-Butadiene	54.092	0.1844	0.1703	0.1643	2544.13	2542.1	2541.43	2540.77	2408.91	2408.8	2408.76	2408.72
C3+	44.0956	0.1682	0.1534	0.147	2461.51	2458.25	2457.23	2456.16	2264.71	2264.52	2264.38	2264.25
C4+	58.1222	0.2281	0.2049	0.1947	3081.63	3077.47	3076.32	3074.97	2841.63	2841.98	2841.83	2841.68
C4=1	56.108	0.1871	0.1732	0.1673	2721.55	2718.7	2717.75	2716.82	2541.25	2540.97	2540.86	2540.76
C5+	72.1488	0.2999	0.2651	0.2505	3754.2	3749.68	3748.71	3746.71	3464.63	3468.87	3468.75	3468.52
C6+ 47/35/17	95.9558	0.389	0.3459	0.3331	4663.16	4657.69	4655.86	4654.08	4316.22	4315.67	4315.46	4315.27
C6+ 50/50/00	93.1887	0.3704	0.3305	0.3183	4533.05	4527.71	4525.93	4524.19	4194.99	4194.46	4194.25	4194.07
C6+ GPA 2261-99	93.1887	0.3943	0.3503	0.3373	4697.93	4692.42	4690.58	4688.78	4348.61	4348.06	4347.84	4347.66
C6+ 57/28/14	94.1904	0.3781	0.3367	0.3243	4580.15	4574.76	4572.96	4571.2	4238.87	4238.34	4238.12	4237.94

Table B-2: ISO Component Data Table *(continued)*

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Carbon Monoxide	28.01	0.0265	0.0224	0.02	282.8	282.91	282.95	282.98	282.8	282.91	282.95	282.98
Carbon Dioxide	44.0095	0.0819	0.0748	0.0728	0	0	0	0	0	0	0	0
Cis-2-Butene	56.108	0.1975	0.1817	0.1761	2714.9	2711.9	2711	2710	2534.6	2534.2	2534.1	2533.9
COS	60.076	0.1225	0.114	0.1095	548.01	548.15	548.19	548.23	548.01	548.15	548.19	548.23
CS2	76.143	0.2145	0.1949	0.1871	1104.06	1104.32	1104.41	1104.49	1104.06	1104.32	1104.41	1104.49
Cyclohexane	84.161	0.3209	0.2864	0.2757	3960.67	3956.02	3954.47	3952.96	3690.23	3689.42	3689.13	3688.86
Cyclopentane	70.14	0.255	0.2302	0.2236	3326.14	3322.19	3320.88	3319.59	3100.77	3100.03	3099.76	3099.51
Diisobutyl	114.23	0	0	0	0	0	0	0	0	0	0	0
2,3-Dimethbutan	86.177	0.3	0.2739	0.2569	4193.63	4188.6	4186.93	4185.28	3878.11	3877.57	3877.36	3877.17
2,2-Dimethpenta	100.21	0	0	0	0	0	0	0	0	0	0	0
2,4-Dimethpenta	100.21	0	0	0	0	0	0	0	0	0	0	0
3,3-Dimethpenta	100.2	0	0	0	0	0	0	0	0	0	0	0
Ethane	30.069	0.1	0.0922	0.0894	1564.34	1562.14	1561.41	1560.69	1429.12	1428.84	1428.74	1428.64
Ethyl Alcohol	46.07	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene	106.167	0.4858	0.4207	0.4037	4613.14	4609.53	4608.32	4607.15	4387.77	4387.37	4387.2	4387.07
Ethylene	28.0532	0.0866	0.08	0.0775	1413.51	1412.11	1411.65	1411.18	1323.36	1323.24	1323.2	1323.15
Ethylene Oxide	44.05	0	0	0	0	0	0	0	0	0	0	0
3-Ethylpentane	100.21	0	0	0	0	0	0	0	0	0	0	0

Table B-2: ISO Component Data Table *(continued)*

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
H2S	34.0809	0.1	0.1	0.1	562.94	562.38	562.19	562.01	517.87	517.95	517.97	517.99
HCL	36.46	925	1.2588	0.8558	7.135	0.1349	0	0	0	0	0	0
Helium	4.0026	0.0006	0.0002	0	0	0	0	0	0	0	0	0
Hydrogen	2.0159	-0.004	-0.0048	-0.0051	286.63	286.15	285.99	285.83	241.56	241.72	241.76	241.81
i-Butane	58.1222	0.2049	0.1789	0.1703	2874.2	2870.58	2869.38	2868.2	2648.83	2648.42	2648.26	2648.12
i-Butene	56.108	0.1871	0.1703	0.1673	2704.8	2702	2701.1	2700.2	2524.5	2524.3	2524.2	2524.1
i-Pentane	72.1488	0.251	0.228	0.2168	3535.98	3531.68	3530.24	3528.83	3265.54	3265.08	3264.89	3264.73
i-Propylbenzene	120.19	0	0	0	0	0	0	0	0	0	0	0
i-Octane	114.23	0	0	0	0	0	0	0	0	0	0	0
Methane	16.0425	0.049	0.0447	0.0436	892.97	891.56	891.09	890.63	802.82	802.69	802.65	802.6
Methyl Alcohol	32.042	0.4764	0.3578	0.3286	766.59	765.09	764.59	764.09	676.44	676.22	676.14	676.06
Methyl cyclo C5	84.161	0.313	0.2811	0.2702	3977.04	3972.46	3970.93	3969.44	3705.34	3705.59	3705.86	3706.6
Methyl cyclo C6	98.188	0.3808	0.3376	0.3256	4600.64	4602.35	4604.09	4609.34	4292.53	4292.78	4293.06	4293.82
2-Methyl hexane	100.21	0	0	0	0	0	0	0	0	0	0	0
3-Methyl hexane	100.21	0	0	0	0	0	0	0	0	0	0	0
m-Xylene	106.167	0	0	0	0	0	0	0	0	0	0	0
n-Butane	58.1222	0.2069	0.1871	0.1783	2883.82	2879.76	2878.57	2877.4	2658.45	2657.6	2657.45	2657.32
n-Decane	142.2817	0.7523	0.645	0.614	6842.69	6834.9	6832.31	6829.77	6346.88	6346.14	6345.85	6345.59

Table B-2: ISO Component Data Table *(continued)*

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
n-Heptane	100.2019	0.4123	0.3661	0.3521	4862.87	4857.18	4855.29	4853.43	4502.28	4501.72	4501.49	4501.3
n-Hexane	86.1754	0.3286	0.295	0.2846	4203.23	4198.24	4196.58	4194.95	3887.71	3887.21	3887.01	3886.84
n-Nonane	128.2551	0.6221	0.5385	0.5148	6182.91	6175.82	6173.46	6171.15	5732.17	5731.49	5731.22	5730.99
n-Octane	114.2285	0.5079	0.445	0.4278	5522.4	5516.01	5513.88	5511.8	5116.73	5116.11	5115.87	5115.66
n-Pentane	72.1488	0.2864	0.251	0.2345	3542.89	3538.6	3537.17	3535.77	3272.45	3272	3271.83	3271.67
Neohexane	86.177	0.2898	0.2627	0.255	4185.84	4180.83	4179.15	4177.52	3870.32	3869.8	3869.59	3869.41
Neopentane	72.15	0.2387	0.2121	0.2025	3521.72	3517.43	3516.01	3514.61	3251.28	3250.83	3250.67	3250.51
Nitrogen	28.0134	0.0224	0.0173	0.0173	0	0	0	0	0	0	0	0
NO_2	46.0006	0	0	0	0	0	0	0	0	0	0	0
NO	30.006	0	0	0	0	0	0	0	0	0	0	0
N_2O	44.02	0	0	0	0	0	0	0	0	0	0	0
o-Xylene	106.167	0.5128	0.4427	0.4231	4602.17	4598.64	4597.48	4596.31	4376.8	4376.48	4376.34	4376.23
Oxygen	31.9988	0.0316	0.0283	0.0265	0	0	0	0	0	0	0	0
1-Pentene	70.14	0.249	0.2258	0.2191	3381.29	3377.75	3376.57	3375.42	3155.92	3155.59	3155.45	3155.34
Propane	44.0956	0.1453	0.1338	0.1288	2224.01	2221.1	2220.13	2219.17	2043.71	2043.37	2043.23	2043.11
Propadiene	40.065	0.1414	0.1304	0.1265	1945.25	1943.96	1943.53	1943.11	1855.1	1855.09	1855.08	1855.08
Propylene	42.0797	0.1378	0.1265	0.1225	2061.57	2059.43	2058.72	2058.02	1926.35	1926.13	1926.05	1925.97
Propyne	40.065	0	0	0	0	0	0	0	0	0	0	0
p-Xylene	106.167	0	0	0	0	0	0	0	0	0	0	0

Table B-2: ISO Component Data Table *(continued)*

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Sulfur Dioxide	64.065	0.1549	0.1449	0.1414	0	0	0	0	0	0	0	0
Styrene	104.15	0	0	0	0	0	0	0	0	0	0	0
Toluene	92.141	0.3886	0.3421	0.3286	3952.72	3949.81	3948.84	3947.89	3772.42	3772.08	3771.95	3771.83
Trans-2-Butene	56.108	0.1975	0.1789	0.1761	2711.1	2708.3	2707.4	2706.4	2530.8	2530.5	2530.5	2530.3
Triptane	100.21	0	0	0	0	0	0	0	0	0	0	0
Water	18.0153	0.2646	0.2345	0.2191	45.074	44.433	44.224	44.016	0	0	0	0

C Data Computations

C.1 Data Acquisition

The 2350A GC Controller performs a 12-bit analog to digital (A/D) conversion every 25 milliseconds on channel 0 during an analysis period. This is the period when the left side of the display is counting the elapsed time of the analysis. The fixed number on the right side of the display is the total cycle time.

Exactly 40 equi-spaced data samples are taken every second for analysis by the controller. A sampling frequency of 40 Hertz (Hz) was chosen to reduce 60 Hz normal mode noise. After each point on the chromatograph signal is sampled, the resulting number is stored in a buffer area in the controller memory for processing. During the analysis, only the last 256 data points are available for processing. Because the data analysis is done as the signal is sampled (in real-time), only a limited number of past data samples is required to analyze any signal.

As a part of the data acquisition process, groups of incoming data samples are averaged together before storing to the controller memory for processing. Non-overlapping groups of N samples are averaged and stored and thus reduce the effective incoming data rate to 40/N samples/second. For example, if N = 5, then a total of 40/5 or 6 (averaged) data samples are stored every second. The value for the variable N is determined by the selection of a Peak Width parameter (PW). The relationship is:

$$N = PW$$

where PW is given in seconds. All the various details in the analysis process are independent of the value of N. Allowable values of N are one to 63 which corresponds to values of PW from 2 to 63 seconds.

The variable N is known as the integration factor. This term is used because N determines how many points are averaged or integrated to form a single value. The integration of data upon input before storing serves two purposes. First, the statistical noise on the input signal is reduced by the square root of N. In the case of N = 4, a noise reduction of two would be realized. Secondly, the integration factor controls the bandwidth of the chromatograph signal. It is necessary to match the bandwidth of the input signal to that of the analysis algorithms in the 2350A. This prevents small, short duration perturbations from being recognized as true peaks by the program. It is therefore important to choose a Peak Width corresponding to the narrowest peak in a group under consideration.

C.2 Peak Detection

For normal area or peak height concentration evaluation, the determination of a peak's start, peak point, and end is automatic. The manual determination of start and end points is used only for area calculations in the Forced Integration mode. Automatic determination of peak onset or start is initiated whenever Integrate Inhibit is turned off. Analysis is started in a region of signal quiescence and stability such that the signal level and activity can be considered as baseline values. It is important that this be the case because the assumption is made by the 2350A software.

Having initiated a peak search by turning Inhibit off, the 2350A Controller performs a point by point examination of the signal slope. This is achieved by using a digital slope detection filter which is a combination low pass filter and differentiator. The output of this detector is constantly compared to a system constant entered by the operator called Slope Sensitivity. A default value of eight is assumed if no entry is made. Lower values make peak onset detection more sensitive and higher values make detection less sensitive. Higher values (20 to 100) would be appropriate for noisy signals, e.g. high amplifier gain. Peak termination is determined by the same application of this detector to the signal, but in the reverse sense. Onset is defined where the detector output exceeds the baseline constant, but termination is defined subsequently where the detector output is less than the same constant.

Sequences of fused peaks are also automatically handled. This is done by testing each termination point to see if the region immediately following it satisfies the criteria of a baseline. A baseline region must have a slope detector value less than the magnitude of the baseline constant for a number of sequential points. When a baseline region is found, this terminates a sequence of peaks. A zero reference line for peak height and area determination is established by extending a line from the point of the onset of the peak sequence to the point of the termination. The values of these two points are found by averaging the four integrated points just prior to the onset point and just after the termination points respectively.

The zero reference line will, in general, be non-horizontal and thus compensates for any linear drift in the system from the time the peak sequence starts until it ends. In a single peak situation, peak area is the area of the component peak between the curve and the zero reference line. The peak height is the distance from the zero reference line to the maximum point on the component curve. The value and location of the maximum point is determined from quadratic interpolation through the three highest points at the peak of the discrete valued curve stored in 2350A. This interpolation technique is used both for peaks as well as valleys (minimum points) in fused peak sequences. In the latter case, lines are dropped from the interpolated valley points to the zero reference line to partition the fused peak areas into individual peaks. The use of quadratic interpolation improves both area and height calculation accuracy and eliminates the effects of variations in the integration factor on these calculations.

While calibrating, the controller may run several analyses of the calibration stream. Using entries from an example program, five analyses would be run. Since only the last three are to be averaged, data from runs one and two are not saved. Results are stored on the third run. Data from runs four and five are added to that stored for run three.

C.3 Analysis Computations

There are two basic analysis algorithms included in the controller:

- Area Analysis – calculates area under component peak
- Peak Height Analysis – measures height of component peak

C.3.1 Conc. Analysis With Response Factor

Calibration

The concentration calculations discussed as follows require a unique response factor for each component in an analysis. These factors may be manually entered by an operator or automatically calculated by calibrating the system.

$$ARF_n = \frac{Area_n}{Cal_n} \text{ or } HRF_n = \frac{Ht_n}{Cal_n}$$

Note
Equation C-1 uses an external standard.

where

ARF_n	area response factor for component “n” in area per mole percent (%)

HRF_n	height response factor for component “n”
$Area_n$	area associated with component “n” in calibration gas
Ht_n	height associated with component “n” in mole percent in calibration gas
Cal_n	amount of component “n” in mole percent of calibration gas

Calculated response factors are stored by the controller for use in the concentration calculations, and are printed out in the configuration and calibration reports.

$$RFAVG_n = \frac{\sum_{i=1}^{k} RF_i}{k}$$

where

$RFAVG_n$	area or height average response factor for component “n”
RF_i	area or height response factor for component “n” from the calibration run
k	number of calibration runs actually used to calculate the response factors

The percent deviation of new RF average from old RF average is calculated in the following manner:

$$devition = \left[\frac{RFnew - RFold}{Rfold} \times 100\right]$$

where the absolute value of percent deviation for alarm has been previously entered by the operator.

Calc. in Mole Percent w/o Normalization

Once response factors have been determined by the controller or entered by the operator, component concentrations are determined for each analysis using the following equations:

$$CONC_n = \frac{Area_n}{ARF_n} \ or \ CONC_n = \frac{Ht_n}{HRF_n}$$

where

$CONC_n$	concentration of component “n” in mole percent
$AREA_n$	area of component “n” in unknown sample
ARF_n	response factor of component “n” calculated from area of calibration sample. Units are area per mole percent
Ht_n	peak height of component “n” in unknown sample
HRF_n	response factor of component “n” calculated from peak height of calibration sample. Units are height per mole percent

Note that the average concentration of each component will also be calculated when data averaging is requested.

Component concentrations may be input through analog inputs 1 to 4 or may be fixed. If a fixed value is used, the calibration for that component is the mole percent that will be used for all analyses:.

$$CONCN_n = \frac{CONC_n}{\sum_{i=1}^{k} CONC_i} \times 100$$

where

$CONCN_n$	normalized concentration of component "n" in percent of total gas concentration
$CONC_n$	non-normalized concentration of component "n" in mole percent
$CONC_i$	non-normalized concentration (in mole percent) from each of the "k" components to be grouped into this normalization
k	number of components to be included in the normalization

C.4 Post Analysis Computations

C.4.1 Liquid Equivalent Computations

The equivalent liquid volume, in gallons per 1000 standard cubic feet (GPM) is given by:

$$GPM_n = CONCN_n \times LCF_n \times \frac{BASEPRS}{14.73} \times \frac{BASETEMP + 459.67}{60 + 459.67}$$

where

GPM_n	gallons/1000 standard cubic feet of component "n"
$CONCN_n$	normalized (if selected) concentration of component "n"
LCF_n	liquid equivalent conversion factor for component "n" at 14.73 PSIA and 60 degrees F
BASE PRS	base (contact) Pressure specified; defaults to 14.73

C.4.2 Heating Value Calculations

1. (a.) Dry Gross BTU of Total Gas

$$DRYBTU|CF = \frac{\sum_{n=1}^{P} [(CONCN)_n (BTU|CF)_n]}{100}$$

where

DRYBTU/CF	uncorrected dry BTU content per cubic foot of total gas sample
$CONCN_n$	normalized (if selected) concentration of component "n", calculated from peak analysis

BTU/CF_n	energy content per cubic foot of component "n", stored in permanent memory
P	total number of components to be used in calculation of total BTU/CF
"100"	removed the "100" factored into the calculation of the concentration earlier in the analysis

2. (b.) Ideal Relative Density

$$TOTALRD = \frac{\sum_{n=1} CONC_n(RD_n)}{100}$$

where

RD_n	relative Density of component "n"
TOTAL RD	relative Density of total gas sample
$CONCN_n$, P, 100	are defined in "1." preceding

3. (c.) Real (corrected) Relative Density
The ideal gas relative density, DI is corrected to the real gas relative Density, Dr, by dividing by the compressibility factor, Z, for gas mixture at 60 °F and one atmosphere pressure and multiplying by the compressibility factor of air at the same conditions:

$$D_R = \frac{D_I Z_{b(air)}}{Z_{b(gas)}}$$

where

D_I	ideal gas relative density ()
$Z_{b(air)}$	compressibility factor of air, or 0.99959
$Z_{b(gas)}$	compressibility factor of gas mixture

4. (d.) Compressibility Factor Dry BTU
Compressibility uses calculations from AGA Report No. 8 (1992) errata (1993) "Compressibility Factors of Natural Gas and other related Hydro-Carbon Gases".

$$CORRDRYBTU = \frac{DRYBTU}{Z}$$

where

DRYBTU	value from Equation C-7
Z	compressibility factor (see Equation C-9)
BASE PRS	base (contract) pressure specified; defaults to 14.73 PSIA

5. (e.) Corrected Saturated BTU

$$CORRSATBU = \frac{(DRYBTU)(0.9826)}{Z}$$

where

DRYBTU	value from Equation C-7
CORRSATBTU	corrected saturated BTU content per cubic foot of total gas sample at base conditions of BASE PRS and 60 °F
Z	compressibility of total gas as calculated in Equation C-10
BASEPRS	base (contract) pressure specified; defaults to 14.73 PSIA

6. (f.) Compressibility and Base Pressure
   Compressibility and base pressure corrections for Dry BTU are:

$$CorrDryBTU = \left(\frac{DryBTUatBasePressure}{Z}\right)\left(\frac{ContractPressure}{BasePressure}\right)$$

where

CORRDRYBTU	value from Equation C-7
Z	compressibility factor (see Equation C-10)
BASE PRESSURE	base (contract) pressure specified; defaults to 14.73 PSIA

7. (g.) BTU Calculations
   Note that the BTU calculations apply to Gross dry, saturated, actual BTU and Net dry, saturated, and actual BTU

$$GrossActualBTU(corr) = GrossDryBTU(corr) \times \left(100 - \frac{(WVC)}{100}\right)$$

where

WVC	Water volume content (provided by a “live analog input”

$$WI = \frac{CORR(GROSS)BTU}{\sqrt{RD}}$$

where

W.I.	Wobbe index value
CORRGROSSBTU	Corrected Dry BTU for total gas Sample as calculated in Equation C-10
RD	real Relative Density as calculated in Equation C-9

Note
All components in the sample must be measured in order to calculate weight percent.

$$WTpercent_n = \frac{(CONC_n)(MW_n)}{\sum_{i=1}^{\kappa} (CONC_i)(MW_i)} \times 100$$

where

$WTpercent_n$	weight percent of component “n”
$CONC_n$	concentration in mole percent of component “n”
Mw_n	molecular weight of component “n”

$\sum_{i=1}^{k}$	sum of weights of all components in sample

$$AVGMW = \sum_{i=1}^{\kappa} (CONC_i)(MW_i)$$

where

AVGMW	average molecular weight
$\sum_{i=1}^{\kappa}$	sum of weights of all components in sample

Note
All components in the sample must be measured in order to calculate liquid volume percent from mole percent.

$$LVpercent = \frac{(WTpercent_n) \div (D_n)}{\sum_{i=1}^{\kappa} (WTpercent_i) \div (D_i)} \times 100$$

where

LV percent	liquid volume
WT percent	weight percent
D	density
$\sum_{i=1}^{\kappa}$	sum of all components in sample

$$RVP = \frac{\sum_{i=1}^{\kappa} (CONC_i)(VP_i)}{100}$$

where

RVP	reid vapor pressure
$CONC_i$	normalized concentration of component “i” in mole percent
VP_i	vapor pressure at 100 F of component “i” (GPA2145 = 94)

Note
All components in the sample must be measured to calculate LRDT.

$$LRD_T = \frac{\sum_{i=1}^{\kappa} (LVpercentL_i)(LRD_i)}{100}$$

where

LRD_T	liquid relative density of sample, relative to water at 60 °F
LRD_i	liquid relative density of component "i" (GPA2145-94)
LVpercent	liquid volume percent from Equation C-18

Note
All components on sample must be measured to calculate Liquid Density.

$$LD_T = \frac{\sum_{i=1}^{\kappa} (LV_i)(LD_i)}{100}$$

where

LD_T	liquid density of total sample in pounds per gallon
LD_i	liquid density of component "i". (GPA 2145-94)
LV_i	liquid volume percent

$$GD = (RD)(76.4976)$$

where

GD	gas density in lb/1000 ft^3
RD	relative density (relative to air)
76.4976	density of air at 14.73 PSIA and 60 °F, in lb/1000 ft^3

C.4.3 Multi-Level Calibration

The properties of each gas component can be viewed using the Component Data menu. Included with the component properties in the Component Data Table are four coefficients labeled Multi-Level Calib 'a', 'b', 'c', and 'd' for each component. If these parameters are all zero, then linear calibration is used. Conc. Analysis With Response Factor for the response factor calculations.

If any of these parameters have a value other than zero, then multi-level, or polynomial calibration is used for that component.

The response factors are then calculated as:

$$ResponseFactor = \frac{aP^3 + bP^2 + cP + d}{Calibration\ Concentration\ (mol\%)}$$

where

P	peak size (Area or Height as selected by the Operator); from average calibration runs

Coefficients: A,B,C, and D	Calculated Offline. Entered after Multi-Level Calibration using several calibration gases (typically seven gases) 1. **Note** If the coefficient values are correct values, the response factor will be close to one.

The mole% value in the sample gas is then calculated as

$$Mol\% = \frac{aP^3 + bP^2 + cP + d}{response factor}$$

where

P	peak size measured in Sample Gas

C.4.4 Indirect Calibration

Component gases which are **NOT** found in the calibration gas, but may be found in the sample gas, can be assigned a response factor which is a fixed multiple (the Relative Response Factor to a Reference Component) that **IS** found in the calibration gas.

The Relative Response Factors and Reference Component Values are included in the Component Data Table (following the Multi-Level Calibration coefficients) Component Data Table.

If the Reference Component is **None**, then normal (direct) calibration is used.

If the Reference Component is defined, (e.g. Propane) then the mole% value for the indirect component (e.g. neoC5), is calculated as:

$$mole\%\ (neoC5) = mole\%\ (\mathrm{Pro}pane\ )\ \left(\frac{P(neoC5)}{P(\mathrm{Pro}pane)}\right)(RRFneoC5)$$

where

P	peak size
RRF	Relative Response Factor

D Analog Output Cal. For 2350A

The initial analog output adjustment will be set at the factory before shipment at standard values (4-20 mA or 1-5 V). It may be necessary to check and/or adjust these values, depending on output cabling or impedance. The adjustment may require two persons if the units are some distance apart. It will require a good digital meter to check the zero and full scale values at the receiving end. The scale or span value can be adjusted by a PC with MON2000 software when the values are known at the receiving end.

It is possible to calibrate the analog outputs using different engineering units. Two examples are described below using both volts and percentages.

Note
The 4-20 mA outputs are calibrated similarly except the current is measured instead of the voltage.

D.1 Calibrating by Volts

This example assumes that an analog output channel needs to calibrated to a span of 1-5 V.

To calibrate an analog output by adjusting the voltage,

Procedure

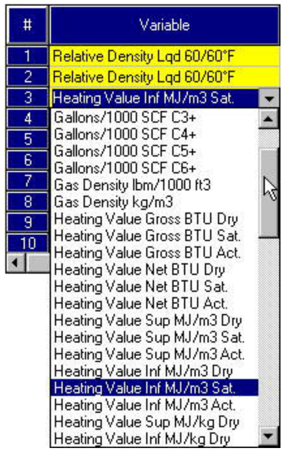
1. Use the *Application* >> *Analog Outputs* menu to access this function.
2. The Analog Outputs dialog appears.
3. Select the channel to be calibrated.

   Output channels 1 and 2 can be scaled from either 4-20 mA or 1-5 V. Channels 3 to 10 are scaled from 4-20 mA.

   ⚠ CAUTION

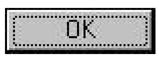
   Although output channels for direct voltage measurement exist for analog output channels 1 and 2, it is recommended that they *not* be used for calibration purposes. Instead, use the current-out terminals and the 250-ohm resistor as described.

4. To change a variable assignment, click the appropriate Variable cell. Use the provided pull-down menu and click the desired variable to select it.



5. For voltage values, set *Zero Scale* to “1.0” and *Full Scale* to “5.0”.

   If the channel is calibrated in milliamperes, set *Zero Scale* to “4” and *Full Scale* to “20”.

6. Set the *Fixed/Var* parameter to “Fixed”.
7. Set the *Fixed Value* to “0.0”.
8. Set Zero Scale Adjustment and the Full Scale Adjustment to “0.0”.
9. Click the  button to accept your changes and exit from the Analog Outputs dialog.
10. Connect a 250-ohm resistor across the signal at the input of the device where this analog output is used. Connect a Voltmeter across the resistor and measure the result.

    Note
    Your Voltmeter reading should be close to 1.0 V but does not have to be exactly 1.0 V. If the reading is negative, reverse the leads.

11. Return to the Analog Outputs dialog and reselect the channel being calibrated.
12. Set the *Fixed Value* to the Full Scale value entered in Step 5.
13. Click the  button to accept your changes and exit from the Analog Outputs dialog.
14. Look at the voltmeter again and record the full scale reading.

    Note
    Your voltmeter reading should be very close to 5.0 Volts. MON2000 will adjust the scale so the span will be 4 Volts and scale accordingly.

15. Return to the Analog Outputs dialog and reselect the channel being calibrated.
16. Change the *Zero Scale Adjustment* to the Zero Scale voltage reading and the *Full Scale Adjustment* to the Full Scale voltage reading.
17. Click the  button to accept your changes and exit from the Analog Outputs dialog.
18. Return to the Analog Outputs dialog and reselect the channel being calibrated.

19. To quickly verify your changes, enter the midpoint of your range (e.g., 3) for the *Fixed Value*. Click the OK button to accept your change. The resulting voltage output should be close to span midpoint (e.g., 3).
20. Return to the Analog Outputs dialog and reselect the channel being calibrated.
21. Set the *Fixed/Var* parameter to "Var" and the *Fixed Value* to "0.0".
22. Click the OK button to accept your changes.

    The voltage output could change slightly from time to time and the MON2000 software will now maintain the correct span.

D.2 Calibrating by Percentages

This second example, shown below, demonstrates that it is also possible to calibrate your outputs as a percentage. For instance, you may wish to read directly values that may be scaled from 0 to 1200. Your voltage span is scaled from 1 to 5 volts so the range is approximately 4 Volts. Thus, 1200 divided by 4 equals 300 units per volt. If you equate the difference as a percentage, the midpoint in units equals 600, or approximately 3 volts.

With this information in mind, you want to set zero units equal to 1.00 V and 1200 units to 5.00 V and let the software adjust the span as you calibrate.

This example assumes that an analog output channel needs to calibrated to a span of 0 to 1200.

To calibrate by percentages,

Procedure

1. Use the *Application* >> *Analog Outputs* menu to access this function.
2. The Analog Outputs dialog appears.
3. Select the channel to be calibrated.

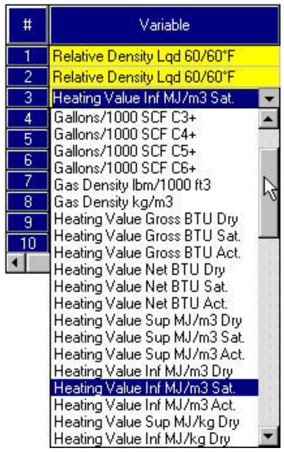
   Output channels 1 and 2 can be scaled from either 4-20 mA or 1-5 V. Channels 3 to 10 are scaled from 4-20 mA.

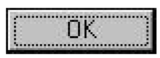
   ⚠ CAUTION

   Although output channels for direct voltage measurement exist for analog output channels 1 and 2, it is recommended that they *not* be used for calibration purposes. Instead, use the current-out terminals and the 250-ohm resistor as described.

   All can be scaled with a percentage.

4. To change a variable assignment, click the appropriate Variable cell. Use the provided pull-down menu and click the desired variable to select it.

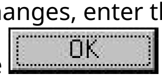


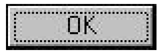
5. Set *Zero Scale* to “0” and *Full Scale* to “1200”.
6. Set the *Fixed/Var* parameter to “Fixed”.
7. Set *Fixed Value* to “0.0”.
8. Set Zero Scale Adjustment and Full Scale Adjustment to “0.0”.
9. Click the  button to accept your changes and exit from the Analog Outputs dialog.
10. Connect a 250-ohm resistor across the signal at the input of the device where this analog output is used. Connect a Voltmeter across the resistor and measure the result.

Note
Your Voltmeter reading should be close to 1.0 V but does not have to be exactly 1.0 V. If the reading is negative, reverse the leads.

11. Return to the Analog Outputs dialog and reselect the channel being calibrated.
12. Set the *Fixed Value* to the Full Scale value entered in Step 5.
13. Click the  button to accept your changes and exit from the Analog Outputs dialog.
14. Look at the voltmeter again and record the full scale reading.

Note
Your voltmeter reading should be very close to 5.0 Volts. MON2000 will adjust the scale so the span will be 4 Volts and scale accordingly.

15. Return to the Analog Outputs dialog and reselect the channel being calibrated.
16. Change the *Zero Scale Adjustment* to the zero scale voltage reading and the *Full Scale Adjustment* to the full scale voltage reading.
17. Click the  button to accept your changes and exit from the Analog Outputs dialog.
18. Return to the Analog Outputs dialog and reselect the channel being calibrated.
19. To quickly verify your changes, enter the midpoint of your range (e.g., 600) for the *Fixed Value*. Click the  button to accept your change. The resulting voltage output should be close to span midpoint (e.g., 3).

20. Return to the Analog Outputs dialog and reselect the channel being calibrated.
21. Set the *Fixed/Var* parameter to “Var” and the *Fixed Value* to “0.0”.
22. Click the 

button to accept your changes.

    The voltage output could change slightly from time to time and the MON2000 software will now maintain the correct span.

E Upgrade 2350A GC S/W and 2350 EPROMS

⚠ CAUTION

To upgrade the Model 500 2350A (GC) software and the 2350 EPROMs, perform all steps in the order they appear in this appendix.

Before beginning the upgrade procedure, ensure that you have identified which standard (i.e., factory-released) application file was used to form the current user application for this GC. Guide to Standard Application Files for more information on standard applications.

E.1 Connect to GC and Halt Analysis

Procedure

1. Ensure that the MON2000 software is running and you are connected to the GC that is to be upgraded.

   Use the *File* >> *Connect* menu to access this function. Connect to the GC Unit for more information.

2. Use MON2000 to halt any ongoing analysis or calibration runs.

   Use the *Control* >> `Halt` menu to access this function. Halt for more information.

   Note
   When halted GC runs have finished, the status for Detector 1 mode will indicate Idle (see GC Status bar; MON2000 User Interface).

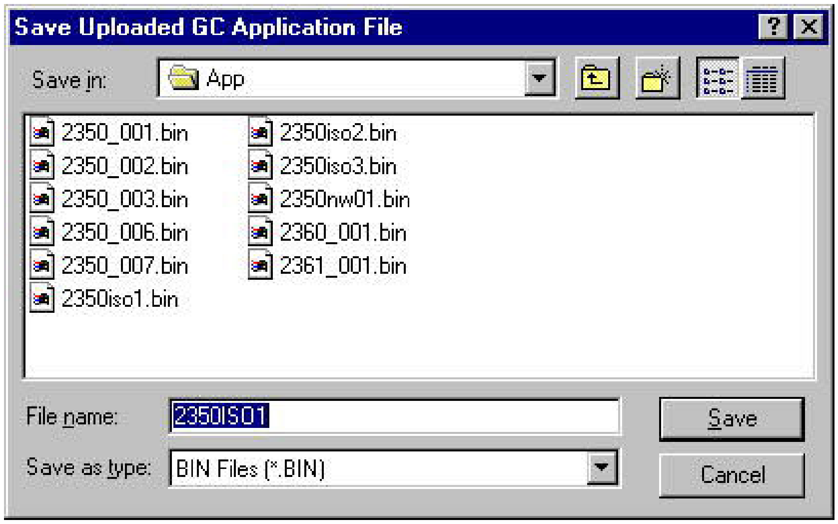
E.2 Offline Edit to Upload App. & Rename

Procedure

1. Use MON2000 to upload (from the GC unit) to the PC the most current parameters that are in use at the GC.

   Use the *File* > *Offline Edit* > *Upload Application* menu to access this function.

2. A menu of stored application files appears. Double-click the desired file.
3. The Save Uploaded GC Application File dialog appears



Use this dialog to assign a new file name to the GC Application file that is the target for uploading.

Note

The existing file name of the GC application file for the connected GC displays in the *File name* field.

For clarity, you could name this file “OLD.bin” to distinguish it from the upgraded application file.

Press the enter key or click the Save button to continue.

---

4. The Upload Application process begins. This process usually takes about 15 minutes to complete.

   MON2000 automatically disconnects from the GC after the Upload Application process has finished.

5. Use the *File* > *Exit* menu to close MON2000.

   Or, you can exit MON2000 by pressing the alt-f x keys, or click the X button on the main window.

E.3 Upgrade User-Defined Applications

Follow the installation instructions provided in Installing MON2000 to upgrade the MON2000 software and/or a standard application file.

⚠ CAUTION

Do not delete any existing MON2000 program or GC application files from the PC hard drive. The upgrade process uses information from these files and automatically overwrites any outdated program file.

Use the Update BIN utility that is installed with the MON2000 software to upgrade a GC application that contains user-defined data (such as components). The Update BIN program allows you to upgrade an application that is either on disk or “live” at the GC Controller. See the following sections for details.

E.4 Upgrade from Disk

To upgrade a user-defined application file (*.BIN) located on your PC hard drive or on a floppy disk,

⚠ CAUTION

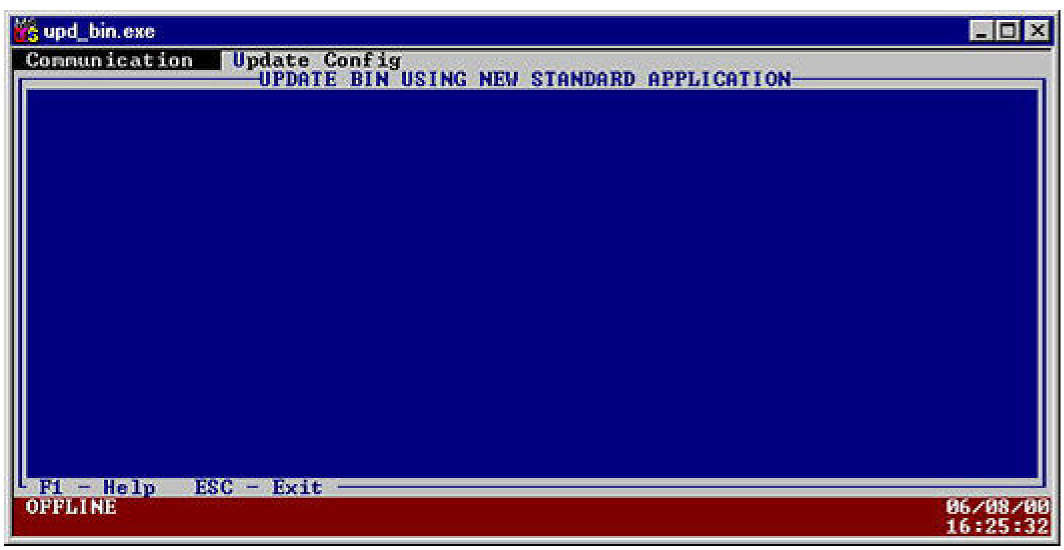
It is recommended that you save a copy of your application file before performing the upgrade.

Procedure

1. Launch the Update BIN software by either:
   - clicking the 

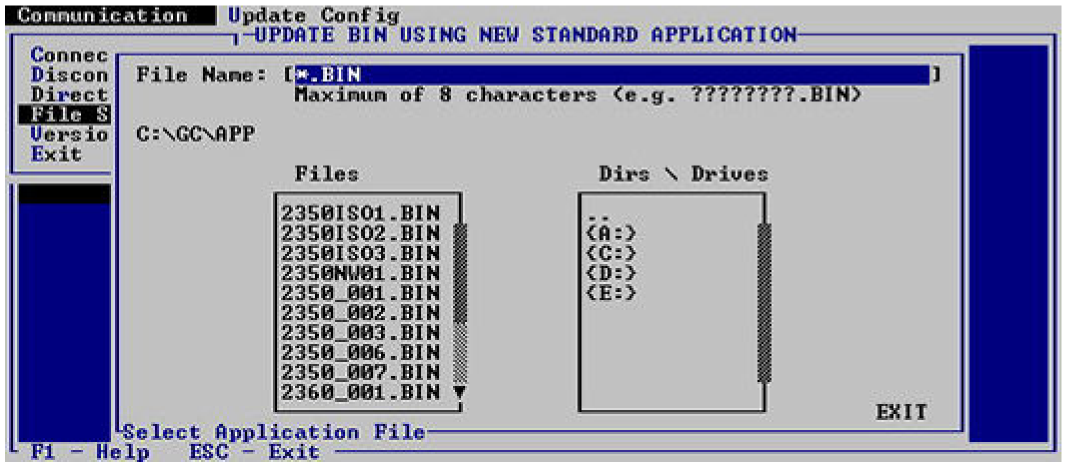
 button and using the *Programs* >>MON2000 >> *Update BIN* menu
   - double-clicking the Update BIN icon on your PC desktop

2. The Update BIN software program launches inside a DOS window.



3. Press the TAB key to access the Communication menu.
4. Use the ARROW keys to select the *File Selection* option, and then press enter.

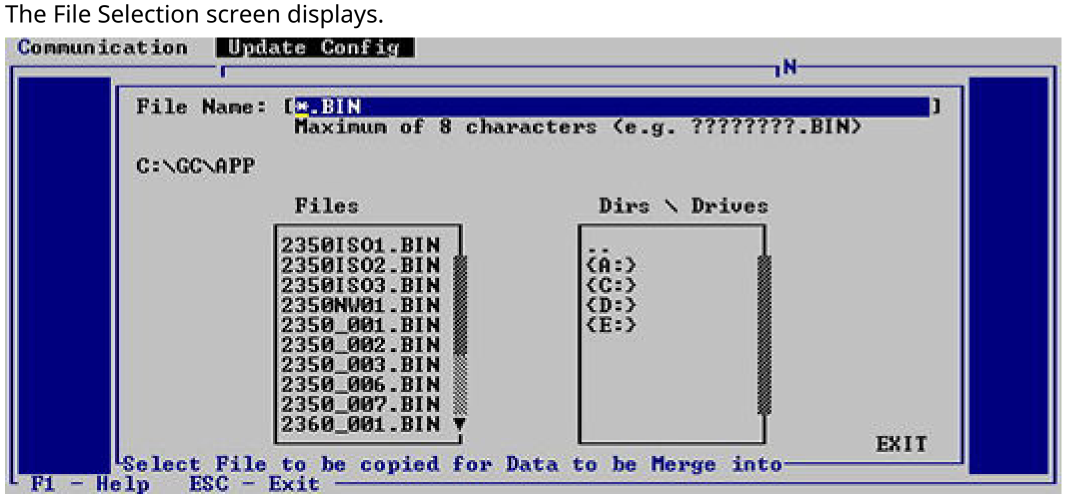
5. The File Selection screen displays.



Use the TAB and ARROW keys to select the desired application file from disk. This file is the file you will be upgrading.

6. Press the TAB key to access the Upgrade Config menu.
7. Use the ARROW keys to select the *Merge* option, and then press ENTER

8. The File Selection screen displays.



Use the tab and arrow keys to select the desired application file from disk. This file is the new application file you wish to merge into the existing file (Step 5).

9. The Merge screen displays.

10. Use the ARROW+ENTER keys to select the desired application settings to upgrade.
    a) Press the SHIFT+ENTER keys to select multiple settings.
    b) Press the F2 key to select all the available settings.
    c) Press the F3 key to clear your selected settings.
11. Press the F4 key to begin the upgrade.
12. When the upgrade is done, press the ESC key or use the *Communication* >> *Exit* menu to close the Update BIN program.

Ensure that you inspect the upgraded application file for any errors.

E.4.1 Upgrade from GC Controller

To upgrade a user-defined application file (*.BIN) currently being used by the GC Controller,

⚠ CAUTION

It is recommended that you upload a copy of your application file before performing the upgrade.

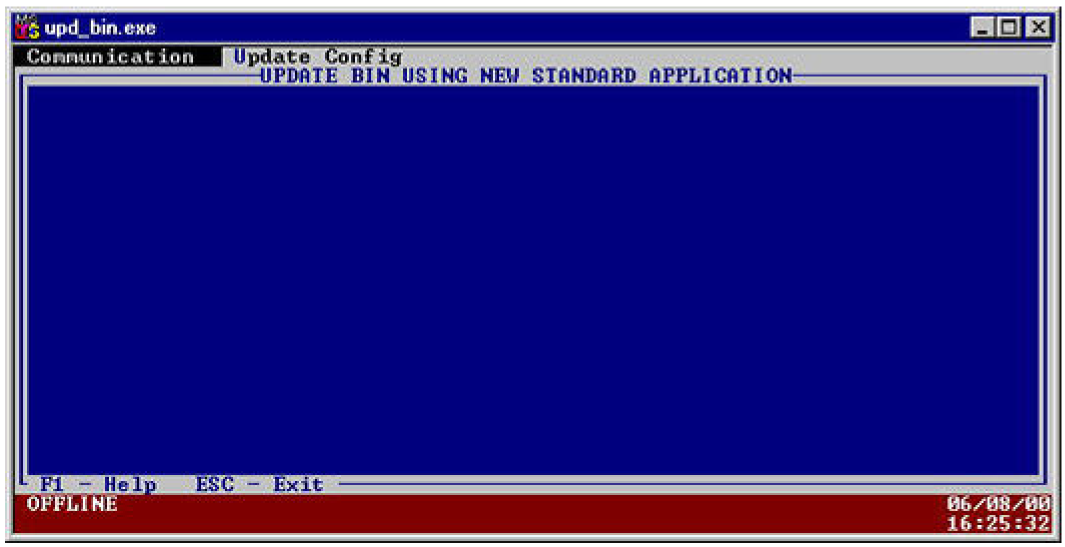
Procedure

1. Launch the Update BIN software by either:

- clicking the 

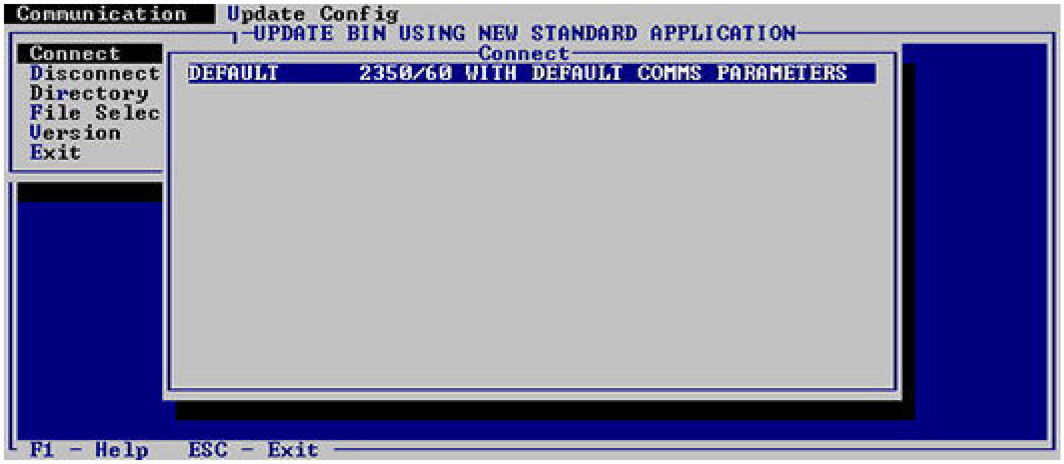
button and using the *Programs* >>MON2000 >> *Update BIN* menu
- double-click the Update BIN icon on your PC desktop

2. The Update BIN software program launches inside a DOS window.



3. Use the ARROW keys to select the *Connect* option, and then press ENTER

4. The Connect screen displays, listing the available GC units.

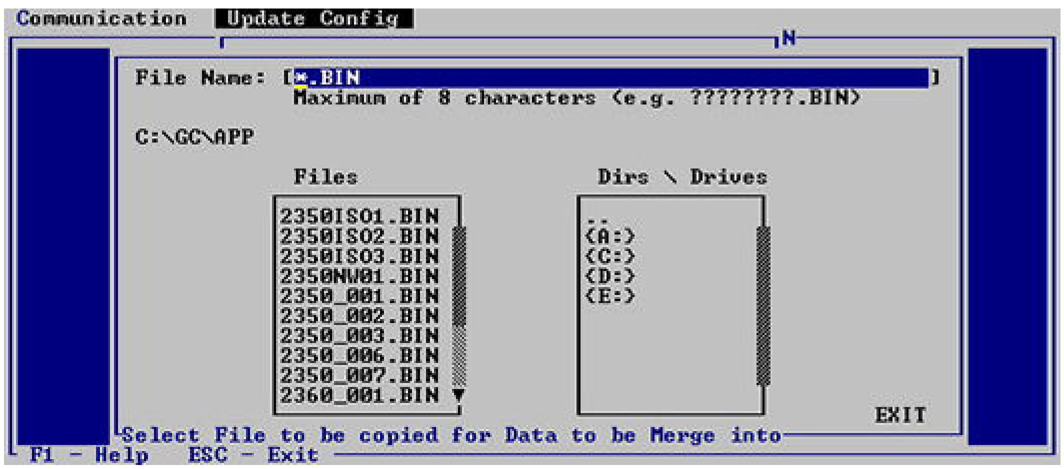


Use the ARROW keys to select the appropriate GC, and then press enter.

5. Update BIN attempts to connect to the GC Controller.

   If the attempt fails, Configure GC Connection for information on configuring the communications parameters for Update BIN.

6. The File Selection screen displays.



Use the TAB and ARROW keys to select the desired application file from disk. This file is the new application file you wish to merge into the existing file (Step 5).

7. The Merge screen displays.

8. Use the ARROW+ENTER keys to select the desired application settings to upgrade.
    a) Press the SHIFT + ENTER keys to select multiple settings.
    b) Press the F2 key to select all the available settings.
    c) Press the F3 key to clear your selected settings.
9. Press the F4 key to begin the upgrade.
10. When the upgrade is done, use the *Communications* >> *Disconnect* menu to cease communications with the GC unit.

11. Press the ESC key or use the *Communication* >> *Exit* menu to close the Update BIN program.

    Ensure that you inspect the upgraded application file for any errors.

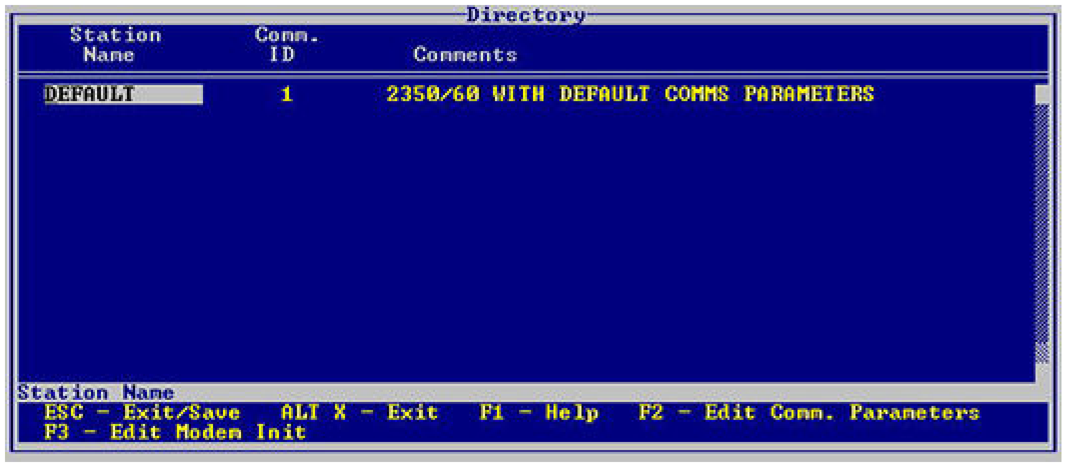
E.4.2 Configure GC Connection

To configure the GC communications parameters for the Update BIN software,

Procedure

1. Use the Communication >> *Directory* menu to access a list of communication settings for each GC unit.

2. The Directory screen displays.



3. Use the ARROW keys to select the desired GC unit and then press the F2 key to edit its communications parameters.

   You can also press F3 to edit the modem initialization string.

4. The Parameters screen displays.

5. Use the ARROW keys and space bar to select the desired parameter and toggle between its options.
6. Press the ENTER key to accept your changes or press the ESC key to cancel.

E.5 Disconnect Power and Disassemble

⚠ WARNING

Failure to follow the instructions below, may cause injury to personnel or damage equipment.

Before you remove the cover from the GC Controller or access its internal electronics, switch OFF the AC power source to the GC Controller, either at the breaker box or the controlling power source switch.

Also, disconnect the AC power cord from J21 before continuing working on the unit.

Procedure

1. Disconnect AC power from the GC Controller.

   When you have access to the GC Controller Terminal Board (TB) for field wiring (accessed from the rear on rack-mount versions and behind the front cover of explosion-proof models) disconnect the AC power cord from J21 before continuing working on the unit.

2. For newer model 19-inch rack mount and retrofit GC Controllers, proceed as follows:
   a) Remove the (right) side access panel that is secured to the chassis with four thumbscrews.
   b) Unplug all cables connected to the boards in slots 2 through 6 of the Card Cage Assembly in order to access the SBC53 CPU Board.
   c) Proceed to Step 3 below.

   ### Example

   For the explosion-proof GC Controller or older rack mount GC Controllers, proceed as follows:
   a) Access the GC Controller Terminal Board for field wiring.

      On the explosion-proof GC Controller, remove outer housing bolts and lower the cover on its bottom hinge. The TB faces the front.

      On rack mount GC Controllers, the TB is exposed and faces the rear.

   b) Loosen the six thumbscrews that secure the TB. Then gently unplug the TB from its mating DIN connectors at the back, top of the board.
   c) Lower the TB down (held in place by its ground straps at the bottom of the board) in order to expose the Card Cage Assembly.
   d) Unplug the TB power supply cord from its connection at the Card Cage Assembly power supply.
   e) Loosen the four thumbscrews that secure the Card Cage Assembly to the chassis. Then remove the Card Cage Assembly away from its chassis mount so that it is easy to work on.
   f) Unplug all cables connected to the boards in slots 2 through 6 of the Card Cage Assembly in order to access the SBC53 CPU Board.

3. Remove the SBC53 CPU Board from slot number 2 (second from the top) of the Card Cage Assembly.

E.6 Replace EPROMS/Reset CPU

Procedure

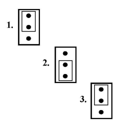
1. For 2350 GC Controllers, locate the EPROMs that will be replaced: U18 and U19.

   They are near the card-connector edge of the SBC53 CPU Board.

   Note
   Carefully note which EPROMs are labeled ODD and EVEN and which sockets hold them: socket U18 EVEN EPROM P/N 8-2350-001 or socket U19 ODD EPROM P/N 8-2350-002

2. Remove, one at a time, each of the old EPROMs, and replace each with its upgrade EPROM.
3. Locate Jumper Pin Set J14. It is near the two EPROMs you have just replaced.

   Note that Jumper Pin Set J14 has a single jumper shorting pins 1 and 2.

4. To reset the CPU registers, remove the jumper from J14 pins 1 and 2, and place it to short J14 pins 2 and 3.
5. After briefly shorting J14 pins 2 and 3, remove the jumper again. Place it back in its original position, shorting J14 pins 1 and 2.

E.7 Reassembly Procedures

Procedure

1. Place and securely plug the SBC53 CPU Board into slot number 2 of the Card Cage Assembly.
2. Reconnect all ribbon cables that were unplugged (Disconnect Power and Disassemble).

   Because the ribbon cables are arranged in layers, it important to reconnect them in the order listed below:

Part Number	System Interface Board connection	Cable Originating from Board
3-2350-063	J12	SBC53
3-2350-052	J9	SBC53
3-2350-062	J11	SBC53
3-2350-051	J4	SBC53
3-2350-064	J8	DSPI/O
3-2350-053	J10	DSPI/O
3-2350-054	J6	RTI1281
3-2350-055	J5	RTI1281

3. Return and secure the Card Cage Assembly its original position in the chassis mounting. Tighten the four screws.
4. Return and secure the field wiring TB in its original position. Tighten the six screws.
5. Reconnect the AC power cord to J21 on the TB, and restore AC power to the 2350A GC Controller.

E.8 Set-Up and Programming

The purpose of this procedure is to define the CMOS table set-up and programming requirements for the CPU assembly and DiskOnChip.

E.8.1 Procedure

Procedure

1. Install the blank DiskOnChip into socket U1 on the CPU assembly, noting the orientation of pin 1.
2. Plug the floppy drive cable into J10 on the CPU assembly and plug the board into the card cage.
3. Plug the keyboard cable into J1 on the CPU assembly.
4. Turn on the power. When the video displays on the monitor, press the DELETE button to access the CMOS setup window.
   a) The Standard CMOS Setup window displays. Press the ENTER button.
   b) Set time and date by either PAGE UP, PAGE DOWN, or by entering the appropriate number value. After making the desired change, press ENTER.
   c) Change Drive C:\ to NONE by pressing PAGE DOWN. Verify that Drive A:\ is the only selected drive. Press ESCAPE**,** F10 (to save changes), Y (to verify that you want the changes to be made), then ENTER.
5. The CPU assembly will reboot and displays the Systems Configuration window. The speaker on the CPU will chirp and the monitor will prompt:

   “ENTER NEW DATE (mm-dd-yy)". Press ENTER.

   "ENTER NEW TIME:". Press ENTER.

   The A:\>> prompt is displayed. Verify that the programming disk is the current revision specified on the work order package and it insert into the floppy drive. Type INSTALL.
6. As the DiskOnChip is being programmed, the following information is displayed:

   A:\>> SYS C:

   SYSTEM TRANSFERRED

   A:\>>CD IMAGE

   A:\IMAGE>>COPY *.*C:\

   BOS.EXE

   PME16.EXE

   SCANDISK.EXE

   SCANDISK.INI

AUTOEXEC.BAT

BOSCHECK.EXE

6 FILE(S) COPIED

A:\IMAGE>>CD\

A:\>>

A:\>>

7. At the A:\>> prompt, type C:, then ENTER.
8. Type PME16, then ENTER.
9. The Protected Mode Program screen displays. Verify that a "cold start - initial" message is displayed in the middle of the screen and LED D2 is blinking on the CPU assembly.
10. Press ESC to exit the program and power down.
11. Carefully remove the cable from J1 and J10 to prevent cracking the connector housing. Install the program label on the end of DiskOnChip opposite the serial number.

E.8.2 Reprogramming the DiskOnChip

Reprogram the DiskOnChip using the following instructions.

Procedure

1. Install either the programmed DiskOnChip into socket U1 on the CPU assembly (noting the orientation of pin 1) or install the complete CPU assembly into card cage.
2. Plug the floppy drive cable into J10 on the CPU assembly and the keyboard cable into J1 on the CPU assembly.
3. Turn on the power. The CPU assembly reboots and displays the Systems Configuration window. The speaker on the CPU will chirp and the monitor will prompt

   "ENTER NEW DATE (mm-dd-yy)".

   Press ENTER

4. "ENTER NEW TIME:".

   Press ENTER**.**

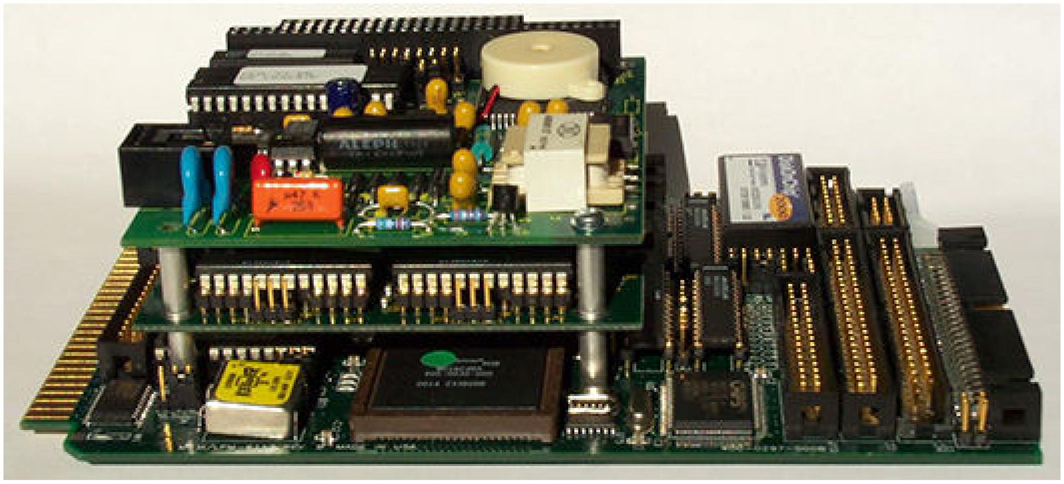
   The A:\>> prompt displays. Verify that the programming disk is the current revision specified on the work order package and insert into the floppy drive. Type `C:`, then ENTER to change to the 'C' drive.

5. After the C:\>> prompt is displayed, type ERASE *.***,** then press ENTER**.** When prompted "ARE YOU SURE?" Type Y, then press ENTER.
6. At the C:\>> prompt, type DIR, then press ENTER. Verify that only the Command.com file remains on the 'C:' drive, that the file size is 54,645 bytes, and that there are 16,105,472 bytes free.
7. Type A:, then ENTER to change back to the A:\ drive.

   Type INSTALL, then follow Steps 6 through 11 (Procedure).

E.8.3 GC Reassembly

Use the following instructions to reassemble the GC Controller (CPU, PC/104 Bus and the Modem).



Procedure

1. Place and securely plug the WinSystems CPU Board into slot number 2 of the Card Cage Assembly.
2. Reconnect all ribbon cables that were unplugged.
3. Return and secure the Card Cage Assembly back into the chassis mounting. Tighten the four screws.
4. Return and secure the field wiring TB to the original position. Tighten the six screws.
5. Reconnect the AC power cord to J21 on the TB, and restore AC power to the GC Controller.

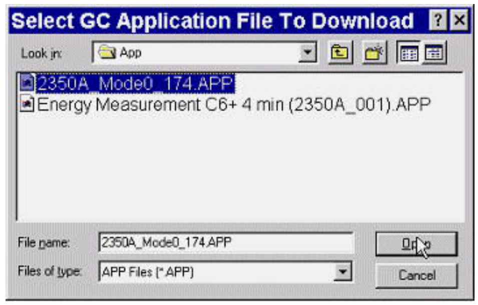
E.9 Connect to GC for Upgraded App.

Procedure

1. Use MON2000 software to connect with the GC unit.

   Use the *File* >> *Connect* menu to access this function. Connect to the GC Unit for more information.

2. Use MON2000 to download the newly upgraded GC application to the connected GC Controller.
   a) Use the *File* >> *Download* menu to access the Download CG Application File dialog.



b) Click the desired .bin file. The file name appears in the *File name* data field.

c) Click the  button or press the ENTER key to download the selected application file to the connected GC unit. A progress bar displays, indicating the completion status.

E.10 Guide to Standard Application Files

This section of the appendix lists the various standard application, or BIN files that have been released by for the GC Controller.

E.10.1 Importance of Standard Application Files

After a new GC Controller has been loaded with a standard application, the standard application is customized by the entry of timed events, component table entries, and other operator entered information consistent with the performance characteristics of the chromatograph hardware to which the Controller is connected and the needs of the user. Thus the standard application becomes a user application and differs from the factory-released, standard application from which it originated.

At the time when software is upgraded, including application files, it becomes important to know which factory-released standard application formed the basis of the user application, so the user application can be upgraded, too, with newer version of the standard application file.

You can determine which standard application formed the basis of the current user application by inspecting various MON2000 screens while connected to the GC (in most cases, you need only inspect the System dialog).

E.10.2 Standard Applications v1.50 and Later

If you are using a GC Application that is version 1.50 or later, you can quickly determine the original standard application name by viewing the variables listed in the System dialog.

Use the *Application* >> *System* menu to access this dialog. In the System dialog, (see Table E-3) find the value for the variable named CFG Base Name, and locate it in the column labeled "CFG Base Name", then read the "Analyzer Name (BIN file)" to determine the application BIN file name.

Analyzer Name (BIN file)	Unit Type	CFG Base Name	System Description	Max. Archive Averages	Stream Sequence
2350_001	2350	USASTD1	2350 Standard 1, 64 avgs	64	8

Analyzer Name (BIN file)	Unit Type	CFG Base Name	System Description	Max. Archive Averages	Stream Sequence
2350_002	2350	USASTD2	2350 Standard 2, 32 avgs	32	8
2350_003	2350	USASTD3	2350 Standard 3, 128 avgs	128	5
2350_006	2350	USASTD6	2350 Std 6, 32 avgs, 10 strs	32	10
2350_007	2350	USASTD7	2350-7 12Str, 128 Avg, 260Mbus	128	12
2350ISO1	2350	ISOSTD1	2350 ISO Std 1, 64 avgs	64	8
2350ISO2	2350	ISOSTD2	2350 ISO Std 2, 32 avgs	32	8
2350ISO3	2350	ISOSTD3	2350 ISO Std 3, 128 avgs	128	8
2350FI02	2350	USSTDFILE02	12 stream with files	204	12
2360_001	2360	USADUAL1	2360 test application	64	8
2350EXMB	2350	USSTDFILE01	Extended Modbus 4 strm plus cal	150	5
2360ISO1	2360	ISODUALSTD1	2360 ISO Std 1, 64 avgs	64	8

Note

Standard BTU applications use the BIN files 2350_001, 2350_002, and 2350_003 for 64, 32, and 128 averages respectively.

The Extended Modbus application uses BIN file 2350EXMB.

The standard dual application uses BIN file 2360_001.

E.10.3 Standard Applications Prior to v1.50

For versions of GC Applications prior to version 1.50, the CFG Base Name variable did not exist. Therefore, a combination of other variables must be inspected to determine the standard application that was used to formulate the current user application.

To determine the standard application used to create a user application prior to version 1.50, compare the values of three variables from the System dialog - Unit Type, Max Archive Averages, and System Description — with the values found in Table E-3. You will also need to compare the maximum number of streams, which can be determined from the Streams option under the Application menu.

There is one more possible complication. If the variable System Description was edited, it may not be the same value as described earlier in Table E-3. In such an instance, it would be impossible to distinguish between the 2350_00n (i.e., USASTD1, USASTD2, and USASTD3) and 2350ISOn (i.e., ISOSTD1, ISOSTD2, and ISOSTD3) applications.

To overcome this complication, you can inspect one more variable:

Procedure

1. Use the *Application*>> *User Defined*>> *Selection* menu to access the Selection dialog.
2. In the Selection dialog, CVTABLE_pri will be the first variable listed if the application is one of the ISO applications.

F A Modbus Reg. List for 2350A GC

F.1 Introduction – SIM_2251 & User_Modbus

GC Controller Modbus registers that may be of interest to the developer are of two varieties, SIM_2251 and User_Modbus. Differences are summarized in the following table.

SIM_2251	User_Modbus
Serial slave port.	Serial slave port.
Modified protocol that allows floating point numbers to be transmitted over Modbus via 2251 emulation slave type.	The standard Gould Modbus protocol that accommodates PLC Emulation LO-HI.
Nearly all register contents are predefined; a few 9000-series registers can be user-defined (i.e., read-write).	Boolean (coils) are predefined. Numeric (registers) are user-defined.
Variables assigned to registers can be listed in contents of a PC-Config Report (for instructions, Generate PC Config Report; for an example report, PC Config Report). For more detail about register contents, SIM_2251 Modbus Register List.	Variables assigned to registers can be listed in contents of a PC-Config Report (for instructions, Generate PC Config Report; for an example report, PC Config Report). Boolean (coils) contents also listed in SIM_2251 Modbus Register List.
When using the Modbus Test software, set *Register Mode* to “ROSEMOUNT” to view register contents (Set Up Port via WinMB).	When using the Modbus Test software, set *Register Mode* to “PLC LH” to view register contents (Set Up Port via WinMB).

F.1.1 Notes on User_Modbus

User_Modbus Register List lists only variables included in the User_Modbus Boolean Modbus registers. These registers are not user-defined and primarily contain alarm flags, possibly useful for debugging purposes. To use the Modbus Test software to view the contents of these registers, you will need to set the *Function* parameter to “1 (Read Coil)”. Establishing Communications through Using Modbus Data for details on using the Modbus Test software.

All other User_Modbus registers can be defined by the user. To define User_Modbus register contents (through assignment of variables), Registers.

To obtain a complete list of register assignments, both SIM_2251 and User_Modbus, use MON2000 to produce a PC-Config Report.

Note
To print a PC-Config Report, Generate PC Config Report; for an example report, PC Config Report and User_Modbus Register List and SIM_2251 Modbus Register List.

F.1.2 Notes on SIM_2251 Modbus

To use the Modbus Test software and view the contents of SIM_2251 registers, you will need to set Register Mode to “Rosemount”, as noted in Table F-1.

To obtain a complete list of register assignments, both SIM_2251 and User_Modbus, use MON2000 to produce a PC-Config Report.

F.2 User_Modbus Register List

```
Slave Name USER_MODBUS
---------------------

MODBUS   Variable      Field      Indices
 Reg.      Name        Name        S   C
--------------------------------------------------------------------------
Boolean (Coils)
    0  sysalarm_set                1   1 Application Checksum Failure
    1  sysalarm_set                2   1 ROM Checksum Failure
    2  sysalarm_set                3   1 RAM Diagnostics Failure
    3  sysalarm_set                4   1 A/D Converter Failure
    4  sysalarm_set                5   1 Detector Oven Failure
    5  sysalarm_set                6   1 Liquid Sample Valve Heater Failure
    6  sysalarm_set                7   1 Sample System Oven Failure
    7  sysalarm_set                8   1 Catalytic Converter Failure
    8  sysalarm_set                9   1 Heater 5 Failure
    9  sysalarm_set               10   1 Heater 6 Failure
   10  sysalarm_set               11   1 Heater 1 Controller Failure
   11  sysalarm_set               12   1 Heater 2 Controller Failure
   12  sysalarm_set               13   1 Heater 3 Controller Failure
   13  sysalarm_set               14   1 Heater 4 Controller Failure
   14  sysalarm_set               15   1 Heater 5 Controller Failure
   15  sysalarm_set               16   1 Heater 6 Controller Failure
   16  sysalarm_set               17   1 FID Flame out
   17  sysalarm_set               18   1 Warmstart Calibration Failure
   18  sysalarm_set               19   1 Valve Timing Failure
   19  sysalarm_set               20   1 Excess Response Factor Deviation
   20  sysalarm_set               21   1 M200 Invalid Non-Volatile Data
   21  sysalarm_set               22   1 M200 Invalid A Module Data
   22  sysalarm_set               23   1 M200 Invalid B Module Data
   23  sysalarm_set               24   1 M200 Bad Options
   24  sysalarm_set               25   1 M200 Stack Overflow
   25  sysalarm_set               26   1 M200 Hardware Shutdown
   26  sysalarm_set               27   1 M200 Synchronization Failure
   27  sysalarm_set               28   1 Preamp Input 1 Out of Range
   28  sysalarm_set               29   1 Preamp Input 2 Out of Range
   29  sysalarm_set               30   1 Preamp Input 3 Out of Range
   30  sysalarm_set               31   1 Preamp Input 4 Out of Range
   31  sysalarm_set               32   1 Preamp Failure
   32  sysalarm_set               33   1 Analog Output 1 HIGH
   33  sysalarm_set               34   1 Analog Output 2 HIGH
   34  sysalarm_set               35   1 Analog Output 3 HIGH
   35  sysalarm_set               36   1 Analog Output 4 HIGH
   36  sysalarm_set               37   1 Analog Output 5 HIGH
   37  sysalarm_set               38   1 Analog Output 6 HIGH
   38  sysalarm_set               39   1 Analog Output 7 HIGH
   39  sysalarm_set               40   1 Analog Output 8 HIGH
   40  sysalarm_set               41   1 Analog Output 9 HIGH
```

41	sysalarm_set	42	1	Analog Output 10 HIGH
42	sysalarm_set	43	1	Analog Output 11 HIGH
43	sysalarm_set	44	1	Analog Output 12 HIGH
44	sysalarm_set	45	1	Analog Output 13 HIGH
45	sysalarm_set	46	1	Analog Output 14 HIGH
46	sysalarm_set	47	1	Analog Output 15 HIGH
47	sysalarm_set	48	1	Analog Output 16 HIGH
48	sysalarm_set	49	1	Analog Output 1 LOW
49	sysalarm_set	50	1	Analog Output 2 LOW
50	sysalarm_set	51	1	Analog Output 3 LOW
51	sysalarm_set	52	1	Analog Output 4 LOW
52	sysalarm_set	53	1	Analog Output 5 LOW
53	sysalarm_set	54	1	Analog Output 6 LOW
54	sysalarm_set	55	1	Analog Output 7 LOW
55	sysalarm_set	56	1	Analog Output 8 LOW
56	sysalarm_set	57	1	Analog Output 9 LOW
57	sysalarm_set	58	1	Analog Output 10 LOW
58	sysalarm_set	59	1	Analog Output 11 LOW
59	sysalarm_set	60	1	Analog Output 12 LOW
60	sysalarm_set	61	1	Analog Output 13 LOW
61	sysalarm_set	62	1	Analog Output 14 LOW
62	sysalarm_set	63	1	Analog Output 15 LOW
63	sysalarm_set	64	1	Analog Output 16 LOW
64	sysalarm_set	65	1	Analyzer Failure
65	sysalarm_set	66	1	Power Failure
66	sysalarm_set	67	1	Fused Peak Overflow - Noisy Baseline
67	sysalarm_set	68	1	CPU Battery Low
68	sysalarm_set	69	1	GC Idle
69	sysalarm_set	70	1	Real-Time Clock Failure
70	sysalarm_set	71	1	Analog Input 1 HIGH
71	sysalarm_set	72	1	Analog Input 2 HIGH
72	sysalarm_set	73	1	Analog Input 3 HIGH
73	sysalarm_set	74	1	Analog Input 4 HIGH
74	sysalarm_set	75	1	Analog Input 1 LOW
75	sysalarm_set	76	1	Analog Input 2 LOW
76	sysalarm_set	77	1	Analog Input 3 LOW
77	sysalarm_set	78	1	Analog Input 4 LOW
78	sysalarm_set	79	1	NA
79	sysalarm_set	80	1	NA
80	sysalarm_set	81	1	NA
81	sysalarm_set	82	1	NA
82	sysalarm_set	83	1	NA
83	sysalarm_set	84	1	NA
84	sysalarm_set	85	1	NA
85	lmtalarm_set	1	1	
86	lmtalarm_set	2	1	
87	lmtalarm_set	3	1	
88	lmtalarm_set	4	1	
89	lmtalarm_set	5	1	

90	lmtalarm_set		6	1	
91	lmtalarm_set		7	1	
92	lmtalarm_set		8	1	
93	lmtalarm_set		9	1	
94	lmtalarm_set		10	1	
95	lmtalarm_set		11	1	
96	lmtalarm_set		12	1	
97	lmtalarm_set		13	1	
98	lmtalarm_set		14	1	
99	lmtalarm_set		15	1	
100	lmtalarm_set		16	1	
101	lmtalarm_set		17	1	
102	lmtalarm_set		18	1	
103	lmtalarm_set		19	1	
104	lmtalarm_set		20	1	
105	stream_data	stream_togg	1	1	Stream 1
106	stream_data	stream_togg	2	1	Stream 2
107	stream_data	stream_togg	3	1	Stream 3
108	stream_data	stream_togg	4	1	Stream 4
109	stream_data	stream_togg	5	1	Stream 5
110	stream_data	stream_togg	6	1	Stream 6
111	stream_data	stream_togg	7	1	Stream 7
112	stream_data	stream_togg	8	1	Stream 8
113	doutcur		1	1	
114	doutcur		2	1	
115	doutcur		3	1	
116	doutcur		4	1	
117	doutcur		5	1	

F.3 SIM_2251 Modbus Register List

Note
The information in the following tables is derived from engineering specification number ES-17128-005, “Model 2251 Enhanced Specification Chromatograph Controller Modbus Communication Indices” and has been updated for the 2350A GC Controllers.

G.3 (continued) **SIM_2251 MODBUS REGISTER LIST**	
Reg. No.	**Description**
3001	Component Table *n* (where *n* = CDT # used during last run) - Component Index #1
3002	Component Table *n* (where *n* = CDT # used during last run) - Component Index #2
3003	Component Table *n* (where *n* = CDT # used during last run) - Component Index #3
3004	Component Table *n* (where *n* = CDT # used during last run) - Component Index #4
3005	Component Table *n* (where *n* = CDT # used during last run) - Component Index #5
3006	Component Table *n* (where *n* = CDT # used during last run) - Component Index #6
3007	Component Table *n* (where *n* = CDT # used during last run) - Component Index #7
3008	Component Table *n* (where *n* = CDT # used during last run) - Component Index #8
3009	Component Table *n* (where *n* = CDT # used during last run) - Component Index #9
3010	Component Table *n* (where *n* = CDT # used during last run) - Component Index #10
3011	Component Table *n* (where *n* = CDT # used during last run) - Component Index #11
3012	Component Table *n* (where *n* = CDT # used during last run) - Component Index #12
3013	Component Table *n* (where *n* = CDT # used during last run) - Component Index #13
3014	Component Table *n* (where *n* = CDT # used during last run) - Component Index #14
3015	Component Table *n* (where *n* = CDT # used during last run) - Component Index #15
3016	Component Table *n* (where *n* = CDT # used during last run) - Component Index #16
3017	Component Table *n* (where *n* = CDT # used during last run) - Component Index #1
3018	Component Table *n* (where *n* = CDT # used during last run) - Component Index #2
3019	Component Table *n* (where *n* = CDT # used during last run) - Component Index #3

G.3 (continued) SIM_2251 MODBUS REGISTER LIST

Reg. No.	Description
3020	Component Table *n* (where *n* = CDT # used during last run) - Component Index #4
3021	Component Table *n* (where *n* = CDT # used during last run) - Component Index #5
3022	Component Table *n* (where *n* = CDT # used during last run) - Component Index #6
3023	Component Table *n* (where *n* = CDT # used during last run) - Component Index #7
3024	Component Table *n* (where *n* = CDT # used during last run) - Component Index #8
3025	Component Table *n* (where *n* = CDT # used during last run) - Component Index #9
3026	Component Table *n* (where *n* = CDT # used during last run) - Component Index #10
3027	Component Table *n* (where *n* = CDT # used during last run) - Component Index #11
3028	Component Table *n* (where *n* = CDT # used during last run) - Component Index #12
3029	Component Table *n* (where *n* = CDT # used during last run) - Component Index #13
3030	Component Table *n* (where *n* = CDT # used during last run) - Component Index #14
3031	Component Table *n* (where *n* = CDT # used during last run) - Component Index #15
3032	Component Table *n* (where *n* = CDT # used during last run) - Component Index #16
3033	Analysis Time (in 1/30ths of 1 second)
3034	Current Stream
3035	Mask of streams associated with Component Table #1 (Bit 2^n = 1 implies stream n included)
3036	Current Month(1-12)
3037	Current Day(1-31)
3038	Current Year(0-99)
3039	Current Hour(0-24)
3040	Current Minutes(0-59)
3041	Cycle Start Time - Month
3042	Cycle Start Time - Day
3043	Cycle Start Time - Year
3044	Cycle Start Time - Hour
3045	Cycle Start Time - Minutes

G.3 (continued) **SIM_2251 MODBUS REGISTER LIST**

Reg. No.	**Description**															
	BIT NUMBER															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
3046	checksum failure	anlyzr failure	D/A 3 high	D/A 3 low	D/A 2 high	D/A 2 low	D/A 1 high	D/A 1 low	spare	spare	A/D 2 high	A/D 2 low	A/D 1 high	A/D 1 low	spare	spare
3047	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	adjust preamp	preamp failure	rf % dev	power fail
3048	stream number 1															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A #1 low
3049	stream number 1															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A #1 high
3050	stream number 2															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A #1 low
3051	stream number 2															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A #1 high
3052	stream number 3															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A #1 low
3053	stream number 3															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A #1 high
3054	stream number 4															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A #1 low
3055	stream number 4															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A #1 high
3056	stream number 5															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A #1 low
3057	stream number 5															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A #1 high
3058	New data flag. Set upon completion of calculations.															

G.3 (continued) SIM_2251 MODBUS REGISTER LIST	
Reg. No.	**Description**
3059	Cal/Analysis flag. Set = 1 if analysis data. Set = 0 if calculation data.
32-BIT INTEGERS	
5001	Cycle Time (in 1/30ths of 1 second)
5002	Calibration Cycle time (in 1/30ths of 1 second)
FLOATING POINT (proposed - IEEE KCS Standard Format) **NOTE:** The following registers will contain 0 (zero) values until at least one analysis run has occurred.	
7001	Mole % - Component #1
7002	Mole % - Component #2
7003	Mole % - Component #3
7004	Mole % - Component #4
7005	Mole % - Component #5
7006	Mole % - Component #6
7007	Mole % - Component #7
7008	Mole % - Component #8
7009	Mole % - Component #9
7010	Mole % - Component #10
7011	Mole % - Component #11
7012	Mole % - Component #12
7013	Mole % - Component #13
7014	Mole % - Component #14
7015	Mole % - Component #15
7016	Mole % - Component #16
7017	GPM or Weight % - Component #1
7018	GPM or Weight % - Component #2
7019	GPM or Weight % - Component #3
7020	GPM or Weight % - Component #4
7021	GPM or Weight % - Component #5

G.3 (continued) SIM 2251 MODBUS REGISTER LIST	
Reg. No.	**Description**
7022	GPM or Weight % - Component #6
7023	GPM or Weight % - Component #7
7024	GPM or Weight % - Component #8
7025	GPM or Weight % - Component #9
7026	GPM or Weight % - Component #10
7027	GPM or Weight % - Component #11
7028	GPM or Weight % - Component #12
7029	GPM or Weight % - Component #13
7030	GPM or Weight % - Component #14
7031	GPM or Weight % - Component #15
7032	GPM or Weight % - Component #16
7033	BTU - Dry
7034	BTU - Saturated
7035	Specific Gravity
7036	Compressibility
7037	WOBBE Index
7038	Total Unnormalized Mole %
7039	Total GPM
7040	Calculation, User Defined 1
7041	Calculation, User Defined 2
7042	Calculation, User Defined 3
7043	Calculation, User Defined 4
7044	Calculation, User Defined 5
7045-7053	Unused
7054	Actual BTU
7055	Average, User Defined 1

G.3 (continued) SIM 2251 MODBUS REGISTER LIST	
Reg. No.	**Description**
7056	Average, User Defined 2
7057	Average, User Defined 3
7058	Average, User Defined 4
7059	Average, User Defined 5
7060	Average, User Defined 6
7061	Average, User Defined 7
7062	Average, User Defined 8
7063	Average, User Defined 9
7064	Average, User Defined 10
7065	Average, User Defined 11
7066	Average, User Defined 12
7067	Average, User Defined 13
7068	Average, User Defined 14
7069	Average, User Defined 15
7070	First Archive of Average, User Defined 1
7071	First Archive of Average, User Defined 2
7072	First Archive of Average, User Defined 3
7073	First Archive of Average, User Defined 4
7074	First Archive of Average, User Defined 5
7075	First Archive of Average, User Defined 6
7076	First Archive of Average, User Defined 7
7077	First Archive of Average, User Defined 8
7078	First Archive of Average, User Defined 9
7079	First Archive of Average, User Defined 10
7080	First Archive of Average, User Defined 11
7081	First Archive of Average, User Defined 12
7082	First Archive of Average, User Defined 13

G.3 (continued) SIM 2251 MODBUS REGISTER LIST	
Reg. No.	**Description**
7083	First Archive of Average, User Defined 14
7084	First Archive of Average, User Defined 15
7085	Analog Input #1 - Current Value in Engineering Units
7086	Analog Input #2 - Current Value in Engineering Units
7087	Actual BTU (last calibration)
7088	Dry BTU (last calibration)
7089	Sat BTU (last calibration)
7090	Wobbe Index (last calibration)
7091	Relative Density (last calibration)
7092	Compressibility (last calibration)
7093	Total GPM (last calibration)
7094	Total Unnormalized (last calibration)
7095-7110	Response Factors (#1-16), Component Table *n* (where *n* = CDT # used during last run)
7111-7126	Response Factors (#1-16), Component Table *n* (where *n* = CDT # used during last run)
7127-7162	Averages, User Defined 1-36 (NOTE: First fifteen, or registers 7127-7141, are repeats of contents of registers 7055-7069)
7163-7198	Maximum values from Averages, User Defined 1-36
7199-7234	Minimum values from Averages, User Defined 1-36
7235-7270	First (most recent) Archive of Averages, User Defined 1-36 (NOTE: First fifteen, or registers 7235-7249, are repeats of contents of registers 7070-7084)
7271-7306	First (most recent) Archive of Maximum values from Averages, User Defined 1-36
7307-7342	First (most recent) Archive of Minimum values from Averages, User Defined 1-36
7343-7378	Second Archive of Averages, User Defined 1-36

G.3 (continued) SIM_2251 MODBUS REGISTER LIST	
Reg. No.	**Description**
7379-7414	Second Archive of Maximum values from Averages, User Defined 1-36
7415-7450	Second Archive of Minimum values from Averages, User Defined 1-36
7451-7486	Third (oldest) Archive of Averages, User Defined 1-36
7487-7522	Third (oldest) Archive of Maximum values from Averages, User Defined 1-36
7523-7558	Third (oldest) Archive of Minimum values from Averages, User Defined 1-36

G.3 (continued) **SIM_2251 MODBUS COMMUNICATION INDICES**

Description: RW = read/write (1) or read-only (0)
LEN = length
REGS = number of Modbus registers required

Reg. No.	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, or DESCRIPTION
9001	0	string	6	3	device model number
9004	0	string	4	2	software revision
9006	1	integer	2	1	system time month (1-12)
9007	1	integer	2	1	system time day (1-31)
9008	1	integer	2	1	system time year (0-99)
9009	1	integer	2	1	system time hour (0-23)
9010	1	integer	2	1	system time minutes (0-59)
9011	1	integer	2	1	system time seconds (0-59)
9012	1	integer	2	1	system time day (0-6)
9013	0	integer	2	1	plug id (Modbus or Device ID, per DIP switch settings)
9014	1	long	4	2	site id
9016	0	string	12	5	device serial number
9022	0	integer	2	1	analysis time 1
9023	0	integer	2	1	analysis time 2 (for dual detector system)
9024	0	integer	2	1	cycle time 1

G.3 (continued) SIM_2251 MODBUS COMMUNICATION INDICES					
Reg. No.	Description: RW = read/write (1) or read-only (0) LEN = length REGS = number of Modbus registers required				
	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, or DESCRIPTION
9025	0	integer	2	1	cycle time 2 (for dual detector system)
9026	0	integer	2	1	run time 1
9027	0	integer	2	1	run time 2 (for dual detector system)
9028	0	integer	2	1	current stream 1
9029	0	integer	2	1	current stream 2 (for dual detector system)
9030	0	integer	2	1	system mode 1
9031	0	integer	2	1	system mode 2 (for dual detector system)
9032	0	integer	2	1	calibrating 1
9033	0	integer	2	1	calibrating 2 (for dual detector system)
9034	0	integer	2	1	active alarm (red light at GC controller)
9035	0	integer	2	1	unack'd alarm (yellow light at GC controller)
9036	0	integer	2	1	hourly average reset - year
9037	0	integer	2	1	hourly average reset - month
9038	0	integer	2	1	hourly average reset - day
9039	0	integer	2	1	hourly average reset - hour
9040	0	integer	2	1	hourly average reset - minutes
9041	0	integer	2	1	24-hour average reset - year
9042	0	integer	2	1	24-hour average reset - month
9043	0	integer	2	1	24-hour average reset - day
9044	0	integer	2	1	24-hour average reset - hour
9045	0	integer	2	1	24-hour average reset - minutes
9046	0	integer	2	1	weekly average reset - year
9047	0	integer	2	1	weekly average reset - month
9048	0	integer	2	1	weekly average reset - day
9049	0	integer	2	1	weekly average reset - hour

G.3 (continued) SIM_2251 MODBUS COMMUNICATION INDICES					
Reg. No.	Description: RW = read/write (1) or read-only (0) LEN = length REGS = number of Modbus registers required				
	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, or DESCRIPTION
9050	0	integer	2	1	weekly average reset - minutes
9051	0	integer	2	1	monthly average reset - year
9052	0	integer	2	1	monthly average reset - month
9053	0	integer	2	1	monthly average reset - day
9054	0	integer	2	1	monthly average reset - hour
9055	0	integer	2	1	monthly average reset - minutes
9056	0	integer	2	1	variable average reset - year
9057	0	integer	2	1	variable average reset - month
9058	0	integer	2	1	variable average reset - day
9059	0	integer	2	1	variable average reset - hour
9060	0	integer	2	1	variable average reset - minutes

MS-00809-0100-2000
Rev. AB
2023

For more information: **Emerson.com**

ROSEMOUNT™

EMERSON™