

**Daniel Gas Chromatograph  
Data Acquisition and Reporting System  
for Shiploading/Unloading**

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**Operations Manual**

**DANIEL MEASUREMENT AND CONTROL, INC.  
AN EMERSON PROCESS MANAGEMENT COMPANY  
HOUSTON, TEXAS**

**Part Number 3-9000-526**

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**DANIEL MEASUREMENT AND CONTROL, INC.**  
**Daniel Gas Chromatograph Data Acquisition and Reporting**  
**System for Shiploading/Unloading Operations Manual**

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## INTRODUCTION

### 1. INTRODUCTION TO GCDARS

The Daniel Gas Chromatograph Data Acquisition and Reporting System for ShipLoading/Unloading (GCDARS) provides a method to acquire and process analysis data from an online gas chromatograph during the loading or unloading of a liquefied natural gas (LNG) tanker. The system performs averaging of the analysis results during shiploading and unloading and also performs the additional calculations of gas quality specified in the GII GNL LNG Custody Transfer Handbook.

The results are integrated with operator entered information and generates a loading/unloading report. The report can be displayed and printed or the information may be saved for later access. Historical data saved in this manner can be recalled for display, editing and printing. Results of individual analyses are saved and can be recalled for display or printing. Additionally, the analysis in progress at the time of manual sample acquisition can be identified by the operator, and a volume (loaded or unloaded) associated with the results. These results are available for display or printing during the loading process.

## 1.1 System Requirements

This system will execute on standard Pentium-based PC running Windows® 95, 98, NT, 2000, or XP. The GCDARS is a 32-bit Windows® application created using Visual Basic 6.0.

## 1.2 About the Software

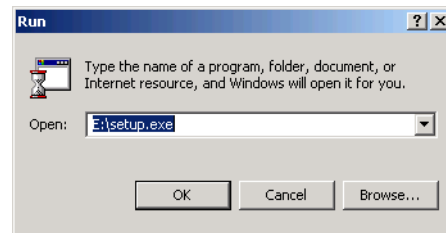
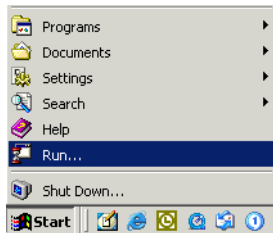
The system also includes a Modbus server task, Modbus Master OCX supplied by WinTECH Software which provides the communications link between the GCDARS and the 2350 Gas Chromatograph Controller.


## GETTING STARTED

### 2. PROGRAM INSTALLATION

Use the following process to install the GCDARS program.

1. Insert the GCDARS installation CDROM or floppy disk in the appropriate drive on the PC.
2. Use the Windows® *Start*>*Run* menu path, then click on the pull-down arrow.
3. Select the CDROM or floppy drive where the installation disk is located (e.g. D:\ or E:\) The *Run* dialog box displays.



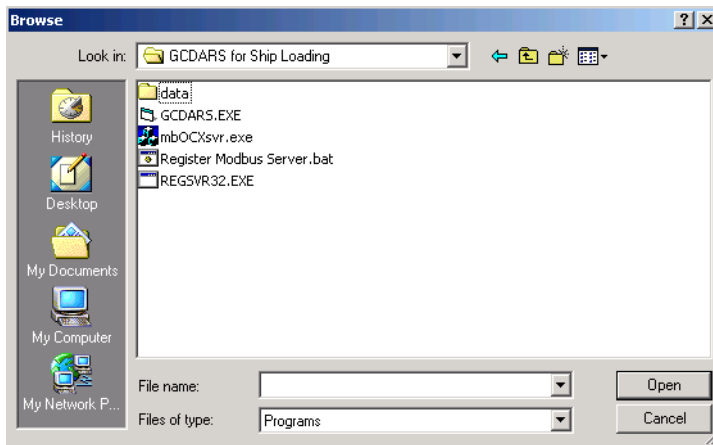
Click on E:\SETUP.EXE and click on the  button to open the Setup installation program. The program will guide you through the installation process.

4. To install the Modbus Master OCX server, use the following process:

From the *Start>Run>Browse* menu path, locate the Register Modbus Server.BAT file (stored in the directory in which the program was installed C:\Program Files\GCDARS for ShipLoading/Unloading) and execute the file. If no installation errors occurred, a message will appear indicating that the registration was successful.



**Prior to starting the GCDARS program, you must install the Modbus Master OCX Server into the Windows® Registry.**





You may create a Windows® Desktop Shortcut icon for fast access to the GCDARS program.

## 2.1 Starting the Program

Start the GCDARS program by double clicking the desktop GCDARS icon or access it from the GCDARS folder.

Starting the GCDARS program automatically runs the Modbus Master OCX server (if it is not currently running).

Port	Sent	Recv'd	Last Conversation
Tapi	0	0	
1	0	0	16:00:53 To: 3802334
2	0	0	
3	0	0	16:10:48 To: 1115144
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
MBap	0	0	

Figure 2-1 GCDARS Modbus Master OCX Server Window

Upon startup, the GCDARS program displays the *Main Window* which shows status information about any Loading/Unloading in progress, and the current Gas Chromatograph Analysis. The *Main Window* also includes the GCDARS *Main Menu* and the system operation control buttons.

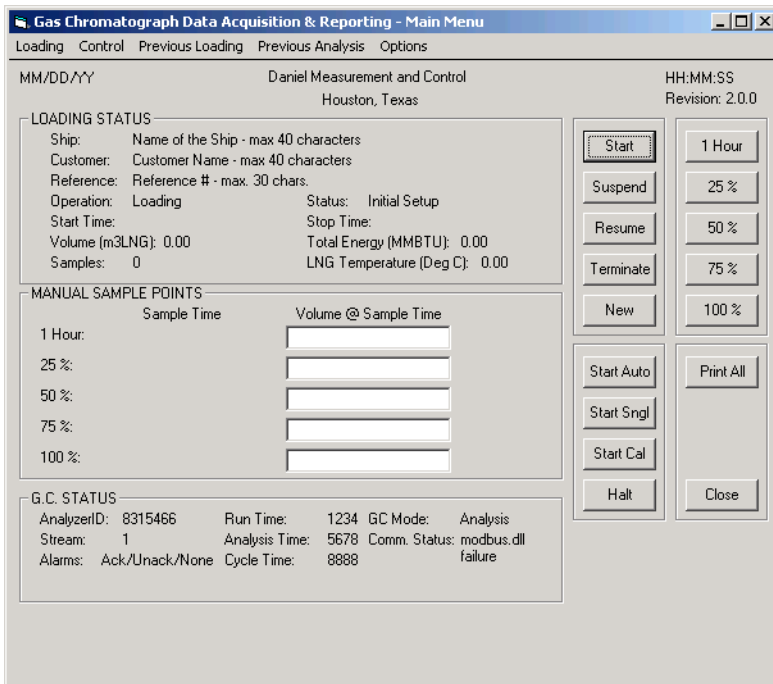
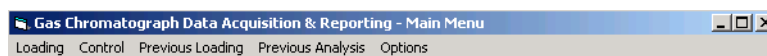


Figure 2-2 GCDARS Main Window

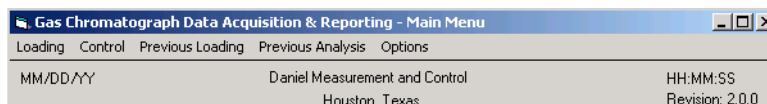
## 2.2 Navigating GCDARS Main Window

The GCDARS Main Window provides an overview of the operation of the system. The top portion of the display includes the GCDARS control toolbar which includes the following:

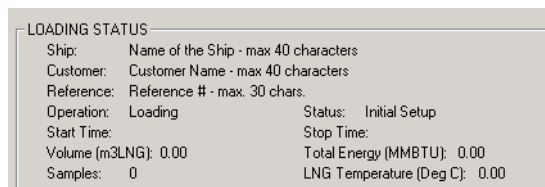


- Loading
- Control
- Previous Loading
- Previous Analysis
- Options

The GCDARS date (MM/DD/YY), company name (Daniel Measurement and Control), time (HH:MM:SS), and program revision (Revision 2.0.0) are located below the toolbar at the top of the window.



The next portion of the display shows the Loading (or Unloading) status. The information displayed includes the following:



- name of the vessel being loaded/unloaded
- name of the customer for this transaction

- operation being performed (e.g. loading or unloading)
- status of the operation
- time at which the loading/unloading started
- time at which the loading/unloading ended
- volume loaded/unloaded
- total energy (in MMBTU) loaded/unloaded
- average temperature of the LNG loaded/unloaded
- number of gas chromatograph analysis samples included in the loading

The center portion of the display includes the Manual Sample Points of Sample and Volume at Sample Time

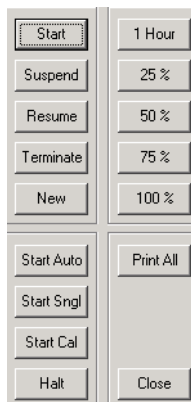
MANUAL SAMPLE POINTS	
Sample Time	Volume @ Sample Time
1 Hour:	<input type="text"/>
25 %:	<input type="text"/>
50 %:	<input type="text"/>
75 %:	<input type="text"/>
100 %:	<input type="text"/>

The lower portion of the display includes status information related to the gas chromatograph. The following information is included:

G.C. STATUS			
AnalyzerID: 8315466	Run Time: 1234	GC Mode: Analysis	
Stream: 1	Analysis Time: 5678	Comm. Status: modbus.dll	
Alarms: Ack/Unack/None	Cycle Time: 8888	failure	

- Analyzer ID of the chromatograph
- stream being analyzed
- current alarm state of the analyzer (e.g. Acknowledged/Unacknowledged/None)

- run time of the current analysis (seconds into the analysis)
- analysis time of the analyzer
- cycle time of the analyzer
- current GC Mode (e.g. Analysis, Calibration, etc...)
- status of communications between GCDARS and the GC controller



The GCDARS control buttons are located on the right side of the GCDARS Main window. The following control function buttons are included:

#### Loading/Unloading Functions:

- Start
- Suspend
- Resume
- Terminate
- New

#### GC Functions:

- Start Auto
- Start Single
- Start Calibration
- Halt

#### User Defined GCDARS Parameters

- 1 hour
- 25%
- 50%
- 75%
- 100%
- Close

## 2.3 GCDARS Control Functions

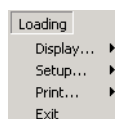
This section describes the GCDARS Control functions.

### Main Menu

Included on the Main Window are the Main Menu selections. The main menu selections provide a logical grouping of the system functions available to the operator via associated sub-menus and displays.

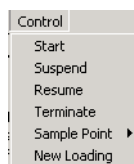
### Loading

The Loading menu selection provides a group of sub-menus which allow the operator to enter setup information related to the current loading/unloading operation. Also, associated with the Current Loading/Unloading operation, the operator may display and print user-entered and calculated data.



### Control

The Control menu selection provides a group of sub-menus which allow the operator to communicate to the GCDARS program during the current loading/unloading operation. Included in these sub-menus are selections to start, suspend, resume, and terminate the acquisition and averaging of the gas chromatograph data associated with the loading/unloading operation. Also, the operator can add the current loading/unloading operation to the historical archive file and a new loading/unloading operation may be started.



## Previous Loading

From the toolbar, click on *Previous Loading* to display the dialog box. This menu selection allows the operator to review, display, and print the detailed report for previously completed loading/unloading operations. The information for these loading/unloading operations has been previously stored in the historical archive file.

Previous Loading - Select

Display Print...

18-Feb-2004 14:18:26

HISTORICAL LOADING STATUS

Ship: NewLoadDec29\_2003

Customer: Monday

Start Time: 12/29/2003 7:56:54 AM

Stop Time: 12/29/2003 11:16:35 A

Reference: 122903\_0755

Volume Unloaded: 2100

LNG Temperature: 0 Deg C

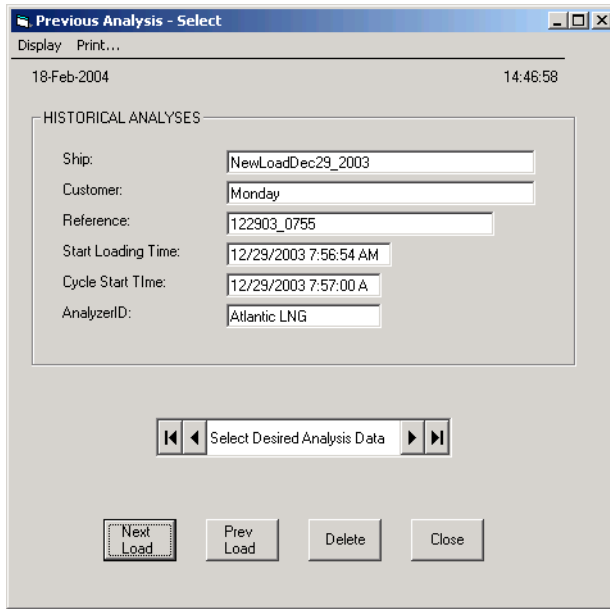
Number of Samples: 49

Select Desired Loading Data

Close Delete

## Previous Analysis

From the toolbar, click on *Previous Analysis* to display the dialog box.

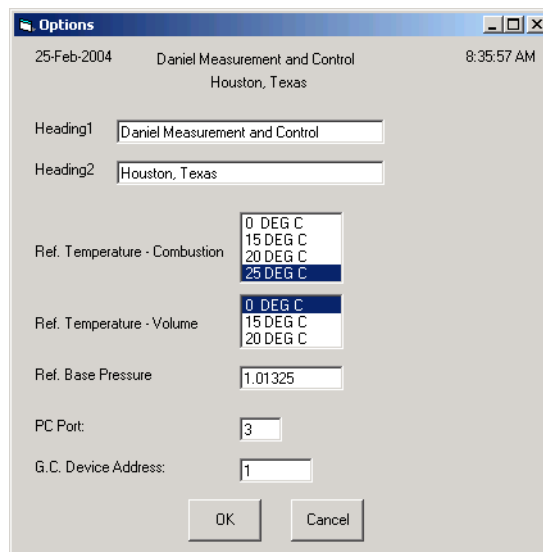


This menu selection allows the operator to display and print the results of any individual analysis.

## Options

This menu selection allows the user to enter/change certain configuration information which relates to the GCDARS system as opposed to an individual loading/unloading operation.

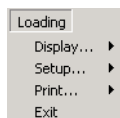
From the GCDARS Main Window, click on the *Options* tab and the Options dialog is displayed.



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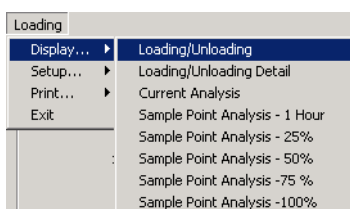
## CURRENT LOADING MENU

### 3. INTRODUCTION



This section describes the sub-menus and displays available under the LOADING selection on the main menu.

#### 3.1 Loading Display Menu



The user can select from the Loading>Display menu any of the following options:

- *Current Loading/Unloading* display
- *Loading/Unloading Detail* display (which includes information for each analysis included in the current loading)
- *Current Analysis* display (which includes information for the most recent gas chromatograph analysis)
- *Sample Point Analysis* (the displays for the gas chromatograph analyses associated with the *Manual Sample Acquisitions* in the current loading/unloading operation)

## Loading Display Loading/Unloading

This display provides the user with summary information relating to the current loading/unloading operation.

18-Feb-2004 15:23:10

LOADING STATUS

Ship: Name of the Ship - max 40 characters  
 Customer: Customer Name - max 40 characters  
 Reference: Reference # - max 30 chars  
 Operation: Loading Status: Initial Setup  
 Start Time: Stop Time:  
 Volume (m3LNG): 0.00 Total Energy (MMBTU): 0.00  
 Samples: 0 LNG Temperature (Deg C): 0.00

Component Name	Contractual Limits mole %	Composition			Out of Limits
		Mean mole %	Min mole %	Max mole %	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
TOTALS		0.0000			
C5+	0.0000- 0.0000	0.0000	0.0000	0.0000	

Molecular Weight	0.0000	Relative Density (@ 60 DegF)	0.0000
Pseudo-Molar Volume (l/mol)	0.000000	Gross calorific value(MMBTU/kg)	0.00000
Corrected molar volume (l/mol)	0.000000	Gross calorific value (kJ/m3(n))	0.00
Density (kg/m3LNG)	0.000	Gross calorific value (BTU/scf)	0.00
Density (lbs/cu.ft.)	0.000	Wobbe Index (kJ/m3(n))	0.00
Relative Density	0.0000	Expansion ratio (m3(n)/m3LNG)	0.000

The top of display includes the same Loading Status information included on the GCDARS Main Window and described in [Section 2.2](#). Beneath this information is a table of information with entries for each component of the LNG.

The tabular information includes the component name, the contractual limits (on the concentration of the component), the mean composition since the beginning of the loading/unloading operation, the minimum and maximum values since the beginning of the loading/unloading, and an indication if the mean composition is outside the contractual limits for the component. When an unloading operation is in process, two additional columns are presented in the table.



**If the concentration at loading is not available and hence not entered, these columns will not be displayed.**

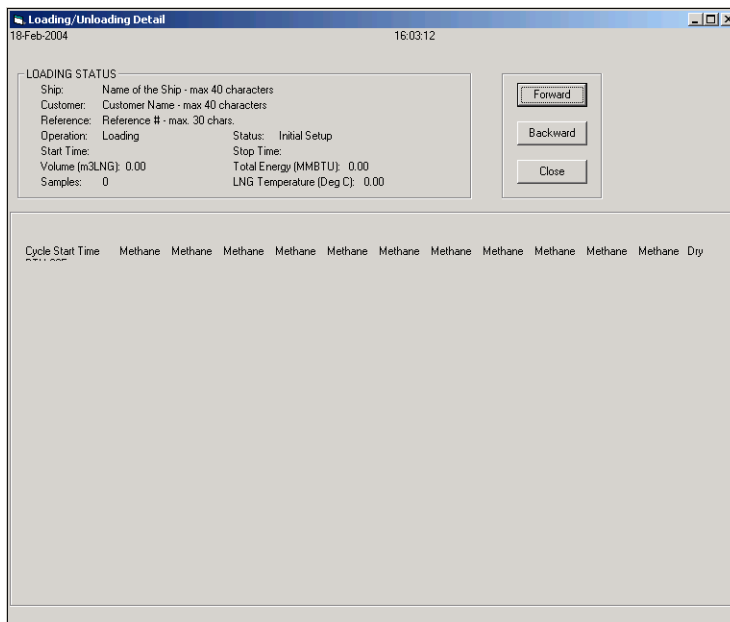
The first column is the concentration of the component at loading, and the second column is the variation between loading and unloading concentration values.

At the bottom of the display are the following property values of the LNG which are calculated from the mean composition values in the table:

- Molecular Weight (kg/kmol)
- Pseudo-Molar Volume (l/mol)
- Corrected Molar Volume (l/mol)
- LNG Density (kg/m<sup>3</sup>)
- LNG Density (lbs/cuft)
- Relative Density
- Relative Density (@60 °F)
- Gross Calorific Value (MMBTU/kg)
- Gross Calorific Value (kJ/m<sup>3</sup>(n))
- Gross Calorific Value (BTU/scf)
- Wobbe Index (kJ/m<sup>3</sup>(n))
- Expansion Ratio (m<sup>3</sup>(n)/m<sup>3</sup>LNG)

## Loading/Unloading Detail Menu

This display provides the user with a view of the component concentrations and the Dry BTU value for each analysis included in the current loading/unloading operation. Its intended use is to allow the user to quickly review the analyses associated with the loading/unloading in order to ascertain if any results appear erroneous.



The top of display includes the same Loading Status information included on the GCDARS-Main Window and described in [Section 2.2](#). The body of the display includes one line for each analysis which includes the cycle start time for the analysis, the concentration for each component, and the Gross Calorific Value (BTU/scf @ 60 °F) for the analysis.

## Loading Display Current Analysis Menu

This display provides the user with the detailed information related to the most recently completed analysis data from the gas chromatograph.

Component Name	Contractual Limits mole %	Mean mole %	Composition Min mole %	Max mole %	Out of Limits
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
Methane	0.0000- 0.0000	0.0000	100.0000	0.0000	
TOTALS		0.0000			
C5+	0.0000- 0.0000	0.0000	0.0000	0.0000	

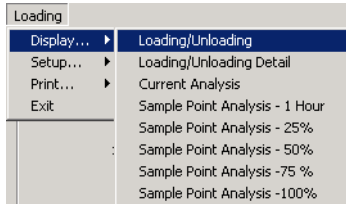
Molecular Weight	0.0000	Relative Density (@ 60 DegF)	0.0000
Pseudo-Molar Volume (l/mol)	0.000000	Gross calorific value(MMBTU/kg)	0.00000
Corrected molar volume (l/mol)	0.000000	Gross calorific value (kJ/m3(n))	0.00
Density (kg/m3LNG)	0.000	Gross calorific value (BTU/scf)	0.00
Density (lbs/cu.ft.)	0.000	Wobbe Index (kJ/m3(n))	0.00
Relative Density	0.0000	Expansion ratio (m3(n)/m3LNG)	0.000

The top of the display includes the same GC Status information as shown on the Main Window and described in [Section 2.2](#). Below the status information is a report of the analysis data which includes:

- Component name
- Component Concentration
- Gross Calorific Value (MMBTU/kg)
- Gross Calorific Value ( $\text{kJ/m}^3$ )
- Gross Calorific Value (BTU/scf)
- Relative Density
- Relative Density (@ 60 °F)
- Molecular Weight (kg/kmol)

- Pseudo-Molar Volume (l/mol)
- Corrected Molar Volume (l/mol)
- LNG Density (kg/m<sup>3</sup>)
- LNG Density (lbs/cuft)
- Gas Density (kg/m<sup>3</sup>)
- Wobbe Index (kJ/m<sup>3</sup>)
- Expansion ratio (m<sup>3</sup>(n)/m<sup>3</sup>LNG)
- Compressibility Factor
- LNG Temperature (°Celsius)

### Manual Sample Point Analyses Menu



A display with analysis results for the analysis associated with each of the five Manual Sample Analysis acquisition points is available. The information included is identical to that described above for the Current Analysis Display. In addition, a field exists for the operator to enter the volume loaded/unloaded at the time of the sample acquisition. The five manual Sample Points are as follows:

- Sample Point Analysis - 1 Hour (one hour after commencement of Loading/Unloading)
- Sample Point Analysis - 25 Percent Loaded/Unloaded
- Sample Point Analysis - 50 Percent Loaded/Unloaded
- Sample Point Analysis - 75 Percent Loaded/Unloaded
- Sample Point Analysis - 100 Percent Loaded/Unloaded

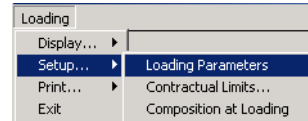
## 3.2 Setup Menu

The *Loading>Setup* sub-menus include three selections of displays which allow the operator to enter the setup information required to define a loading/unloading operation.

These sub-menus are:

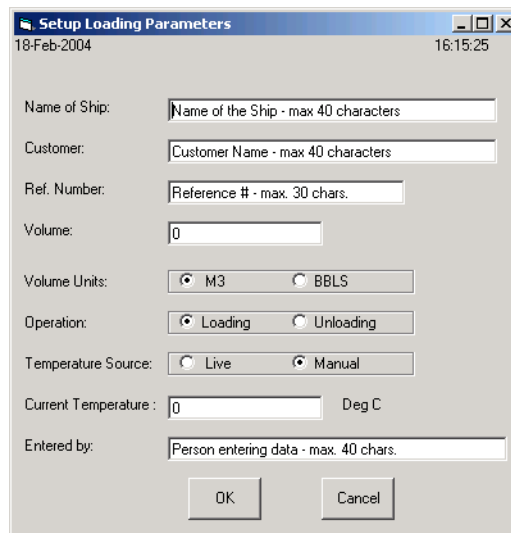
- Loading Parameters
- Contractual Limits
- Composition at Loading

Some of the data must be entered prior to starting the loading/unloading operation. All of the data on these displays can be edited until a new loading is started.



## Loading Parameters

This display allows entry by the operator of the following information:



The screenshot shows a window titled "Setup Loading Parameters" with a date of 18-Feb-2004 and a time of 16:15:25. The window contains the following fields and controls:

- Name of Ship:  Name of the Ship - max 40 characters
- Customer:  Customer Name - max 40 characters
- Ref. Number:  Reference # - max. 30 chars.
- Volume:  0
- Volume Units:  M3  BBLS
- Operation:  Loading  Unloading
- Temperature Source:  Live  Manual
- Current Temperature:  0 Deg C
- Entered by:  Person entering data - max. 40 chars.
- Buttons: OK, Cancel

- Name of the Ship (40 characters maximum)
- Name of the Customer (40 characters maximum)
- Reference Number (30 characters maximum)
- Loading / Unloading selection
- Volume loaded/unloaded during this loading/unloading operation
- Volume Units (BBLS or m3)
- Temperature Source (Live via GC Analog Input #1 or Manual)
- Current Temperature of LNG cargo (used if Manual Temperature source selected)
- Entered by (Name of person entering information 40 characters maximum)



The user can add a set of limits to the file by clicking on the  button at the bottom of the display. An entry will be added (identical to that shown on the display) and that record will be selected for editing.

When the user clicks on the  button the limits as displayed are chosen as those to be used for the loading/unloading operation. Also the data set as displayed, is saved in the selected record in the file which stores the predefined contractual limits data sets.

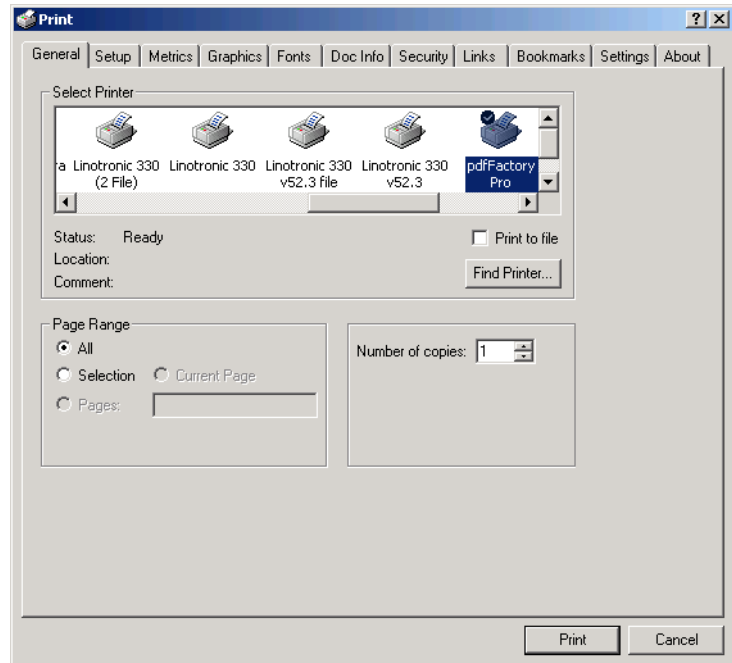
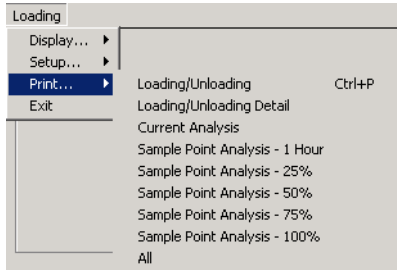
Clicking on the  button discards any edits made to the selected record and exits the display. The user must exit this display using  to select a set of limits for the current loading prior to performing the *CONTROL>START* function to begin the loading/unloading operation. If the limits have not been set, the Status field on the Loading Status area of the GCDARS Main Window indicates "Setup Incomplete". After selecting a set of contractual limits the status will change to "Ready to Start".



### 3.3 Print Menu

The user can request printed reports for the Loading/Unloading in progress, the current analysis, or for any of the manual sample point analyses.

GCDARS prompts you to select the printer and opens the Windows® Printer dialog.

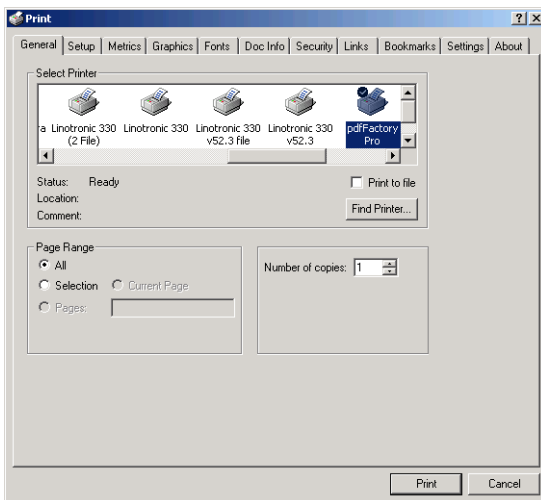
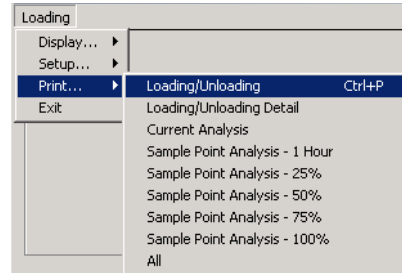


If you have installed the **pdfFactory** printer driver, select this printer now and set up the output configurations (e.g. fonts, landscape, etc...).

### Print Loading/Unloading Report Menu

Use the *Loading>Print>Loading/Unloading* menu path to print a copy of the Loading/Unloading report for the current loading operation.

The Print dialog box displays and allows the selection of any of the attached Windows® Print devices, setting of number of copies, etc...

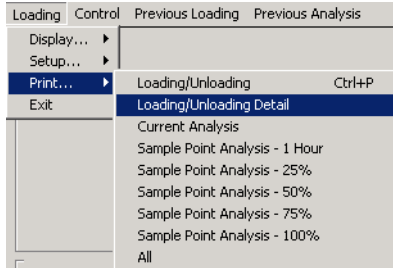


**You may want to install the PDF Factory printer software. This software automatically generates a PDF file for immediate viewing and printing or for saving the file to disk.**



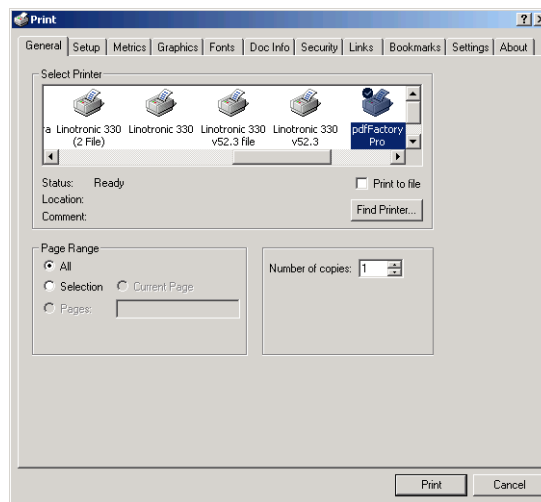
**As of Revision 1.1.0 of GCDARS, this report has been modified to print in landscape mode and the font size reduced slightly so that it can be printed on a single page.**

## Print Loading/Unloading Detail Report Menu



Use the *Loading>Print>Loading/Unloading Detail* menu path to print a copy of the Loading/Unloading Detail Report for the current loading operation.

The Print dialog box displays and allows the selection of any of the attached Windows® Print devices, setting of number of copies, etc...

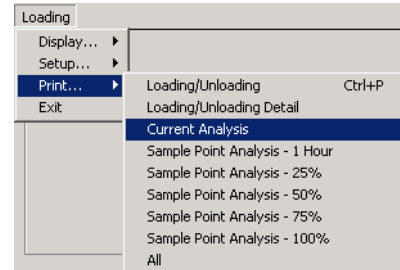


The report contains all of the data described above on the Loading/Unloading Detail display.

## Print Current Analysis Report Menu

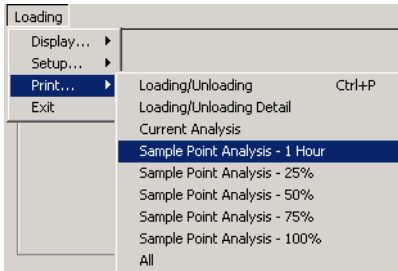
Use the *Loading>Print>Current Analysis* to print a copy of the analysis report for the current (most recently completed) analysis.

The Print Dialog displays and allows the selection of any of the attached Windows® Print devices, setting of number of copies, etc...



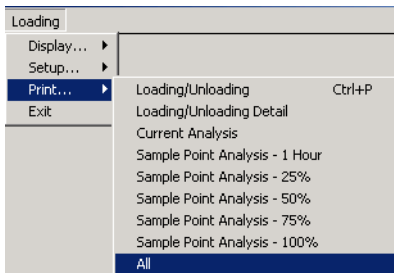
The data included in this report is that described in the Current Analysis Display.

## Sample Point Analysis Reports Menu



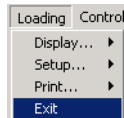
These selections allow the user to print a copy of the analysis report for each of the five analyses associated with the Manual Sample Point Analysis acquisition data. The data included on the report is identical to the data included on the Current Analysis Report with the addition of the volume loaded at the time of the sample acquisition.

### Print All



This selection allows the user to print a copy of all available reports for the current loading/unloading operation. Alternatively, pressing the Print All button on the Main Window performs the same function.

### Exit



This selection closes all open files and exits the GCDARS program. Alternatively, depressing the Close button on the Main Window performs the same function.

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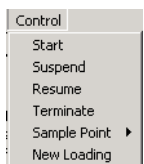
## CONTROL MENU

### 4. INTRODUCTION

The Control menu selection provides a group of sub-menus for operator communication to the GCDARS program with specified time limits of the Current Loading/Unloading operation. The Control (communication) parameters are required during a loading/unloading operation so that the GCDARS program can include the results from the analyses which occur within these time limits.

Additionally, the operator selects the times at which the Manual Sample Points acquisitions occur so the appropriate data analysis can be associated with the Current Loading/Unloading operation.

#### 4.1 Navigating the Control Menu



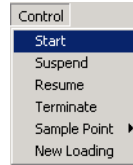
The submenu categories are:

- Start
- Suspend
- Resume
- Terminate
- Sample Point
- New Loading


The following sections describe the GCDARS program's functions for each of these sub-menus.

## 4.2 Control Start Menu

Use the *Control>Start* menu path to begin the GCDARS program data acquisition and averaging of the composition results from the gas chromatograph analyses process.



Or,

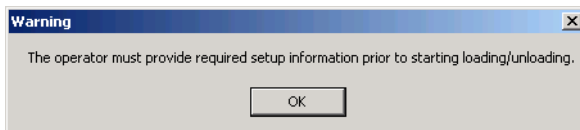
Click on the  button from the GCDARS Main Window.

The time at which the operator issues this command will be recorded as the "Start Time" for the loading/unloading operation.



**The Status field, on the Main Window, must indicate "Ready to Start" or this command will be ignored.**

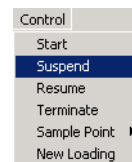
If the operator has not provided the setup parameters, the following message is displayed:




Note that Discrete Output #1 closes when the GCDARS program is in the process of shiploading or unloading and remains closed until the job is terminated.

## 4.3 Control Suspend Menu

Use the *Control>Suspend* menu path to temporarily interrupt the Loading/Unloading data acquisition process (e.g., due to ship problems, equipment malfunctions, weather conditions).



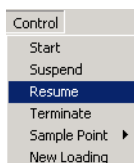
Or,

Click on the  button from the GCDARS Main Window.

```
Status: Suspended
Stop Time: 20-Feb-2004 13:54:50
Total Energy (MMBTU): 0.00
LNG Temperature (Deg C): 20.00
```


The GCDARS Status field on the Main Window, displays the status (SUSPENDED) and the acquisition and averaging of the gas chromatograph data is suspended. The time at which the **Suspend** command is issued, is recorded as the temporary “Stop Time” for the loading/unloading process.

#### 4.4 Control Resume Menu



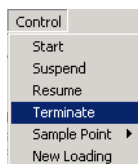
Use the *Control>Resume* menu path only after the **Suspend** command has been given.

Or,

Click on the  button from the GCDARS Main Window.


Following the **Resume** command, the acquisition and averaging of data from the gas chromatograph is resumed and the “Stop Time” is cleared. The loading status is returned to the previous operation (loading or unloading).

#### 4.5 Control Terminate Menu



Use the *Control>Terminate* menu path to stop the GCDARS program data acquisition and averaging of the composition results from the gas chromatograph. Selecting this menu command, indicates the loading/unloading process is complete.

Or,

Click on the  button on the GCDARS Main Window.

Acquisition and averaging of the gas chromatograph data is stopped and the time at which the **Terminate** command is issued, is recorded as the “Stop Time”.

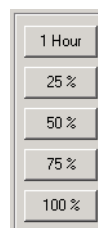
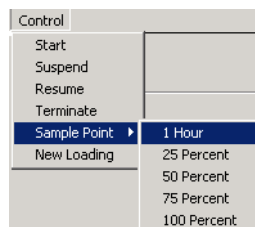
After issuing the **Terminate** command, ensure that the final volume loaded/unloaded is entered and then print the final Loading/Unloading Report.

#### 4.6 Control Sample Points Menu

Use the *Control>Sample Point* menu path to access the acquisition sub-menus of the five Manual Sample Points.

Or, use the Sample Point buttons on the GCDARS Main Window. The Manual Sample points are labeled as follows:

- 1 Hour
- 25 %
- 50 %
- 75 %
- 100 %



GCDARS applies the corresponding sample point to the acquisition process. The time is saved as the “time of occurrence” of the Manual Sample Point.

Analysis currently in progress is saved as the analysis associated with the selected Sample Point. At the end of the analysis, the Manual Sample Point Status field on the Main Window is updated with the Sample Point time (and the volume at the Sample Point when entered by the operator).

MANUAL SAMPLE POINTS	
Sample Time	Volume @ Sample Time
1 Hour:	<input type="text"/>
25 %:	<input type="text"/>
50 %:	<input type="text"/>
75 %:	<input type="text"/>
100 %:	<input type="text"/>

After this process is complete, the operator can view the analysis report and enter the volume at the Sample Point.

## 4.7 Control New Loading Menu

Use the *Control>New Loading* menu path to access this function.

The Main Window displays:



The New Loading command clears the data associated with a loading/unloading operation and returns the settings to the default values in preparation for the next loading/unloading operation.

Or,

Use the  button on the Main Window to perform this function.

Prior to clearing the current loading/unloading parameters the data is saved in the historical archive file.

## PREVIOUS LOADING MENU

### 5. INTRODUCTION

The Previous Loading menu selection allows the operator to view, edit and print the loading/unloading information from previous operations stored in the historical archives.

#### 5.1 PREVIOUS LOADING - SELECT MENU

Use the *Previous Loading* menu path to access the Previous Loading - Select dialog box.

The following information from the current record in the historical archive file is displayed.

HISTORICAL LOADING STATUS	
Ship:	NewLoadDec29_2003
Customer:	Monday
Start Time:	12/29/2003 7:56:54 AM
Stop Time:	12/29/2003 11:16:35 A
Reference:	122903_0755
Volume Unloaded:	2100
LNG Temperature:	0 Deg C
Number of Samples:	49

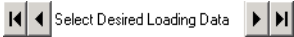
<< Select Desired Loading Data >>>


Close Delete

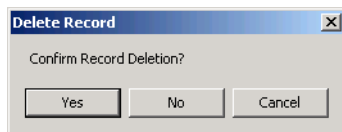
The user is presented with information from the current record in the historical analysis and the display includes the following:


- Ship name
- Customer name
- Start Time
- Stop Time
- Reference
- LNG Temperature
- Volume Loaded (or Unloaded)
- Number of Samples (number of gas chromatograph analyses included)

## 5.2 Navigating the Previous Loading Menu



Navigate the historical file by clicking on the  control arrows to scroll forward, backward, to the beginning of the file, and to the end of the file.

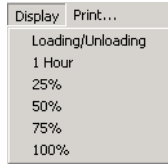
Click on the  button to delete any record in the file. Prior to deleting the record, GCDARS displays the confirmation dialog.



Click on the  button to delete the selected record.

Or,

Click on the  button or the  button to abort this process and to return to the Previous Loading - Select Window.



From the toolbar, click on the *Display* tab and select one of the following options from the pull-down menu for the parameters defined earlier (e.g. 1 hour, 25%, etc....):

- Loading/Unloading
- 1 Hour
- 25%
- 50%
- 75%
- 100%

### 5.3 Previous Loading - Display Menu

Selecting the Loading /Unloading option displays the Previous Loading - Display dialog:

Component Name		Contractual Limits mole %	Mean mole %	Composition Min mole %	Max mole %	Out of Limits
HISTORICAL LOADING DATA Ship: Lollipop Customer: Bubba Reference: 123 Operation: Loading                      Status: Terminated Start Time: 31-Dec-2003 10:55:47      Stop Time: 07-Jan-2004 13:29:54 Volume (m3LNG): 1000.00                  Total Energy (MMBTU): 22883.28 Samples: 18                                      LNG Temperature (Deg C): -10.00						
C6+	0.0000- 0.2000	0.0304	0.0289	0.0289		
Propane	0.0000- 5.0000	1.0526	1.0000	1.0000		
i-Butane	0.0000- 1.0000	0.3158	0.3000	0.3000		
n-Butane	0.0000- 1.0000	0.3158	0.3000	0.3000		
neo-Pentane	0.0000- 1.0000	0.1053	0.1000	0.1000		
i-Pentane	0.0000- 1.0000	0.1045	0.0993	0.0993		
n-Pentane	0.0000- 1.0000	0.1052	0.0999	0.0999		
Nitrogen	0.0000- 3.0000	2.6316	2.5000	2.5000		
Methane	80.0000-100.0000	94.2862	89.5719	89.5719		
C O 2	0.0000- 2.0000	1.0526	1.0000	1.0000		
Ethane	0.0000- 5.0000	5.0000	5.0000	5.0000		
TOTALS		105.0000				
C5+	0.0000- 0.5000	0.3454	0.3281	0.3281		
Molecular Weight (kg/kmol)		18.0473	Relative Density (@ 60 DEGF)		0.6244	
Pseudo-Molar Volume (l/mol)		0.039859	Gross calorific value (MMBTU/kg)		0.04869	
Corrected molar volume (l/mol)		0.038400	Gross calorific value (kJ/m3(n))		39629.12	
Density (kg/m3LNG)		469.981	Gross calorific value (BTU/scf)		1053.84	
Density (lbs/cuRt)		29.340	Wobbe Index (kJ/m3(n))		54747.01	
Relative Density		0.6243	Expansion ratio (m3(n)/m3LNG)		625.010	

The data included is identical to that described for the Current Loading/Unloading operation.

To close the Previous Loading - Display Window, click on the X icon in the upper right-hand corner. This returns you to the Previous Loading - Select Window.

## PREVIOUS ANALYSIS MENU

### 6. INTRODUCTION

The Previous Analysis menu selection allows the operator to view and print the analysis reports for previously completed analyses, both from the Current Loading/Unloading operations and from Previous Loading/Unloading operations.

#### 6.1 Previous Analysis - Select Menu

From the GCDARS Main Window, Click on the Previous Analysis tab. The Previous Analysis - Select Window displays:

Previous Analysis - Select

Display Print...

18-Feb-2004 14:46:58

HISTORICAL ANALYSES

Ship: NewLoadDec29\_2003

Customer: Monday

Reference: 122903\_0755

Start Loading Time: 12/29/2003 7:56:54 AM

Cycle Start Time: 12/29/2003 7:57:00 A

AnalyzerID: Atlantic LNG





Select Desired Analysis Data


Next Load Prev Load Delete Close


The user is presented with information from the current record in the historical analysis and the display includes the following:


- Ship name
- Customer name
- Reference
- Start Time
- Cycle Start Time
- Analyzer ID

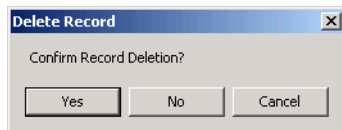
## 6.2 Navigating the Previous Analysis Menu

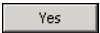
Navigate the historical archive file by clicking on the   Select Desired Loading Data   control arrows to scroll forward, backward, to the beginning of the file, and to the end of the file.

Click on the  button to return to the beginning of the analyses for the next loading/unloading operation (GCDARS Version 1.1.0 and later).

Click on the  button to return to the end of the previous loading/unloading operations (GCDARS Version 1.1.0 and later).

Click on the  button to delete any record in the file. Prior to deleting the record, GCDARS displays the confirmation dialog.



Click on the  button to delete the selected record.

Or,

Click on the  button or the  button to abort this process and to return to the Previous Analysis Window.

If the analysis of the record deleted is a part of the Current Loading/Unloading operation, the results from the deleted analysis will be removed from the averages and all results recalculated. If the deletion is performed while the Loading/Unloading operation is **Suspended** or after the Loading/Unloading is **Terminated**, but before a new Loading/Unloading is initiated, then this recalculation will take place (GCDARS Version 1.1.0 and later).

When a new Loading/Unloading operation is initiated and the selected Loading/Unloading operation is moved to the historical loading file, then deleting analysis records will not affect the Loading/Unloading results.

### 6.3 Viewing the Loading - Display Menu

From the GCDARS Main Window toolbar, click on *Display* to view the archive of the Previous Historical Analysis operation.



Click on the  button to return to the *Previous Analysis* Window.

## 6.4 Printing a Previous Analysis Report

From the GCDARS Main Window, use the *Previous Analysis* menu path. The *Previous Analysis - Select* Window displays:

18-Feb-2004 14:46:58

HISTORICAL ANALYSES

Ship: NewLoadDec29\_2003

Customer: Monday

Reference: 122903\_0755

Start Loading Time: 12/29/2003 7:56:54 AM

Cycle Start Time: 12/29/2003 7:57:00 A

AnalyzerID: Atlantic LNG

Select Desired Analysis Data

Next Load Prev Load Delete Close

Click on the *Print* tab and to select the printer device and print the report. See [Section 3.3](#) for detailed printing instructions.

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## GCDARS GC CONTROL FEATURES

### 7. INTRODUCTION

This section discusses the gas chromatograph functions available from the GCDARS Main Window.

#### 7.1 Navigating the GC Control Features

Buttons are included on the GCDARS Main Window (GCDARS v2.0.0 and later) to control the gas chromatograph's mode of operation.

The screenshot shows the 'Gas Chromatograph Data Acquisition & Reporting - Main Menu' window. The window title bar includes standard OS controls. The menu bar contains 'Loading', 'Control', 'Previous Loading', 'Previous Analysis', and 'Options'. The main area is divided into several sections:

- MM/DD/YY**: Daniel Measurement and Control, Houston, Texas
- HH:MM:SS**: Revision: 2.0.0
- LOADING STATUS**:
  - Ship: Name of the Ship - max 40 characters
  - Customer: Customer Name - max 40 characters
  - Reference: Reference # - max. 30 chars.
  - Operation: Loading      Status: Initial Setup
  - Start Time:                      Stop Time:
  - Volume (m3LNG): 0.00      Total Energy (MMBTU): 0.00
  - Samples: 0                      LNG Temperature (Deg C): 0.00
- MANUAL SAMPLE POINTS**:
 

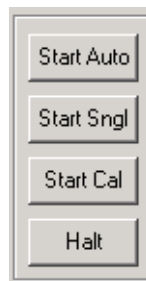
Sample Time	Volume @ Sample Time
1 Hour:	<input type="text"/>
25 %:	<input type="text"/>
50 %:	<input type="text"/>
75 %:	<input type="text"/>
100 %:	<input type="text"/>
- G.C. STATUS**:
 

AnalyzerID: 8315466	Run Time: 1234	GC Mode: Analysis
Stream: 1	Analysis Time: 5678	Comm. Status: modbus.dll failure
Alarms: Ack/Unack/None	Cycle Time: 8888	

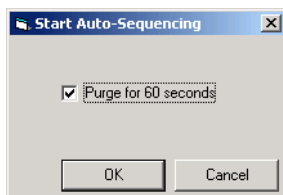
On the right side of the window, there are two columns of control buttons:

- Column 1: Start, Suspend, Resume, Terminate, New, Start Auto, Start Sngl, Start Cal, Halt
- Column 2: 1 Hour, 25 %, 50 %, 75 %, 100 %, Print All, Close

These four buttons are located in the lower right-hand part of the Main Window and perform the following functions:



- **Start Auto** - Start auto-sequencing. Click on the **Start Auto** button and the Start Auto-Sequencing dialog box displays. Select the desired options; to purge or not purge for 60 seconds before auto-sequencing begins.

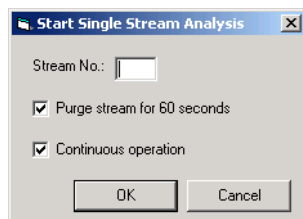


Click on the **OK** button to begin the purge.

Or

Click on the **Cancel** button to return to the GCDARS Main Window.


- **Start Sngl** - Start an analysis on a single stream. Click on the **Start Sngl** button and the Start Single Stream Analysis dialog box displays. Select the desired options; the desired stream, whether or not to purge first, and whether to only perform a single analysis or run that stream continuously.




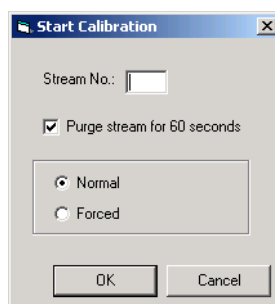
Enter the stream number.

Click on the **OK** button to begin the purge.

Or

Click on the  button to return to the GCDARS Main Window.


- **Start Cal** - Start a calibration. Click on the  button and the Start Calibration dialog box displays. Select the desired options; calibration stream, whether or not to purge first, and whether the calibration is normal or forced.




Enter the stream number, then select the Normal (calibration) radio button or Forced (calibration) radio button.

Click on the  to begin the purge.

Or

Click on the  button to return to the GCDARS Main Window.

- **Halt** - Halt the current analysis. Click on the  button to halt the current analysis upon completion of the current run.

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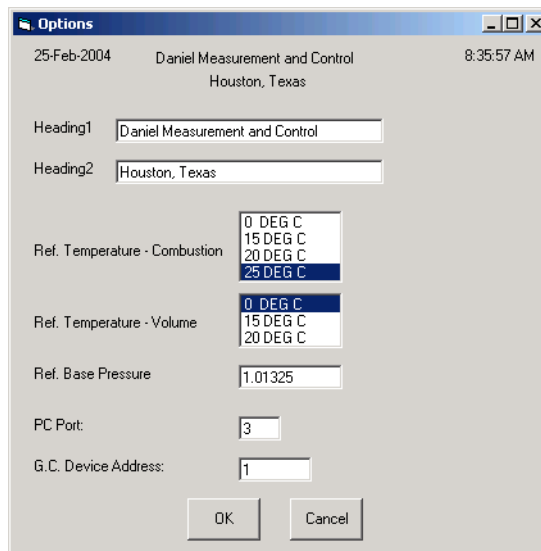
## OPTIONS MENU

### 8. INTRODUCTION

This Main Menu selection allows the user to display and edit several parameters which are associated with the PC and/or the gas chromatograph (rather than being associated with an individual loading operation).

#### 8.1 Setting Options Parameters

Use the *Options* menu path to access this function.



The following parameters are available for user input/edit:

- Heading1 - displayed or printed as the first line of the heading on all displays and reports.
- Heading2 - displayed or printed as the second line of the heading on all displays and reports.

- Reference Temperature - Combustion - The combustion reference temperature used in the calorific value calculations made by the program. A selection is made from 0 DEG C, 15 DEG C, 20 DEG C, and 25 DEG C.
- Reference Temperature - Volume - The volume reference temperature used in the calorific value calculations made by the program. A selection is made from 0 DEG C, 15 DEG C, and 20 DEG C.
- Base Reference Pressure - The base reference pressure (in BAR A) used in the calorific value calculations made by the program.
- PC Port - The communications port on the PC which is used by the GCDARS program to communicate with the chromatograph.
- G.C. Device Address - The device address used by the program when communicating with the GC using the Modbus protocol.

## WARRANTY CLAIM PROCEDURES

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

1. Provide Daniel Measurement and Control, Inc. or Rosemount Analytical, Inc. with proof of the Date of Purchase and proof of the Date of Shipment of the product in question.
2. Return the product to Daniel Measurement Services (DMS) within twelve (12) months of the date of original shipment of the product, or within eighteen (18) months of the date of original shipment of the product to destinations outside of the United States. The Purchaser must prepay any shipping charges. In addition, the Purchaser is responsible for insuring any product shipped for return, and assumes the risk of loss of the product during shipment.
3. To obtain Warranty service or to locate the nearest DMS office, sales, or service center call (713) 827-6314, Fax (713) 827-6312, or write to:

Daniel Measurement Services  
11100 Brittmore Park Drive  
Houston, Texas 77041

Or contact DMS via [www.emersonprocess.com/daniel](http://www.emersonprocess.com/daniel).

4. When contacting DMS for product service, the Purchaser is asked to provide information as indicated on the following page entitled "Customer Repair Report".
5. For product returns from locations outside the United States, it will be necessary for you to obtain the import consignment address so that DMS's customs broker can handle the importation with the U.S. Customs Service.
6. DMS offers both on call and contract maintenance service designed to afford single source responsibility for all its products.
7. DMS reserves the right to make changes at any time to any product to improve its design and to insure the best available product.

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## CUSTOMER REPAIR REPORT

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

COMPANY NAME: \_\_\_\_\_

TECHNICAL CONTACT: \_\_\_\_\_ PHONE: \_\_\_\_\_

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

INVOICE ADDRESS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SHIPPING ADDRESS: \_\_\_\_\_

\_\_\_\_\_

RETURN SHIPPING METHOD: \_\_\_\_\_

EQUIPMENT MODEL #: \_\_\_\_\_ S/N: \_\_\_\_\_ FAILURE DATE: \_\_\_\_\_

DESCRIPTION OF PROBLEM: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

WHAT WAS HAPPENING AT TIME OF FAILURE? \_\_\_\_\_

\_\_\_\_\_

ADDITIONAL COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

REPORT PREPARED BY: \_\_\_\_\_ TITLE: \_\_\_\_\_

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

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

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

**FOR FASTEST SERVICE CONTACT DANIEL MEASUREMENT SERVICES VIA OUR WEBSITE:  
[www.emersonprocess.com/daniel](http://www.emersonprocess.com/daniel)**



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