Agilent
MS Workstation

Getting Started

Agilent Technologies

Notices

Manual Part Number

G1431-90002

Edition

First edition, March 2011

Printed in USA

Agilent Technologies, Inc.
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Santa Clara, CA 95051 USA

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Contents

1 Introduction

In This Book

This document contains an overview of the items included with your system. It is intended to help you get started using your GC/Ion Trap System.

In the following pages you will find:

- Details on where to find additional help
- Photos of your hardware
- Each toolbar found in the MS Workstation software
- Procedures for common MS Workstation operations
- A brief section on basic troubleshooting
- A summarized maintenance schedule

Please refer to your online help and the electronic manuals and videos included on your supplied disk for detailed information.

Where to Find Help

User Information DVDs

Your system comes with an extensive library of reference material including online help files, electronic manuals, and videos delivered to you on separate DVDs that are supplied with each instrument.

The **Agilent Technologies GC & GC/MS Hardware User Information and Utilities DVDs** are included with each instrument, and provide in-depth reference and maintenance material for curent Agilent gas chromatograms, mass selective detectors, ion traps, and GC samplers.

These DVDs include localized versions of the information you need most, such as:

- Getting Familiar documentation
- Safety and Regulatory guides
- Site Preparation checklists
- Installation information
- Operating guides
- Maintenance information
- Troubleshooting details

Online Help (F1)

For each installed instrument, the associated online help files include detailed MS Workstation instructions on topics such as:

- What's New?
- Diagnostics
- Startup and Shutdown procedures
- Running an Analyses
- Setting MS Operation Parameters

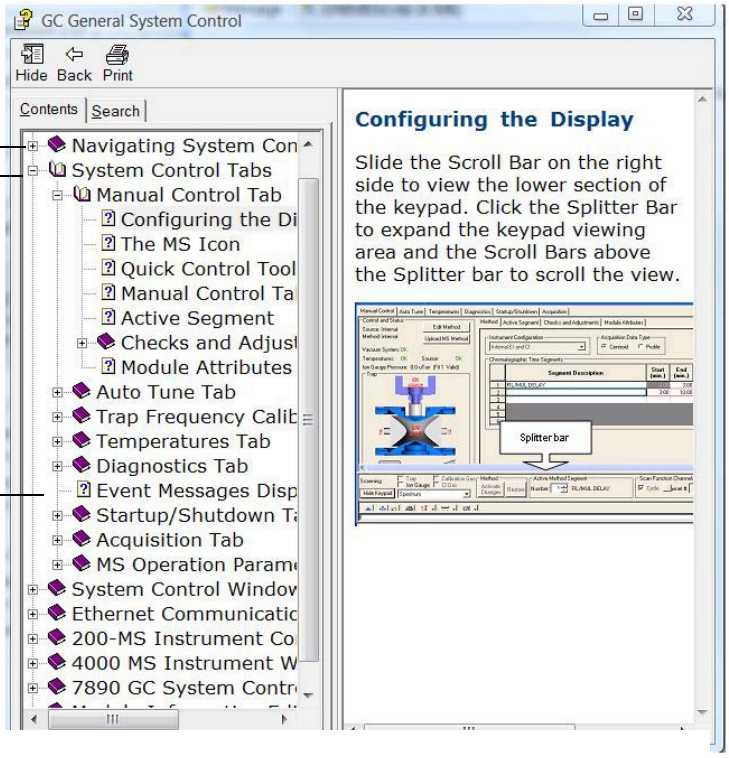
To access the online help, press **F1**, or select **Help** topics from the **Help** menu.

Help icons

Indicates a book containing more help topics. To open a book, double-click it.

Indicates an open book of help topics. To close an open book, double-click

Indicates a single help topic. To open the topic click it.



Functions

Hide/Show	Lets you turn on or off the display of the list of help topics.
Back	Goes back to the previous help topic.
Print	Lets you print the current book or help topic.
Contents	Displays the list of help topics (shown above).
Search	Lets you type a word or phrase and then displays a list of all the topics in the online help that contain those words.

To print a single help topic

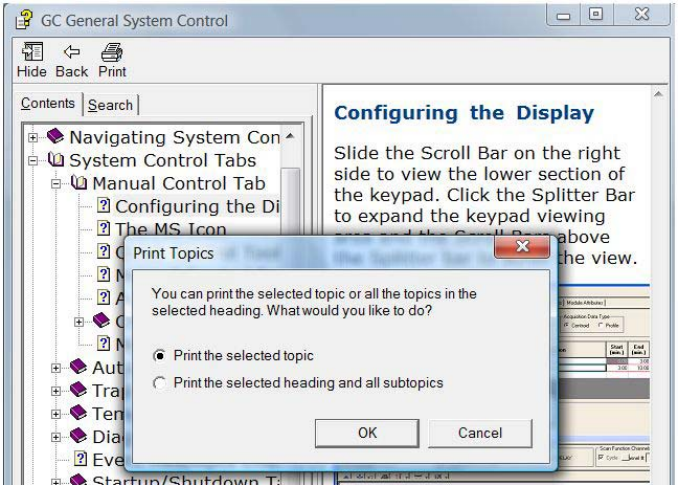
1 Highlight the topic you want to print (for example, **Configuring the display**).

2 Right-mouse click, and select **Print**...

3 Select **Print the selected topic** and click **OK**.

4 Verify the printer selected and click **Print**.

5 The information on that single topic will print. The topics linked to it will not print.



To print all subtopics in a heading at once

1 Highlight the topic you want to print (for example, **Configuring the display**).

2 Right-mouse click, and select **Print**...

3 Select **Print the selected heading and all subtopics**, and click **OK**.

4 Verify the printer selected, and click **Print**.

5 The information for ALL topics within the heading of the selected topic will print. In this case, all topics under the book named **Manual Control Tab** would print, which is about 8 pages of information.

What's New in This Revision

MS Workstation now provides support for the Agilent 7890A GC and 7693A ALS instruments and Windows 7.

Hardware

The Agilent 240 Ion Trap MS with an Agilent 7890 GC and 7693 Automatic Sampler

Keypad for the 7890 GC

The MS Workstation software provides instrument control for the 7890 GC. This allows you to use the software, instead of the GC keypad, to program the instrument. However, there are times when you may want to use the keypad to quickly access some functions.

Safety Warnings

WARNING

Do not perform maintenance with the Ion Trap on or connected to its power source unless specifically instructed to by documentation supplied with the Ion Trap.

The Ion Trap interface can be on and at a dangerously high temperature even though the Ion Trap is off. After it is turned off, the Ion Trap interface cools very slowly. Make sure all parts have cooled before handling them.

Be careful when working behind the GC. During cool-down cycles, the GC will emit hot exhaust that could cause burns.

If you are analyzing toxic chemicals or using toxic solvents, use a hose to route the pump exhaust out of your laboratory. Note that the oil trap provided with standard foreline pumps stops foreline pump oil only, it does not trap or filter out toxic chemicals.

Use chemical-resistant gloves and safety glasses when replacing pump fluid. Avoid all contact with the fluid.

The insulation around the inlets, detectors, valve box, and insulation cups is made of refractory ceramic fibers (RCF). Avoid inhalation of RCF particles. Ventilate your work area, wear long sleeves, gloves, safety glasses, and a disposable respirator. Dispose of insulation in a sealed plastic bag. Wash your hands with soap and cold water after handling RCFs.

1 Introduction

2
MS Workstation Views and Toolbars

MS Workstation Startup Icon

At installation, the **Workstation Toolbar** shortcut is placed on the Desktop. Click the icon to display the MS Workstation toolbar.

MS Workstation Main Toolbar

The main MS Workstation toolbar provides:

- **Application** buttons (items **1 through12** below) and
- **Quick Link** buttons (items **13 and 14** below).

Rest the cursor on any Application button to show:

- The application name, as a tooltip directly under the button.
- A brief description of the application, to the right of the button.

Right click an Application button to display a menu from which you may either get help for that item, or run the application.

Click a Quick Link button, similar to **items 13 and 14** below, to display a menu of tasks that may be performed on the listed file.

1 

System Control/Automation
Monitors instrument status, performs automated injections, and batch recalculations.

2 

View/Edit Methods
Lets you view and edit instrument operation, data acquisition, and data handling methods.

3 

Edit Automation Files
Lets you edit SampleLists, RecalcLists and Sequences off-line.

4 

Review/Process MS Data
Lets you review chromatograms and spectra, perform library searches, and review and process quantitation results.

5 

Standard MS Reports
Lets you create, edit, and view standard MS reports.

6 

Custom MS Reports
Lets you create, edit, and view customized MS reports.

7 

Security Administration
Lets you set MS Workstation security options and passwords.

8 

Batch Reporting
Lets you generate standard reports for a group of data files by dragging and dropping them on the **Batch Report** window.

9 

View/Edit Chromatograms
Lets you review standard GC chromatograms, interactively edit data handling parameters, and recalculate results.

10 

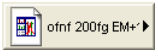
Standard Chrom Reports
Lets you preview standard chromatogram and results reports.

11 

ACSEd
Active Compounds Set Editor. Activates a set of compounds.

12 

Quick Start!
Lets you run a sample without a Sample List.

13 

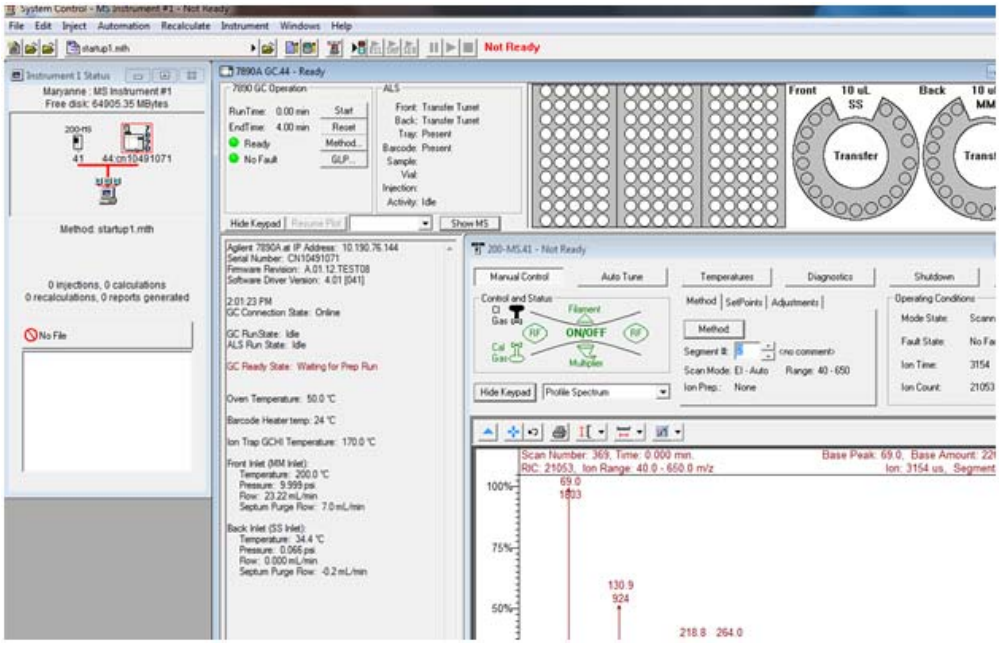
Provides quick access to the most recent data file used.

14 

Provides quick access to the most recent method used.

System Control View

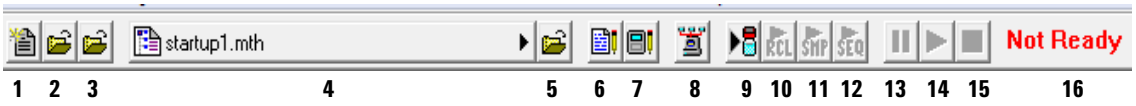
The System Control view is displayed when you startup the MS Workstation. This window displays the configured instruments and their parameters.



The Instrument Status Window provides an overview of the installed modules, active method, and automation information such as number of injections and calculations.

System Control Toolbar

The System Control Toolbar contains common actions that are required to run automations and edit methods.



1		Creates a new automation file (RecalcList, SampleList or Sequence). You are prompted for the name of the new file.
2		Opens an existing automation file. Displays the Open Automation Dialog Box.
3		Opens the message log file.
4		Active Method QuickLink button. Lets you display operations that may be performed on the active method, including re-activation (which downloads the method to any modules attached to the instrument).
5		Activates a method. Displays the Active Method dialog box.
6		Displays the Edit Notes dialog box. Notes are displayed in the Open File dialog box and are included in the automation file printout.
7		Displays the Module Information Editor dialog box. Module information is logged in data files generated by the instrument and can be included in reports.
8		Displays the Instrument Status Window.
9		Displays the Inject Single Sample dialog box and lets you inject a single sample.

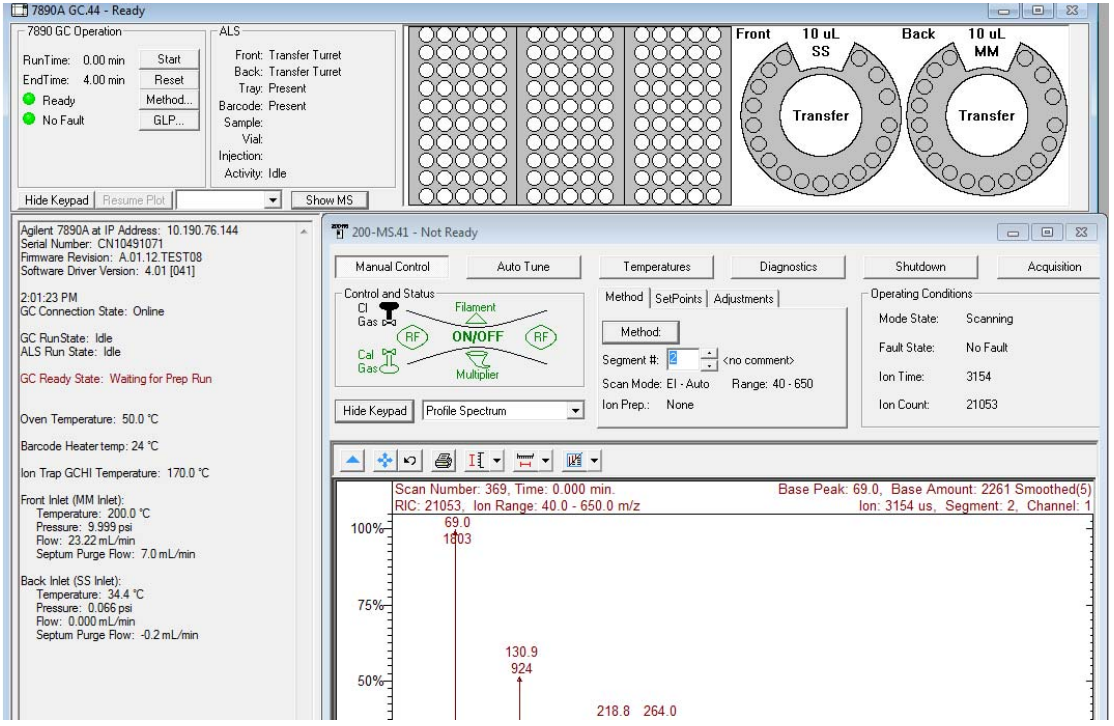
10		Begins the RecalcList currently open in the instrument. This item is disabled unless a RecalcList has been opened.
11		Begins the SampleList currently open in the instrument. This item is disabled unless a SampleList has been opened.
12		Begins the Sequence currently open in the instrument. This item is disabled unless a Sequence is open.
13		Pauses automation. The current run will complete and then automation is suspended.
14		Resumes automation after a pause. Automation continues at the point that it was suspended.
15		Stops automation. Stops the current run, resets all modules simultaneously and suspends the Sequence.
16		Instrument status indicator. Shows if the instrument of: **Not Ready - Running - Computing - Printing**. When the instrument is ready but not running (idle), no status is displayed.

System Control Module Windows

Each module of the instrument will have a separate window visible in System Control. Below is a brief description of the 7890A/7693 Module Window, the 220 GC/MS Ion Trap Module Window, and the 240 GC/MS Ion Trap Module Window.

7890 Module Window

If a 7890A GC is configured, the following window will be displayed in System Control.

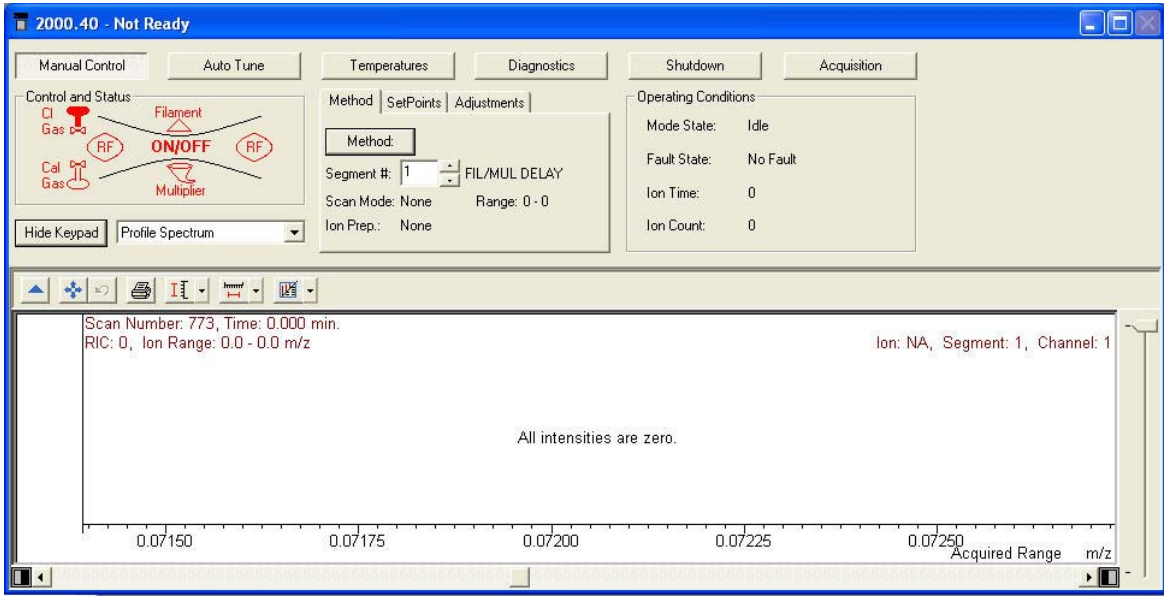


This module window displays the GC status (left column) and ALS status and configuration (top).

The 7890 GC Operation section (top left) displays the method runtime, end time, ready and fault status. From this section you may:

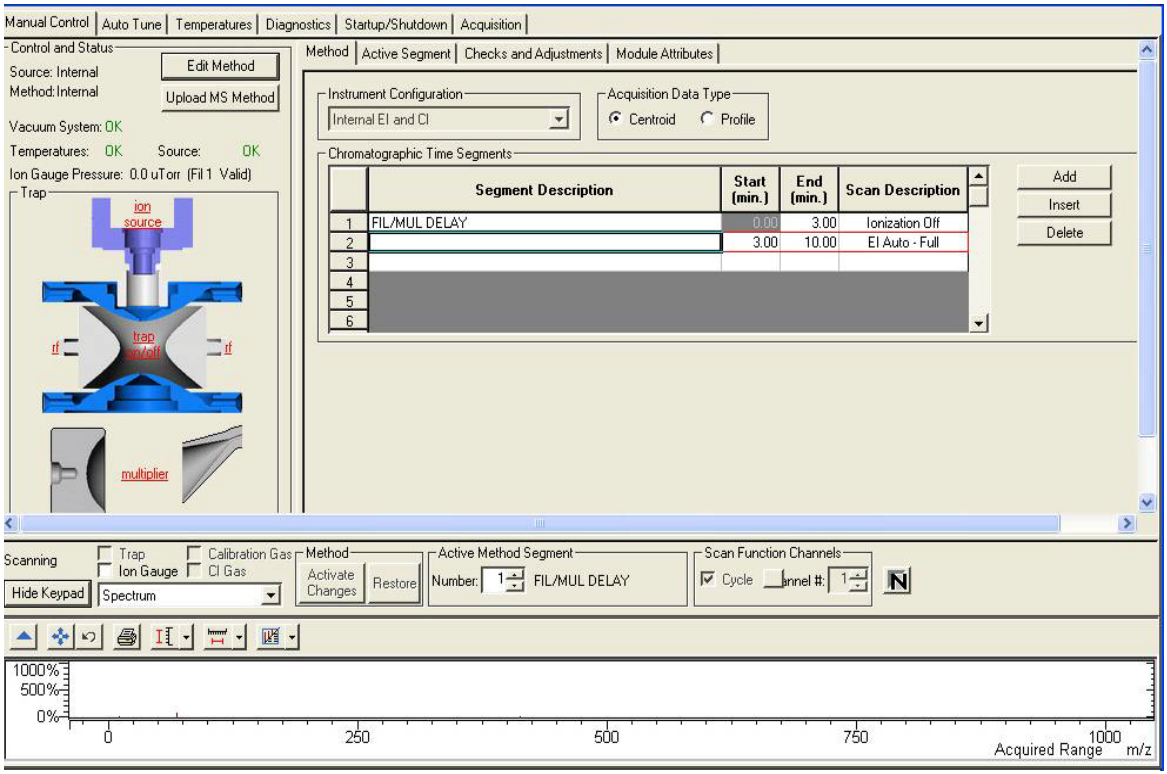
- Start the GC only (**Start** button)
- Reset the GC module (**Reset** button)
- Edit the GC section of the active method (**Method** button)
- View GLP information (**GLP** button)

220 GC/MS Ion Trap Module Window



The 220 GC/MS Ion Trap Module Window displays the general status of the instrument. From here you may access the Auto Tune, Temperatures, Diagnostics, Shutdown and Acquisition functions.

240 GC/MS Ion Trap Module Window



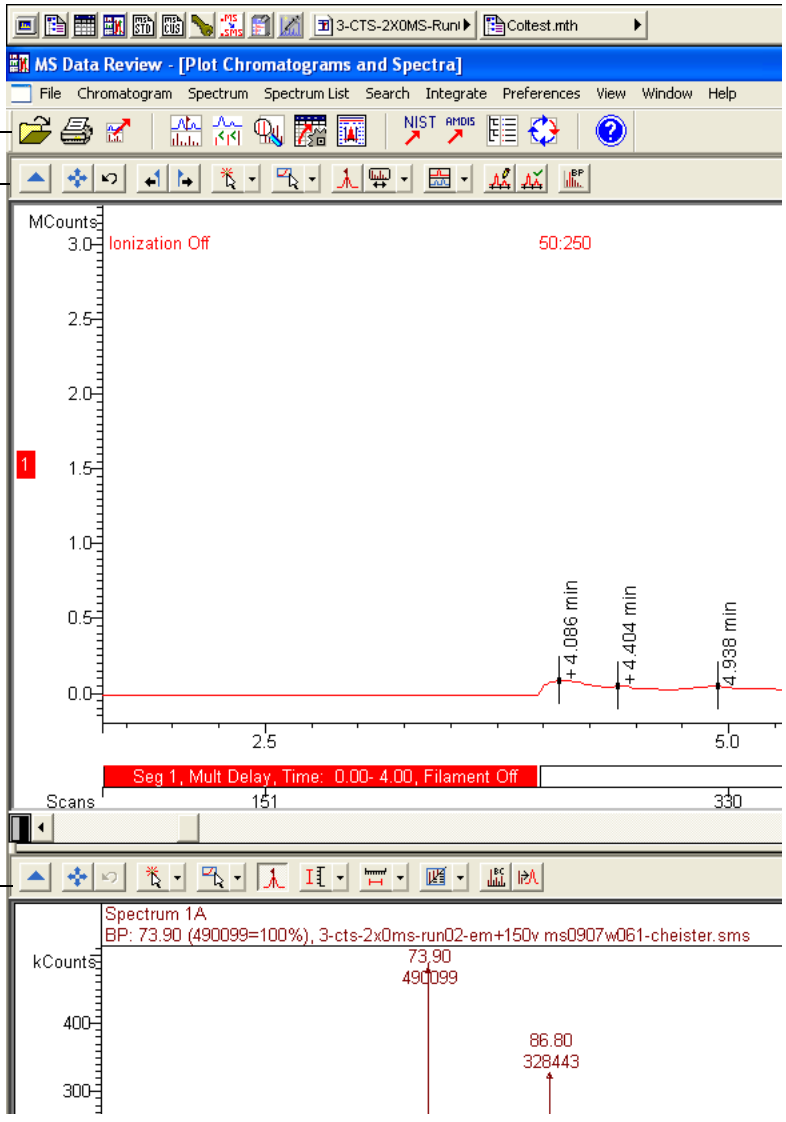
The 240 GC/MS Ion Trap Module Window displays the general status of the instrument. From here you may edit the online method or access the Auto Tune, Temperatures, Diagnostics, Shutdown and Acquisition functions.

MS Data Review Toolbars

The following section describes the MSDR Toolbar icons. Refer to the online help for more details.

Main Toolbar on page 25

Chromatogram Toolbar on page 27



Spectrum Toolbar on page 29

Main Toolbar

1  Selects data file to plot and allows you to select a mass or range of masses.

2  Print opens the Make Reports Window for various printing options for chromatograms, spectra, etc.

3  Export opens a menu for exporting chromatograms, spectra and various views to relevant applications such as ASCII, the clipboard and spectra to spectra lists.

4  Opens the Plot Chromatogram and Spectra view.

5  Displays TurboDDS in the Plots view (500-MS only).

6  Search offers a choice of:

- Library searching the active spectrum
- Target list searching the active spectrum
- Target list searching the active chromatogram

7  Opens the Process Data view.

8  Opens the Results view.

9		Opens the NIST MS Search application and initiates a NIST library search of the active spectrum.
10		Opens the AMDIS application for the active chromatogram.
11		Toggles the chromatograms and spectra pane at the right of the Plots view to full screen. Clicking this icon again restores the original view.
12		Rotates plots and spectra (from side-by-side to top and bottom).
13		Opens the Help menu.

Chromatogram Toolbar

.

1		Hides the toolbar.
2		Expands the chromatogram to full scale on the X and Y axes.
3		Returns to previous scaling of chromatogram.
4		Moves the marker backwards, scan by scan, to display spectrum at each point.
5		Moves the marker forwards, scan by scan, to display spectrum at each point.
6		Opens the menu to set the single click action of the mouse in the chromatogram window.
7		Opens the menu to set the click and drag action of the mouse in the chromatogram window.

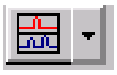
8 

Toggles between the following views when clicking a peak:

- Spectrum of the peak at the point of the mouse click
- Spectrum at the apex of the peak

9 

Shows the spectrum of the point of selection on a peak or an average spectrum. May represent up to 7 scans (point of selection plus up to three scans on either side of the selection).

10 

Opens the menu for plots to be stacked, overlaid, or overlaid with all peaks normalized to the tallest peak in each plot.

11 

Edit background correction: opens a menu so that the baseline can be isolated from the peaks according to the user's preferences, thus subtracting baseline components from the spectrum of the analyte.

12 

Background correction markers: displays or hides the markers separating the baseline from the peaks.

13 

Non-DDS Mode: The Base Peak (BP) icon only works for the TIC plot. Click the Base Peak icon to display the Intensity of the Base Peak. If extracted ions or other scan descriptors are displayed when the Base Peak icon is pressed, no change is made to these plots.

DDS Mode: Click the Base Peak icon to change the All Scan Descriptors RIC plot to Intensity of Base Peak or vice versa. If the survey scan or any other MS levels are also displayed, the survey scan is also displayed with the All Scan Descriptors (RIC or Intensity of Base Peak) Plot in the same mode.

Spectrum Toolbar

1  Hides the toolbar.

2  Expands the spectrum to full scale on the X and Y axes.

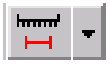
3  Returns to previous scaling of spectrum.

4  Opens the menu to set single click action of the mouse in the spectrum window; see Chromatogram toolbar

5  Opens the menu to set the click and drag action of the mouse in the spectrum window; see Chromatogram toolbar.

6  Sets the Mass Ruler Point selection mode to the Nearest m/z or Highest m/z.

7  Sets the Y axis of the spectrum as auto scaled so that base ion is either full scale or fixed to your preference (with the fixed selection, the Y axis must be less than full scale for the base ion).

8  Set mass range: spectrum will show the acquisition range or a fixed range that you have selected. If maximum of current and previous is selected, the acquisition range will be displayed but will no longer be normalized to the base peak

9  Set spectrum display: provides you a choice of a plot of mass of ions versus intensity, a table of ions and intensity as percent of the base peak, or a summary of information about the spectrum (data file name, run time, acquisition range, etc.).

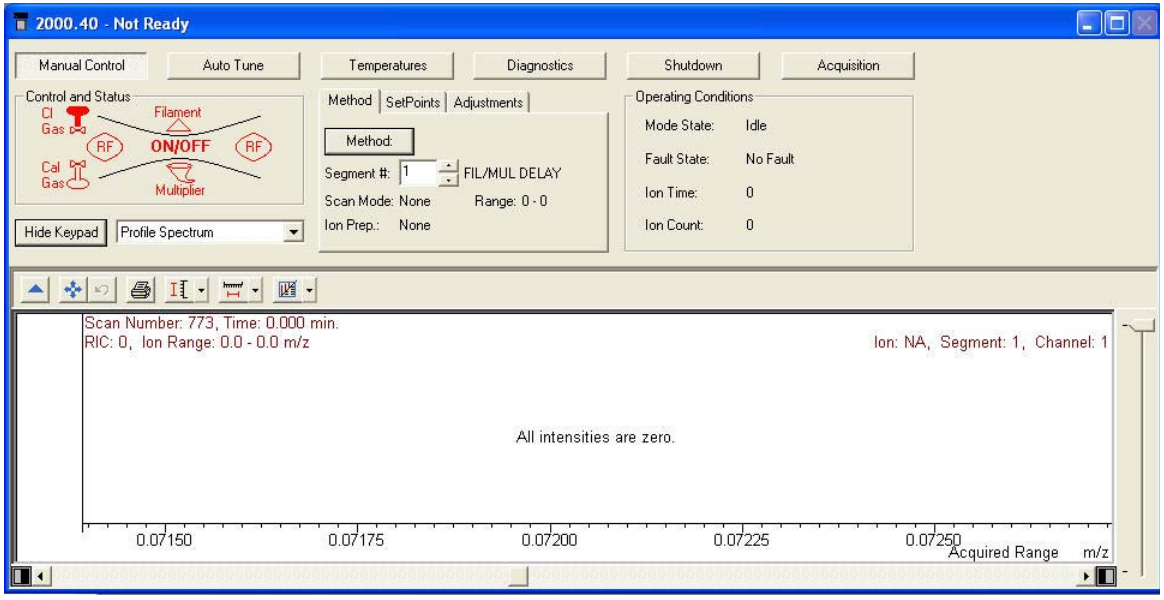
10  Background correct spectrum: may be set to on or off. On means that extraneous ions from the baseline have been removed from the analyte spectrum display.

11  Open menu to enter a single ion or range of ions. A range of ions can also be entered by selecting a portion of the spectrum with the mouse. After the ions are entered, click the **Plot** button, to generate a chromatogram that only contains the ions selected.

3
Common Tasks

Before Running Samples on the Agilent 220 GC/MS Ion Trap

Before running samples on the Agilent 220 GC/MS Ion Trap, access the Ion Trap Module Window and perform the steps listed below.



1 Check temperatures.

   a Click the **Temperatures** tab.

   b Confirm the trap, manifold and MS transfer-line are set at temperature to run samples. (The GC Heater Interface [GCHI] will automatically be set to the same value.)

   c Remember, at least 2 hours are required for thermal equilibrium for trap electrodes. Tuning the system and running samples can only occur after this period.

2 Manually tune the instrument.

   a Click the **Manual Control** tab.

   b Select **Adjustments>RF Adjustments**.

   c Turn the screw at the bottom front panel of the instrument to tune it, and click **Save Results**.

   d Click **Adjust Cal Gas**, and adjust the valve until the concentration is **OK**, then click **Save Results**.

3 Check the system status and faults.

   a Click the **Diagnostics** tab.

   b Run diagnostics to check the system for status and faults.

   c Confirm all passed, or take corrective action on failures.

4 Auto Tune the instrument.

   a Click **Auto Tune**.

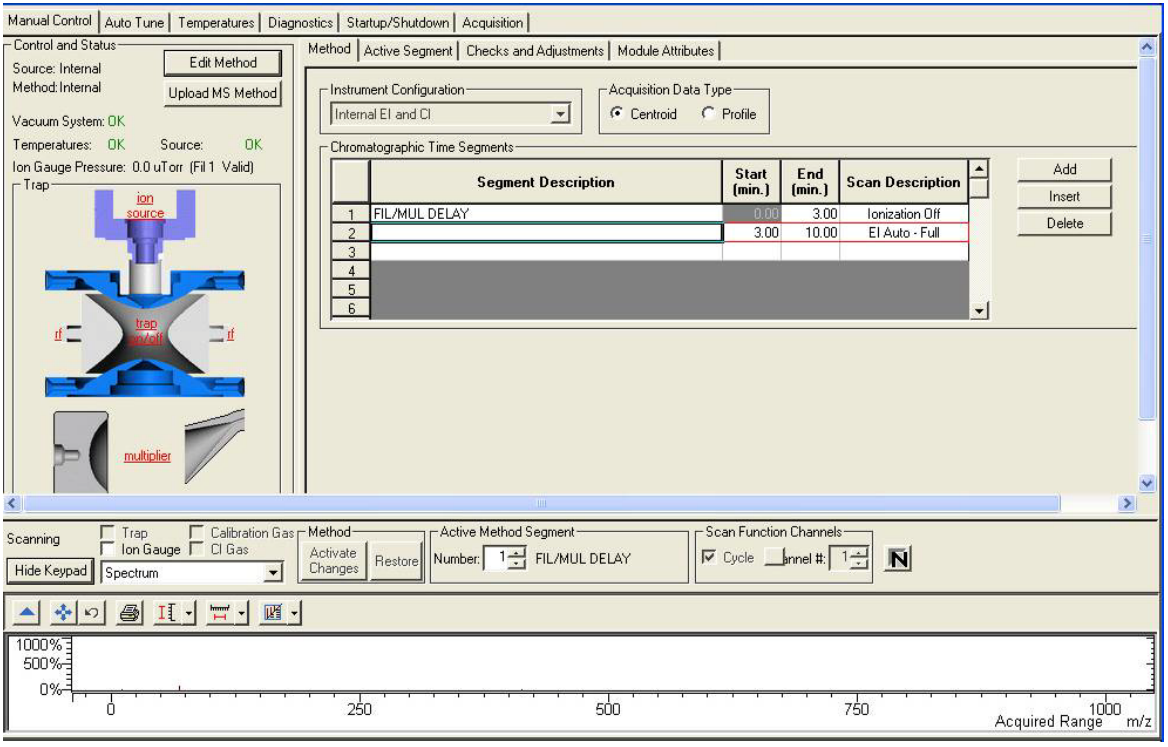
   b Select **All** and tune the instrument, including check air/water, the multiplier setting, mass calibration, and trap function calibration.

   c Check that the auto tune passes or acquisition of samples will not be permitted.

After completing the above steps, the system is ready to run samples.

Before Running Samples on the Agilent 240 GC/MS Ion Trap

Before running samples on the Agilent 240 GC/MS Ion Trap, access the Ion Trap Module Window and perform the steps listed below.



1 Check temperatures.

   a Click the **Temperatures** tab.

   b Confirm the trap, source (external mode only), manifold and MS transfer line are set at temperature to run

samples. (The GC Heater Interface [GCHI] will automatically be set to the same value.)

c Remember, at least 2 hours are required for thermal equilibrium for trap electrodes. Tuning the system and running samples can only occur after this period.

2 Manually tune the instrument and check Cal Gas.

a Click the **Manual Control** tab.

b Click the **Checks and Adjustments** tab.

c Perform the **RF Ramp Adjustment**.

d Manually tune the instrument by turning the screw at the bottom front panel and click **Done** to save the results.

e Perform the **Air/Water Check** and confirm acceptable levels, then click **Save Results**.

f Perform the **Cal Gas Adjustment**, and adjust the valve until the concentration is **OK**, then click **Done** to save the results.

3 Check the system status and faults.

a Click the **Diagnostics** tab.

b Run diagnostics to check the system for status and faults.

c Confirm all pass or take corrective action on failures.

4 Auto Tune the instrument.

a Click the **Auto Tune** tab.

b Select **All** and tune the instrument.

c Check that the auto tune passes or acquisition of samples will not be permitted.

After completing the above steps, the system is ready to run samples.

GC/MS System Shutdown

1. From the AgilentWS/Service folder, activate the GC Shutdown method. This will set GC zones to a low temperature before maintenance work is done.
2. Click the **Shutdown** tab, then click the **Shutdown** button to shutdown the vacuum system and heated zones in an orderly manner. When the **Shutdown** button is pressed in the 220-MS, and 240-MS, the GCHI is set to 35 °C by default.
3. Wait until all zones are cool before turning off power.

CAUTION Exposing the trap electrodes to air above 100 °C may damage them.

4. Open the vent and wait 10 minutes before starting maintenance.
5. Confirm the GC heated zones are cool and turn off power before starting maintenance.

GC/MS System Startup

1. Confirm the vent is closed and all GC and MS connections are tight. Power-up the MS and the GC.
2. Open System Control from the MS Workstation toolbar to activate communication between the PC and all modules connected to it.
3. Check the Status screen displays of the GC and MS. The **Startup/Shutdown** tab will appear as the turbo vacuum pump spins-up. The turbo pump speed should reach 100 + 1 % in 1 to 2 minutes. The turbo current should be less than 350 mA when the turbo reaches 100 %.
4. Click the **Diagnostic** tab. Check vacuum levels of foreline pressure (<100 mTorr) and ion gauge pressure (< 200 µTorr after a few minutes).

5 Click the **Manual Control** tab. Turn on the trap and check the system for high mass noise.

6 Click the **Temperature** tab. The system must be baked-out to remove excess water and background for proper tuning and before running samples.

7 Click **Start Bake-out**.

8 After an overnight bake-out, perform the common tasks described above before running samples on the MS.

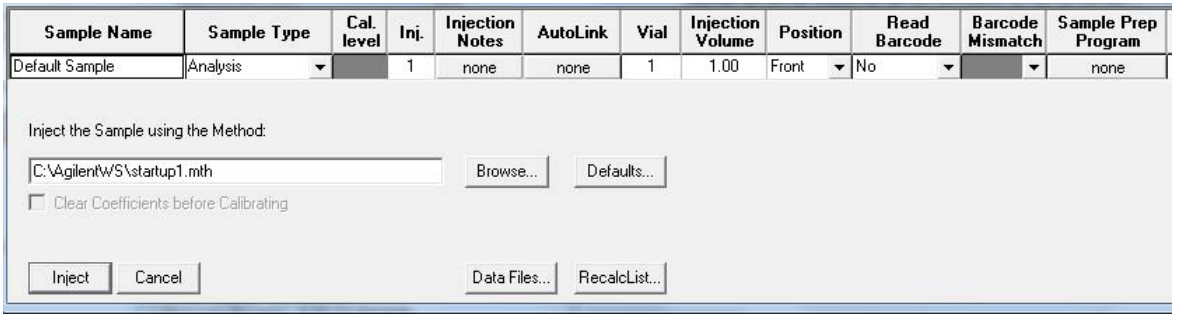
To Acquire Data in System Control

1 Click **Instrument>Setup Ethernet Communications** and ensure that the GC is configured in System Control.

2 If the ALS is connected to the GC, click **Instrument>Configuration** and place the GC module in the AutoStart box, if it is not already there.

To inject a single sample

1 From the System Control Toolbar, click the Inject Single Sample icon  to display the Inject Single Sample dialog box, shown below.



2 Enter Sample and Vial information.
In this dialog box, you may change the injection method, where and how data files are saved (**Data Files** button) and options for the RecalcList (**RecalcList** button).

3 If pretreatment is required, click **Sample Prep Program** (shown above as none), and a new dialog will appear. Enter the program steps into the displayed dialog box and save.

4 After setting all parameters, click **Inject** to run the sample.

To create a sample list

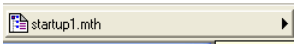
1. From the MS Workstation Toolbar, click **Edit Automation Files**.
2. Click **File>New>SampleList**. Select the appropriate Sample List Type. Enter sample and vial information.
3. If pretreatment is required, click on the **Sample Prep Program** (shown above as none), and a new dialog box will appear. Enter the program steps into this dialog box and save.
4. Click **Data Files** to place the files in the correct folder.
5. Click **RecalcList** to create a RecalcList.
6. Save the SampleList. The sample list is now configured to make injections and collect data.

To run a sample list

1. From System Control, select **File>Open Sample List**, and select the appropriate sample list to run.
2. From System Control, click 

to open the Sample List dialog box.
3. In the Sample List dialog box, select **Begin** to start the automation.

To edit an entire method

1. Before performing any type of off-line method editing, make sure that the GC has been configured in System Control. This will enable the GC configuration to be properly stored for use in the Method Editor.
2. From the System Control Toolbar, click the Method icon 

to open the Method Editor. The Method Editor can also be accessed from the Method Editor icon on the MS Workstation Toolbar.
3. Modify the sections of the method as needed. The Method Editor allows you to set-up instrument parameters and post-run processing for all configured modules.

4 Save any changes made to the method.

To Analyze MS Data

MS Data analysis is performed in the MS Data Review (MSDR) Application.

1 From the MS Workstation Main Toolbar, click  to access the MS Data Review application.

2 From the MS Data Review toolbar, click  to open a data file.

3 With the data file open, click  to access the Process View.

4 Click **Process** to perform the calculation.

5 Once the file has been processed, click the Results View icon,  .

6 In the Results View you may view the Calibration Curve, Results List, and Reports.

Operating Tips

- Back up your data and methods regularly.
- Save Tune reports in a notebook for future reference.
- Perform system maintenance as indicated by the maintenance schedule at the end of this manual, or in the GC and Ion Trap hardware documentation. Keep a record of all maintenance performed.
- When venting the Ion Trap, take advantage of the cool GC to do maintenance such as replacing inlet liners, septa, etc.
- After bake-out, wait *at least 2 hours* for the Ion Trap to reach thermal equilibrium before tuning or acquiring data.
- Optimum sensitivity generally occurs at column flow rates of 1.2 mL/min or less.
- When injecting volumes greater than one microliter, use the pulsed splitless mode and increase the initial oven temperature 10–20°C.
- For splitless injections, pulsed splitless mode gives more quantitative sample transfer onto the column. A pulse pressure of twice the initial inlet pressure is typical.
- Selecting **Constant Flow mode** will provide the most efficient separation in most cases.
- For a new column, check that the column nuts are still tight after the first few oven temperature cycles.
- Use the [Config] [Status] buttons on the Agilent 7890 GC keypads to set the three display items most important to you (for example, **time remaining**, **oven temp**, etc.).
- Rinse and refill ALS wash vials. Do not add more solvent to a partially full vial.

4
Basic Troubleshooting

Basic Troubleshooting

Run Diagnostics when hardware failures occur. Refer to the hardware manual for detailed procedures.

Ion gauge pressure is > 200 µTorr

- Check GC helium flow; it should be 1 mL/min (no pressure pulse).
- Check for tight column nuts on the injector and transfer line.
- If the analyzer has been removed, check the O-ring seal for particulates or fibers.
- Check the O-ring on the transfer line for twists, deformation, or tears. Replace the O-ring if necessary.

Leak checking

To determine if the leak is in the MS or the GC:

1. Go to System Control, activate the Daily Checks method (DailyChecks.mth), and view the mass range of 10-50 m/z in the Manual Control Mode of the MS module window.
2. Increase the carrier gas flow from 1 mL/min to 2 mL/min.
   - **If the 28 ion increases or decreases**, then the leak is probably in the GC or line gas filters.
   - **If the 28 ion abundance remains stable**, the leak is probably in the MS.

If the leak is in the GC or line gas filters:

Perform injector maintenance and recheck using the Daily Checks method. If the leak persists, check for leaks at the GC.

If the leak is in the MS:

1 Check that the column nut is tight.

- If the column nut is secure, set the scan range from 10 to 100 amu and use a Freon-based dusting canister to spray around the various seals: column nut, transfer line O-ring, and analyzer O-ring.
- If these sprays are not available, use the argon gas supply. Systematically spray the argon in short bursts at the seals and look for an ion at 40 amu.

2 If the location of the leak is still unknown, plug the MS at the transfer line and repeat the leak check on the MS.

- If the plugged MS does not leak, connect the GC and leak check the GC.

No FC43 (Cal Gas) signal

Run the Diagnostics to check for an electrical problem. Loss of signal may be caused by:

- Burned out filaments
- No Cal Gas in vial
- Large air leak

Loss of signal on sample runs

The most common MS reasons for loss of signal are:

- Dirty trap electrodes (clean electrodes)
- Dirty gate conductor and trap gate conductor (clean or replace conductors)
- Carbon deposits at trap oven near filaments
- Cracked quartz spacers (replace)

The most common GC reasons for loss of signal are:

- Plugged syringe needle
- Dry or loose plunger

- Poor injection method
- Labile or active compounds
- Poor analytical conditions

5
Routine Maintenance

Routine Maintenance

Maintenance depends upon sample load, matrix, and quality control requirements. Your applications may require different maintenance intervals than the following. For more information, refer to the appropriate manual.

Daily

- Check and, if necessary, refill the solvent wash vial on autosampler.
- Check the autosampler syringe and stroke count. Replace as needed.
- Check for leaks by running the air/water Segment #1 of the DailyChecks.mth.
- Check gas filters and the carrier gas supply (>250 psi on high pressure stage of regulator).
- Check the tightness of the column nut on the transfer line and injector.

Weekly

- Adjust the Cal Gas and run all Auto Tune functions.
- Use the Daily Checks.mth to check High Mass Noise.
- Bake out the ion trap overnight or over the weekend.

Monthly

- Run diagnostics for the multiplier, RF, and filaments.
- Check the RF voltage range and adjust if non-linear.

2 to 3 Months

- Replace the column, if necessary.
- 210/220-MS Check the color of the oil in the foreline pump. If it is dark or muddy, change the oil and the oil mist cartridge more frequently.

- Clean trap electrodes if needed.
- Replace the filament if it is broken, fails diagnostics, or shows low sensitivity.

Yearly

Change the foreline pump oil and the oil exhaust filter.

Variable

- Refill the calibration gas bulb when empty.
- Check and replace the injector septum (50-200 injections or as needed).
- Clip the column (8-30 cm, frequency is dependent upon matrix).
- Run the Mass Calibration and Trap Function Calibration if masses are not assigned correctly.
- Replace the electron multiplier when voltage exceeds 2500V.
- Check that the GC/MS gas filters are clean. Replace them when necessary.

5 Routine Maintenance

Agilent Technologies

Printed in USA, March 2011

G1431-90002