# Agilent 5975T LTM GC/MSD

## Field Lab Hardware Installation

Agilent Technologies

# Notices



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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 General Information



Included in this section are the "Important Safety Warnings" that list critical safety precautions for all users.

# Introduction

This document provides field installation instructions for the Agilent Technologies 5975T LTM GC/MSD.

The 5975T LTM GC/MSD system consists of:

- 5975T LTM GC/MSD basic mainframe
- Optional ion gauge and controller
- Optional 7693 Series Automatic Liquid Sampler
- Optional standard laptop PC MSD ChemStation bundle
  Refer to your MSD ChemStation documentation for additional information
- Available, recommended foreline vacuum pumps
  - IDP3 dry pump
  - MVP-055-3 dry pump
- Optional reusable shipping boxes

Figure 1 shows the front of the 5975T LTM GC/MSD system.


**Figure 1** 5975T LTM GC/MSD system

# Important Safety Warnings

There are several important safety notices to keep in mind when using the GC/MSD.

## Many internal parts of the GC/MSD carry dangerous voltages

If the GC/MSD is connected to a power source, even if the power switch is off, potentially dangerous voltages exist on:

- The wiring between the GC/MSD power cord and the AC power supply
- The AC power supply itself
- The wiring from the AC power supply to the power switch

With the power switch on, potentially dangerous voltages also exist on:

- All electronics boards in the instrument.
- The internal wires and cables connected to these boards.
- The wires for any heater (oven, detector, inlet, or valve box).

**WARNING** **All these parts are shielded by covers. With the covers in place, it should be difficult to accidentally make contact with dangerous voltages. Unless specifically instructed to, never remove a cover unless the detector, inlet, or oven are turned off.**

**WARNING** **If the power cord insulation is frayed or worn, the cord must be replaced. Contact your Agilent service representative.**

## Electrostatic discharge is a threat to GC/MSD electronics

The printed circuit boards in the GC/MSD can be damaged by electrostatic discharge. Do not touch any of the boards unless it is absolutely necessary. If you must handle them, wear a grounded wrist strap and take other antistatic precautions. Wear a grounded wrist strap any time you must remove the MSD right side cover.

## Many parts are dangerously hot

Many parts of the GC/MSD operate at temperatures high enough to cause serious burns. These parts include but are not limited to:

- The inlet
- The guard column enclosure and its contents
- The guard column nuts attaching the guard columns to the inlet, LTM column, and MSD
- The analyzer
- The foreline pump

Whenever possible, cool the part of the instrument that you will be maintaining before you begin working on it. If you must perform maintenance on hot parts, use a wrench and wear gloves.

**WARNING** **The insulation around the inlet is made of refractory ceramic fibers. To avoid inhaling fiber particles, we recommend the following safety procedures: ventilate your work area; wear long sleeves, gloves, safety glasses, and a disposable dust/mist respirator; dispose of insulation in a sealed plastic bag; wash your hands with mild soap and cold water after handling the insulation.**

# Hydrogen Safety

**WARNING** **The use of hydrogen ($H_2$) as a carrier gas is potentially dangerous.**

**WARNING** **When using $H_2$ as the carrier gas or fuel gas, be aware that hydrogen gas can flow into the guard column enclosure and create an explosion hazard. Therefore, be sure that the supply is turned off until all connections are made and ensure that the inlet, MSD, and column fittings are either connected to a column or capped at all times when hydrogen gas is supplied to the instrument.**

**Hydrogen is flammable. Leaks, when confined in an enclosed space, may create a fire or explosion hazard. In any application using hydrogen, leak test all connections, lines, and valves before operating the instrument. Always turn off the hydrogen supply at its source before working on the instrument.**

Hydrogen is a commonly used GC carrier gas. Hydrogen is potentially explosive and has other dangerous characteristics.

- Hydrogen is combustible over a wide range of concentrations. At atmospheric pressure, hydrogen is combustible at concentrations from 4% to 74.2% by volume.
- Hydrogen has the highest burning velocity of any gas.
- Hydrogen has a very low ignition energy.
- Hydrogen that is allowed to expand rapidly from high pressure can self-ignite.
- Hydrogen burns with a nonluminous flame which can be invisible under bright light.

## Dangers unique to GC/MSD operation

Hydrogen presents a number of dangers. Some are general, others are unique to GC or GC/MSD operation. Dangers include, but are not limited to:

- Combustion of leaking hydrogen.
- Combustion due to rapid expansion of hydrogen from a high-pressure cylinder.
- Accumulation of hydrogen in the guard column enclosure and subsequent combustion.
- Accumulation of hydrogen in the MSD and subsequent combustion.

## Hydrogen accumulation in an MSD

**WARNING** **The MSD cannot detect leaks in inlet and/or detector gas streams. For this reason, it is vital that column fittings should always be either connected to a column or have a cap or plug installed.**

All users should be aware of the mechanisms by which hydrogen can accumulate (Table 1) and know what precautions to take if they know or suspect that hydrogen has accumulated. Note that these mechanisms apply to *all* mass spectrometers, including the MSD.

**Table 1** Hydrogen accumulation mechanisms

| Mechanism | Results |
|---|---|
| Mass spectrometer turned off | A mass spectrometer can be shut down deliberately. It can also be shut down accidentally by an internal or external failure. In an external failure, the mass spectrometer shutdown does not shut off the flow of carrier gas. As a result, hydrogen may slowly accumulate in the mass spectrometer. However, in an external power failure, the EPC will be turned off and the flow of gas stopped. |

**Table 1** Hydrogen accumulation mechanisms (continued)

| Mechanism | Results |
|---|---|
| Mass spectrometer manual shutoff valves closed | Some mass spectrometers are equipped with manual foreline pump shutoff valves. In these instruments, the operator can close the shutoff valves. Closing the shutoff valves does not shut off the flow of carrier gas. As a result, hydrogen may slowly accumulate in the mass spectrometer. |

**WARNING** **Once hydrogen has accumulated in a mass spectrometer, extreme caution must be used when removing it. Incorrect startup of a mass spectrometer filled with hydrogen can cause an explosion.**

**WARNING** **After a power failure, the mass spectrometer may start up and begin the pumpdown process by itself. This does not guarantee that all hydrogen has been removed from the system or that the explosion hazard has been removed.**

## Precautions

Take the following precautions when operating a GC/MSD system with hydrogen carrier gas.

### Equipment precaution

You MUST make sure the front side-plate thumbscrew is fastened finger-tight. Do not overtighten the thumbscrew; it can cause air leaks.

**WARNING** **Failure to secure your MSD as described above greatly increases the chance of personal injury in the event of an explosion.**

### General laboratory precautions

- Avoid leaks in the carrier gas lines. Use leak-checking equipment to periodically check for hydrogen leaks.
- Eliminate from your laboratory as many ignition sources as possible (open flames, devices that can spark, sources of static electricity, etc.).
- Do not allow hydrogen from a high pressure cylinder to vent directly to atmosphere (danger of self-ignition).
- Use a hydrogen generator instead of bottled hydrogen.

### Operating precautions

- Turn off the hydrogen at its source every time you shut down the instrument.
- Turn off the hydrogen at its source every time you vent the MSD (do not heat the capillary column without carrier gas flow).
- Turn off the hydrogen at its source every time shutoff valves in an MSD are closed (do not heat the capillary column without carrier gas flow).
- If a power failure occurs, immediately turn off the hydrogen at its source .
- If a power failure occurs while the GC/MSD system is unattended, even if the system has restarted by itself:
  1. As soon as you notice the situation, immediately turn off the hydrogen at its source.
  2. Turn off the instrument and allow it to cool for 1 hour.
  3. Eliminate **all** potential sources of ignition in the room.
  4. Open the vacuum manifold of the MSD to atmosphere.
  5. Wait at least 10 minutes to allow any hydrogen to dissipate.
  6. Start up the instrument as normal.

When using hydrogen gas, check the system for leaks to prevent possible fire and explosion hazards based on local Environmental Health and Safety (EHS) requirements. Always check for leaks after changing a tank or servicing the gas lines. Always make sure the vent line is vented into a fume hood.

# Safety and Regulatory Certifications

The 5975T LTM GC/MSD conforms to the following safety standards:

- Canadian Standards Association (CSA): CAN/CSA-C222 No. 61010-1
- International Electrotechnical Commission (IEC): 61010–1
- EuroNorm (EN): 61010–1

The 5975T LTM GC/MSD conforms to the following regulations on Electromagnetic Compatibility (EMC) and Radio Frequency Interference (RFI):

- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326
- AUS/NZ

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB–001 du Canada.

The 5975T LTM GC/MSD is designed and manufactured under a quality system registered to ISO 9001.

## Information

The Agilent Technologies 5975T LTM GC/MSD meets the following IEC (International Electro-technical Commission) classifications: Equipment Class I, Laboratory Equipment, Installation Category II, Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and is designed for use in stationary or mobile labs. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the MSD has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard.

## Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

See accompanying instructions for more information.

Indicates a hot surface.

Indicates hazardous voltages.

Indicates earth (ground) terminal.

Indicates potential explosion hazard.

Indicates radioactivity hazard.

Indicates electrostatic discharge hazard.

Indicates that you must not discard this electrical/electronic product in domestic household waste.

## Electromagnetic compatibility

This device complies with the requirements of CISPR 11.

- This device does not cause harmful interference.
- This device accepts any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

1. Relocate the radio or antenna.
2. Move the device away from the radio or television.
3. Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
4. Make sure that all peripheral devices are also certified.
5. Make sure that appropriate cables are used to connect the device to peripheral equipment.
6. Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
7. Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

## Sound emission declaration

### Sound pressure

Sound pressure Lp <70 dB according to EN 27779:1991.

### Schalldruckpegel

Schalldruckpegel LP <70 dB am nach EN 27779:1991.

## Customer Responsibilities

The following are not included with the Agilent installation. They are the responsibility of the customer, unless previous arrangements have been made between the customer and the Agilent Technologies Customer Service Organization.

- Preparation of all site facilities including the provision of adequate space, supporting bench, and power to match the unit(s) purchased. See the *5975T LTM GC/MSD Site Preparation Guide* for details.
- Purchase of operating supplies including: high-purity carrier gas(es), syringes, pipettes, vials, and solvents. See the *5975T LTM GC/MSD Site Preparation Guide* for details.
- Training for programs not specifically listed in this document.
- Tests of customer-supplied samples, equipment, and/or method development.
- Any tasks not described in this manual.

In addition, the customer is required to:

- Provide someone to help lift the 5975T LTM GC/MSD onto the bench.
- Have the primary user and, if possible, all other users of the instrument present during installation to receive familiarization instruction from the Agilent Technologies service representative.

# Before You Start

Verify that all the conditions specified in the *5975T LTM GC/MSD Site Preparation Guide* have been met:

- Adequate space is available for the system
- A suitable supporting bench is available
- Adequate electrical power is available at the correct voltages and frequencies (See “Electrical Requirements" on page 21.)
- Environmental control systems are adequate (See “Air Conditioning and Environmental Requirements" on page 25.)
- Adequate preparations have been made for safe exhaust venting
- Computer supplies, printer paper are available
- There is a conveniently located telephone
- Supplies necessary for instrument operation are available, including solvents and helium carrier gas

**NOTE** Installation and verification will only be performed using helium carrier gas.

Provide someone to help lift the 5975T LTM GC/MSD onto the bench.

# Electrical Requirements

You are responsible for providing appropriate electrical power and power outlets for all of the components in your 5975T LTM GC/MSD system. Power considerations include:

- Voltage ranges of major components
- Power configurations
- Power requirements
- Power plugs and cords

## Voltage ranges of major components

The 5975T LTM GC/MSD includes a full-range power supply that can operate without reconfiguration on either of two wide ranges of single-phase alternating current (AC) electrical power:

- 120-127 VAC 50/60 Hz (typical for North America)
- 200-240 VAC, 50/60 Hz (typical for Europe and Japan)

The foreline pump draws its power from the 5975T LTM GC/MSD. However, a different foreline pump is supplied depending on the voltage range on which the pump will be operating. The pump is supplied according to the standard voltage in the country from which the order originates. For example, if an order originates from an Agilent Technologies sales office in Germany, the foreline pump supplied will be configured to operate on the standard voltage and frequency of electrical power in Germany.

**NOTE** The 5975T LTM GC/MSD does not support 100 VAC input power. In countries that have only 100 VAC power, a step-up transformer must be used to provide the appropriate voltage.

**CAUTION** If an instrument is being ordered from one location but is to be installed in another location with different electrical power characteristics, this must be noted on the order. A special note must also be made if the electrical power at the site is different from the standard electrical power in that country.

## Power configurations

Electrical power for the 5975T LTM GC/MSD must be single-phase. The neutral wire **cannot** be used for safety grounding. The ground wire should carry zero current except for ground-fault current or static electric discharge. The entire system should share an isolated, noise-free electrical ground. This system ground should be electrically separate from the ground for the rest of the building, back to the main ground for the facility. Power configurations are provided in Table 2.

**WARNING** **Connecting to a power source which is not equipped with a protective earth contact (ground) creates a shock hazard for the operator and can damage the instrument.**

**WARNING** **Interrupting the protective conductor inside or outside the 5975T LTM GC/MSD or disconnecting the protective earth terminal (ground) creates a shock hazard for the operator and can damage the instrument.**

**Table 2** Power configurations

| Configuration | Measurement | Nominal voltage |
|---|---|---|
| Single phase, 120-127 VAC | Line to neutral | 120 or 127 VAC* |
| | Line to ground | 120 or 127 VAC* |
| | Ground to neutral | < 0.5 V rms |
| Single phase, 200-240 VAC | Line to neutral | 200, 220, or 240 VAC* |
| | Line to ground | 200, 220, or 240 VAC* |
| | Ground to neutral | < 0.5 V rms |

* Varies with country and/or region

## Power requirements

Table 3 lists the power requirements for the 5975T LTM GC/MSD and related equipment. Extra power capacity for future additions is recommended.

The turbo pump, and foreline pump are powered by the 5975T LTM GC/MSD. An additional outlet and surge protector are needed for the data system and the optional vacuum gauge. The 5975T LTM GC/MSD and data system must each have a separate circuit breaker. All of the equipment **must** share a common ground.

Power must meet the specifications listed in Table 3. Use a line monitor to check power stability. If your line power is unstable, you may need to install a line conditioner.

The instrument operates on either voltage range specified in Table 3. The foreline and turbo pumps are supplied with the voltage that is suitable to the country specified on the order where the instrument will operate.

**Table 3** Power requirements

| Line voltage | Maximum continuous power consumption | Supply circuit rating | Outlets required |
|---|---|---|---|
| 120-127 VAC, 50/60 Hz | 1450 VA (400 VA for foreline pump only) | 15 A | 1 |
| 200-240 VAC, 50/60 Hz | 1100 VA | 15 A | 1 |

## Power plugs and cord

The 5975T LTM GC/MSD is supplied with a 20 amp power cord and a plug appropriate for the country from which the order originates. For example, if an order originates from an Agilent Technologies sales office in Germany, the plug supplied will be compatible with the standard voltage and outlet configuration in Germany.

Data system components also include power cords with plugs appropriate for the country where the order was placed.

Power cord lengths for the 5975T LTM GC/MSD and the data system components and accessories are approximately 2.3 m (7.5 ft).

**CAUTION** If an instrument is being ordered from one location but is to be installed in another location with different electrical power characteristics, this must be noted on the order. A special note must also be made if the electrical power at the site is different from the standard electrical power in that country.

**WARNING** **Make sure the power cords supplied with the 5975T LTM GC/MSD are appropriate for your country and site before installing the instrument.**

**WARNING** **Do not use extension cords. They are not designed to work with the supplied power cord and can be a safety hazard.**

**NOTE** Maintain easy access to the power cords so they can be disconnected for maintenance.

## Other electrical considerations

Additional electrical considerations include:

- Electromagnetic interference (EMI), such as is generated by NMRs, radio transmitters, and microwave links, may interfere with system performance.
- Protect the system from static electricity by observing humidity and temperature requirements. Minimize the presence of nonconductive products such as carpets and vinyl floor tiles.
- Install emergency-off pushbuttons that can disconnect power to the ventilation system and all electric equipment in the room except overhead lighting.
- Provide separate convenience outlets for building maintenance and other appliances. Convenience outlets must be on circuits separate from the 5975T system. Convenience outlets must share the normal building distribution ground, **not** the 5975T LTM GC/MSD system ground.
- In some geographical areas it may be advisable to install lightning protection for personnel and equipment.

# Air Conditioning and Environmental Requirements

Air conditioning considerations include temperature, humidity, airborne dust, and exhaust venting. Each of these is considered in more detail in the following material.

## Temperature, humidity, and altitude

The 5975T is specified for operation under the following conditions:

- Operation requires constant temperature (variations <2 °C/h)
- Operation and storage require a noncondensing, noncorrosive atmosphere
- The temperature and humidity limits in Table 4
- Maximum altitude for operation: 4600 m

**Table 4** Temperature and humidity limits

| | Temperature | Humidity (relative) |
|---|---|---|
| Operation | 15 °C to 35 °C (59 °F to 95 °F) | 40% to 80% |
| Storage | –20 °C to 70 °C (–4 °F to 158 °F) | 0% to 95% |

Environmental control systems must maintain these temperature and humidity ranges.

The 5975T LTM GC/MSD is rated for 1200 Watts (4000 BTU/h). The data system also contributes significantly to the cooling load although the exact amount depends on its configuration. Additional allowances should be made for other heat sources such as heat from other equipment, heat from adjacent rooms, and heat from laboratory personnel.

## Airborne dust

Agilent Technologies recommends a maximum airborne particle density of 55 µg/$m^3$. If you suspect your site exceeds this limit, contact your local Agilent Technologies Customer Service Organization. Customer Engineers with special training and equipment can test for airborne particle density. They can offer suggestions for reducing airborne dust.

## Exhaust venting

There are two sources of exhaust on the system: the foreline pump and the inlet split vent and septum purge vent. The foreline pump outputs gas removed from the vacuum manifold by the high vacuum pumps. In addition to the inlet carrier gas, the foreline pump exhaust also contains traces of solvent and sample.

**WARNING** **User safety requires that the exhaust gases from the system be vented externally to the building and not recirculated by the environmental control system. Health hazards include chemical toxicity of solvents, samples, derivitizing agents, pump fluid vapor, and aerosolized biological samples.**

**WARNING** **The pump exhaust contains carrier gas and traces of solvents, analytes, and foreline pump oil. The supplied oil trap stops only pump oil. It does *not* trap or filter out toxic chemicals. If you are using toxic solvents or toxic or flammable carrier gas, or analyzing toxic chemicals, do not install the oil trap. Install a hose to take the pump exhaust to a fume hood.**

The foreline pump exhaust **can not** be vented into the laboratory if any hazardous materials will be introduced into the system, including samples, solvents, and carrier gases. It must be vented external to the building or vacuum exhausted to a fume hood.

If a negative pressure vent is not available, the length of tubing from the foreline pump to an ambient pressure vent should not exceed 460 cm (15 ft). The exhaust **can not** be connected to a positive pressure vent. Maximum exhaust flow expected is 1250 mL/min He or $H_2$.

Exhaust gas venting must comply with all local environmental and safety codes.

## Fume (exhaust) hood

An auxiliary work space and fume hood are needed for some maintenance procedures.

## Other Documentation

Additional information is contained in the following documentation:

- 5975T LTM GC/MSD Hardware Manuals, which are located on the Agilent Utility DVD including:
  - 5975T LTM GC/MSD Operation Manual
  - 5975T LTM GC/MSD Troubleshooting and Maintenance
  - 5975T LTM GC/MSD Hydrogen Safety
  - 7693A Automatic Liquid Sampler Installation, Operation, and Maintenance
- 5975T LTM GC/MSD Site Preparation Guide
- Agilent MSD ChemStation software manuals and online help
- The sensitivity specifications for your instrument, Agilent publication 5988-9991EN
- For updated information, see the Agilent Technologies' Web site at http://www.agilent.com/chem

# 1 General Information

# 2 Installation



This chapter contains instructions for how to receive the 5975T LTM GC/MSD from the factory, set up the instrument for the first time, complete a system performance evaluation, and familiarize yourself with the instrument.

# Overview

Listed below are the steps performed for hardware installation by Agilent Technologies' representative. These steps are described in this chapter:

- Unpacking and inspecting materials shipped from the factory
- Setting up the 5975T LTM GC/MSD for initial customer use
- Installing the computer and peripherals
- Configuring the instrument
- Evaluating performance when first shipped from factory
- Familiarizing the customer with the system

Listed below are the steps performed for hardware transport and installation by the customer. These steps are covered in Chapters 3 and 4:

- Preparing the system for transport
- Setting up the 5975T LTM GC/MSD in the field
- Installing the computer and peripherals
- Configuring the instrument
- Evaluating performance

# Unpacking and Inspecting the Agilent Factory Shipped Materials

Shipping containers delivered from the Agilent factory should not be opened until an Agilent Technologies' representative is present to verify the contents of each container. Warranty claims for missing items will not be honored unless an Agilent Technologies' representative verifies the contents of each shipping container as it is unpacked.

The Agilent representative and a representative from your organization must both be present to perform the following:

1. Unpack the instrument and its components.
2. Check each item off on the packing list, and verify serial numbers.
3. Record the serial numbers in the installation documentation.
4. Retain shipping containers and material until contents are checked for completeness and instrument performance is verified.

If there are any discrepancies, contact the distribution center.

# Attaching the Instrument to the Shipping Container

If the 5975T LTM GC/MSD is being used continuously in a building laboratory until required transport to a field location, this procedure can be skipped until transportation is required.

### Materials needed

- GC ship kit
- 6 Washers (2190-0421)
- 6 Bolts (0570-0106)
- Metal strap kit (G3880-80018)
- 5975T LTM GC/MSD Hardware Manuals
- Wrench, 1/4-inch × 5/16-inch open end
- 5975 Series MSD shipping kit

### Procedure

1. Place the base of the reusable shipping container on a bench or on the top of the reusable shipping container top cover.
2. Place the 5975T LTM GC/MSD mainframe on top of the base of the reusable shipping container. Align the holes in the rails on the instrument base with the holes in the plastic insert on the reusable shipping container base.
3. Place the metal straps on top of the instrument rails and align the holes.
4. Bolt the straps and rails on the base of the 5975T LTM GC/MSD to the plastic insert in the base of the container.

**WARNING** **Bolt the instrument to the brackets in the base of the container before lifting the unit by the base of the container.**

**WARNING** **To prevent injury, get lifting assistance.**

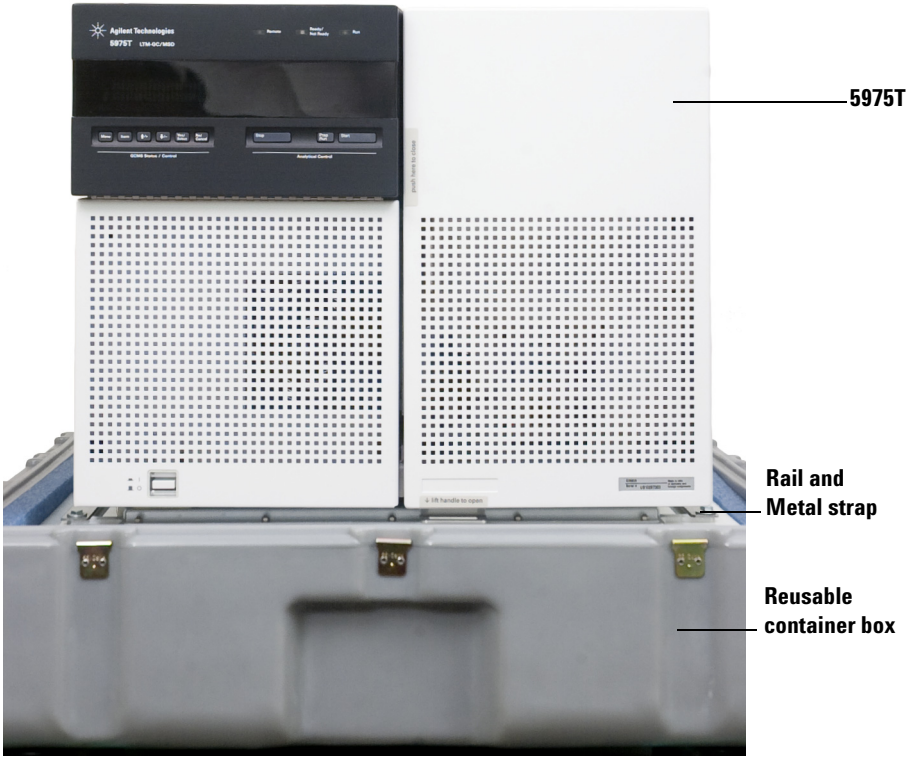


**Figure 2** Instrument mounted to shipping container base

# Connecting the Helium Lines to the GC

1 If needed, install a two-stage pressure regulator with on/off valve to the helium carrier gas supply cylinder.

2 Attach the Big Universal Trap and Indicating Oxygen Trap to the rear of the instrument using the supplied brackets and screws.

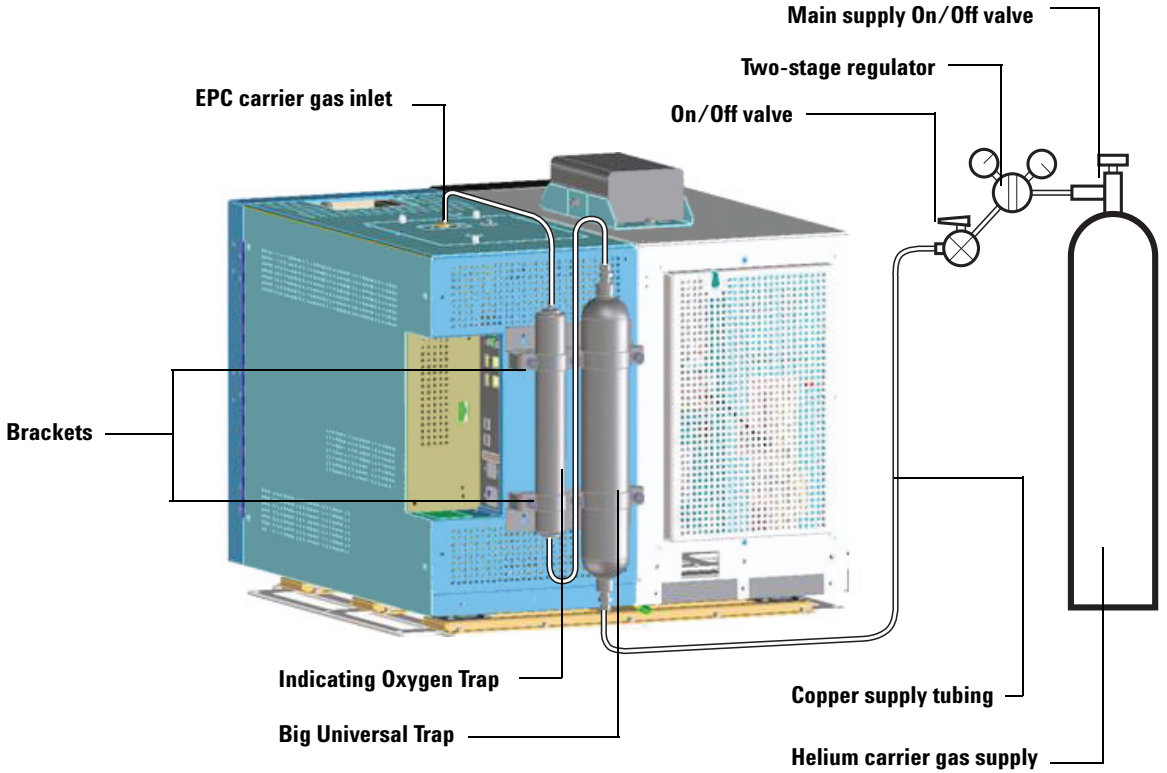


**Figure 3** Connect helium

3 Remove the shipping cap from the outlet of the Indicating Oxygen Trap. Cut a section of 1/8-inch copper tubing from the ship kit and run it from this connection to the EPC inlet connection located on top of the instrument. Do not attach the line to the EPC inlet until the line is purged.

4 Remove the shipping cap from the outlet of the Big Universal Trap and the inlet of the Indicating Oxygen Trap. Cut a section of 1/8-inch copper tubing from the ship kit and run the tubing between these two connections.

5 Use the remaining 1/8-inch copper tubing in the ship kit and connect it to the carrier gas supply line on/off valve (Figure 3). The other end of this line will be connected to the inlet of the Big Universal Trap after the line is purged. Leave the excess tubing coiled in this section to allow for long runs in a field laboratory.

6 Turn on the carrier gas flow at a low pressure, 35 to 55 kPa (5 to 8 psi).

7 Let the line purge to the room for 5 to 10 minutes.

8 Remove the shipping cap on the inlet of the Big Universal Trap and immediately connect this end of the tubing to the trap while maintaining helium gas flow.

**CAUTION** Only remove the caps on the gas purifier when ready to immediately attach the helium gas stream to prevent air contamination. Air contamination will ruin the gas purifier.

9 Purge the flow system for 20 minutes. You can continue with the next step while you wait.

10 If analyzing toxic chemicals or using hydrogen as a carrier gas, run exhaust lines from the split vent and purge vent outlet connections to a safe location outside the building.

11 Attach the helium supply line to the EPC inlet and set the helium gas supply pressure at the regulator between 70 and 100 psig.

12 Check for and repair any leaks found at all fittings between the compressed air tank and the EPC inlet on top of the instrument.

# Preparing the Vacuum System and Column

### Materials needed

- 5975T LTM GC/MSD Troubleshooting and Maintenance Manual
- Diagonal cutters
- Tygon tubing or hose for pump exhaust (11-mm id)
- Plastic gloves

### Procedure

1. Remove the foreline pump from the shipping container and then remove the plugs from the inlet and the outlet of the pump.
2. Verify that the available AC power matches the voltage rating of the foreline pump.
3. Attach the correct line voltage identification sticker to the instrument back panel.
4. Remove the cable ties holding the foreline hose.
5. Remove the blank flange from the free end of the foreline hose and connect the hose to the inlet port of the foreline pump.
6. If nontoxic and nonflammable carrier gas, solvents, and analytes will be used, install the pump exhaust filter on the outlet of the pump. Otherwise, install a hose (11-mm id) to take the foreline pump exhaust outside or to a fume (exhaust) hood.

**CAUTION** Remove the red plug from the outlet of the pump before switching on the MSD power. Operation with the plug in place will destroy the pump.

**WARNING** **The pump exhaust contains carrier gas and traces of solvents, and analytes. If you are using toxic solvents or toxic or flammable carrier gas, or analyzing toxic chemicals, vent the pump exhaust to a location outside the building.**

7. Connect the foreline pump power cord to the receptacle on the side of the MSD. See Figure 4.

8 If you will be using hydrogen as a carrier gas or analyzing toxic chemicals in this location, attach a 1/4-inch hose to the outlet of the split vent filter and attach another 1/4-inch hose to the purge vent line. Vent these lines to a location outside the building.

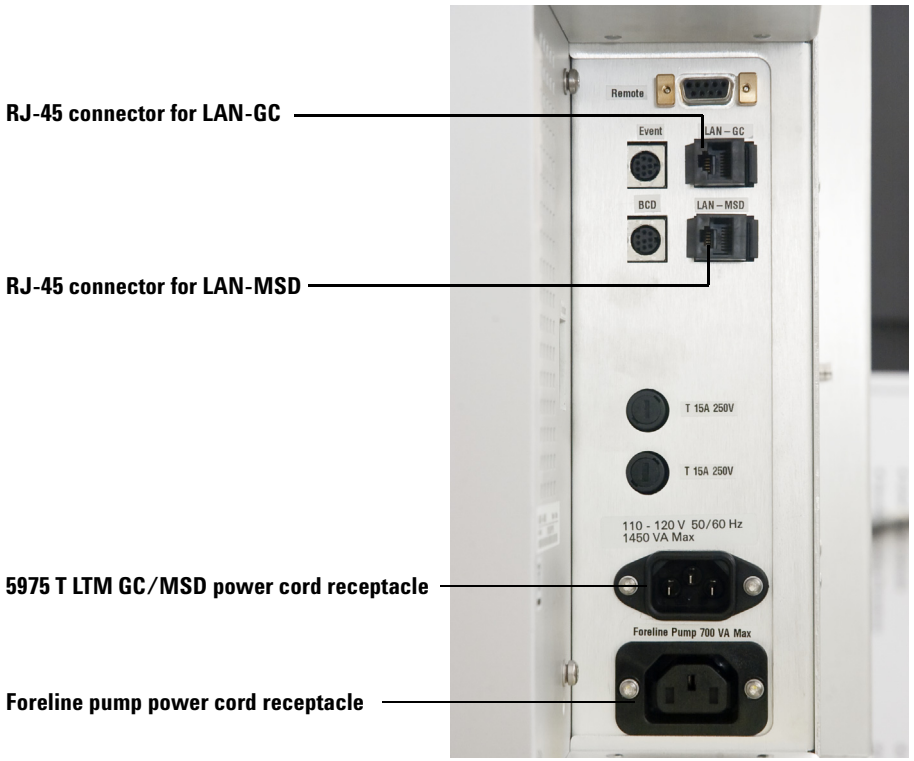


**Figure 4** Connections on the side of the instrument

**CAUTION** The foreline pump must be plugged into the receptacle provided in the side of the instrument in order to have adequate overcurrent protection. Plugging the pump into a wall outlet will void the warranty on the pump.

9 Remove the analyzer cover of the MSD. See the *5975T LTM GC/MSD Operation Manual* for more information.

10 Loosen the side plate thumbscrews.

The rear side plate thumbscrew should be unfastened during normal use. It is only fastened during shipping. The front side plate thumbscrew should only be fastened if hydrogen or other flammable or toxic substances are used for carrier gas.

11 Equalize the pressure in the analyzer by turning the vent valve knob counterclockwise 1/2 turn.

As shipped from the factory, the MSD is not under vacuum. It has been backfilled with clean, dry nitrogen for shipping.

**CAUTION** The MSD is shipped with empty calibration vials. The MSD cannot be tuned without calibration fluid.

12 Add PFTBA (05971-60571) to the EI calibration vial at the front of the MSD.

13 Remove the interface column nut and blank ferrule from the end of the GC/MSD interface.

14 Install the MSD guard column in the GC/MSD interface, see the *5975T LTM GC/MSD Operation Manual* for more information.

15 Cap the LTM column module end of the MSD guard column while the column module is conditioned. Use a CFT union, CFT interface nut, and blanking ferrule to cap the MSD guard column.

16 If supplied, install the optional high vacuum gauge controller kit (G3880-64010) on top of the analyzer cover using the screws and bracket supplied with the kit. First place the bracket from the kit on top of the analyzer cover aligning the captive screws on the bracket with the threaded holes in the top cover and fasten the screws. Then place the ion gauge tube controller inside the bracket aligning the captive screws on the back side with the threaded holes in the controller and hand tighten the screws. Attach the vacuum gauge transducer (G3880-80011) to the flange connection at the rear of the analyzer manifold. Run a control cable (G3880-80012) from the transducer to the vacuum controller (G3880-80010) and a power wire from the controller to the back of the unit. Do not stress these cables.

See the *5975T LTM GC/MSD Troubleshooting and Maintenance Manual* for more information.

**WARNING** **The gauge controller must be properly grounded. See the manufacturer's manual supplied with the gauge controller.**

**17** If there is an 7693A ALS, install it now. See the Agilent 7693A Automatic Liquid Sampler Installation, Operation, and Maintenance Manual.

- Install the ALS parking post on the inlet.
- Plug the ALS cable into its connector on the back of the instrument.
- Remove the shipping clamp from the syringe carrier. Save it for reuse during transport.
- Install the syringe.
- The standard turret is installed.

**18** If supplied, install the Merlin Microseal (optional). Follow the instructions provided with the Merlin Microseal.

**CAUTION** Do not use syringes with tapered needles with a Microseal.

# Installing the ChemStation PC

1. Unpack the PC and printer.
2. Position the PC components on the bench.
3. Install the PC.

   See the PC installation documentation. Please pay attention to the voltage requirements in the PC documentation.
4. Position the network switch on the bench, and plug in its power supply.

   See the switch installation documentation.
5. Connect a shielded LAN cable between the RJ-45 LAN connector on the side of the instrument labeled LAN-MSD and connector #1 on the network switch. See Figure 4.
6. Connect a shielded LAN cable between the RJ-45 LAN connector on the side of the instrument labeled LAN-GC to connector #2 on the network switch. See Figure 4.
7. Connect a shielded LAN cable between the RJ-45 connector on the PC and connector #3 on the network switch.
8. Install the printer and connect to the PC with a USB cable.

   See the printer installation documentation.
9. Turn on the printer and PC, in that order.

   The LAN switch does not have a power switch; it is “on” whenever it is connected to AC power.
10. Install the software. See the software installation manual.

## Starting the Instrument

1. Verify that the instrument power cord is disconnected from the buildings power supply.
2. Verify the sideplate thumbscrews are completely loosened. (Shown in Figure 5.)
3. Remove the cables and open the analyzer for column installation. See the *5975T LTM GC/MSD Operation Manual* for more information.

**CAUTION** Opening the analyzer while either sideplate thumbscrew is still tight will irreparably damage the baseplate. Damage of this type is not covered by the warranty.

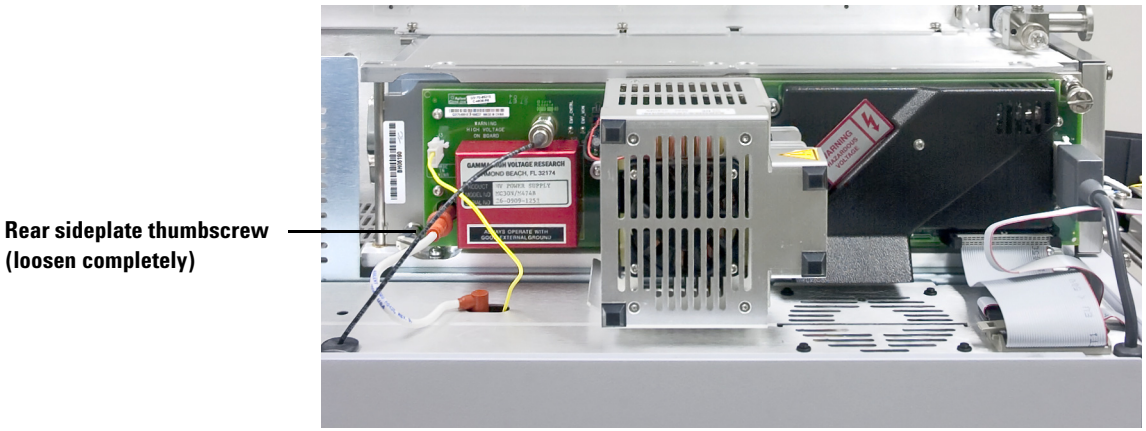


**Figure 5** Loosen sideplate thumbscrews

4. Close the vent valve.
5. Connect the power cord to an appropriate AC outlet.
6. Press the power switch on the front of the instrument to pump down the analyzer. See the *5975T LTM GC/MSD Operation Manual*.

   Press on the side plate of the analyzer to achieve a good seal. Verify that the foreline pump and the front fan turn on, and that the foreline pump stops gurgling within 1 minute.
7. Reinstall the analyzer cover.
8. If needed, set the LAN address for the MSD and GC from the local control panel.

9 Run the ChemStation Configuration Editor and set the LAN address for the LAN-MSD and LAN-GC connectors on the instrument.

10 Run the GC/MSD ChemStation and configure the following:

- He carrier gas
- HP-5msUI 30m × 0.25mm, 0.25µm 5975T Column Module
- ALS Syringe size (if ordered)

11 Set the method parameters for startup.

Startup method

- LTM column off
- Guard column heated enclosure off
- Column flow rate to 5 mL/min
- Split flow to 200 mL/min

12 Save this method as startup.M.

# Conditioning the LTM Column Module

This procedure is used to prepare a new LTM column module for use on the 5975T LTM GC/MSD.

### Materials needed

- Column cutter, ceramic (5181-8836) or diamond (5183-4620)
- Ferrules (SilTite)
  - 0.3-mm id, for < 0.25 mm id column (5188-5361)
  - 0.4-mm id, for < 0.32 mm id column (5188-5362)
- Hand lens (magnifying loupe)
- Clean, lint-free gloves, clean
  - Large (8650-0030)
  - Small (8650-0029)
- Internal column nut (G2855-20530)
- Unions (G3182-60580)
- Safety glasses
- Wrench, open-end, 1/4-inch, and 5/16-inch (8710-0510)

**WARNING** **Do not condition your LTM column module with hydrogen. Hydrogen accumulation in the guard column enclosure can result in an explosion. If you plan to use hydrogen as your carrier gas, first condition the column with ultrapure (99.999% or better) inert gas such as helium, nitrogen, or argon.**

**CAUTION** Wear clean, lint-free gloves to prevent contamination of the parts.

### Procedure

1 If necessary, remove the existing LTM column module assembly. This leaves the instrument in a powered off state.

2 Install the new LTM column module that requires conditioning.

3 If necessary, install a new liner and septum in the inlet before powering on the instrument.

4 Power on the instrument. The MSD transfer line should be capped off. If the analyzer was vented, pump down the instrument.

5 Connect a new guard column to the inlet.

6 Connect the inlet guard column to the LTM column module inlet union.

7 From the ChemStation, edit the column configuration for this LTM module and change the carrier gas type configured if switching to a different carrier gas supply.

8 Turn on the inlet, set its mode to splitless, and set the column flow to 30 cm/s.

9 Check for leaks.

**CAUTION** Do not heat the column without a flow of carrier gas. You will damage the column.

10 Allow the carrier gas to flow through the column for 5 minutes without heating the LTM column or guard column enclosure.

11 Close the LTM module door.

12 Set the guard column enclosure temperature to 10 °C below the maximum LTM column temperature.

13 Ramp the LTM column temperature at 5 °C/minute to 10 °C above your highest analytical temperature.

14 Once the LTM column temperature exceeds 80 °C, inject 5 µL methanol into the inlet. Repeat two more times at 5-minute intervals. This helps remove any contamination from the column before it is installed into the GC/MSD interface.

**CAUTION** Never exceed the maximum column temperature.

15 Hold the temperature of 10 °C above your highest analytical temperature for 3 hours while allowing a flow rate of 30 cm/s through the column.

**WARNING** **Be careful! The guard column heated enclosure or internal accessories may be hot enough to cause burns. If either is hot, wear heat-resistant gloves to protect your hands or allow the parts to cool before beginning the work.**

16 Cool down the enclosure and attach the MSD guard column to the LTM column module outlet union.

17 Check for leaks.

18 With a column flow of 30 cm/s, wait for 5 to 10 minutes before increasing the LTM column temperature to a low standby temperature.

## See also

For more information about installing a capillary column, refer to the application note *Optimizing Splitless Injections on Your GC for High Performance MS Analysis*, publication number 5988-9944EN.

# About Chromatographic Checkout

The tests described in this section provide basic confirmation that the instrument can perform comparably to factory condition. However, as parts of the instrument age, performance can change. The results presented here represent typical outputs for typical operating conditions and are not specifications. The tests assume the following:

- Use of an automatic liquid sampler. If not available, use a suitable manual syringe instead of the syringe listed.
- Use of a 10-µL syringe in most cases. However, a 5-µL syringe is an acceptable substitute for the 1-µL injections described here.
- Use of the septa and other hardware (liners, o-ring, syringe and so forth) described. If you substitute other hardware, performance can vary.

## To prepare for chromatographic checkout

Because of the differences in chromatographic performance associated with different consumables, Agilent strongly recommends using the parts listed here for all checkout tests. Agilent also recommends installing new consumable parts whenever the quality of the installed ones is not known. For example, installing a new liner and septum ensures that they will not contribute any contamination to the results.

1. Check the indicators/dates on the gas supply traps. Replace/recondition expended traps.
2. Install new consumable parts for the inlet and prepare the correct injector syringe (and needle, as needed).

**Table 5** Recommended parts for checkout

| Recommended part for checkout | Part number |
|---|---|
| Syringe,10-µL | 5181-1267 |
| Syringe, 5-µL | 5182-0836 |
| O-ring | 5188-5365 |
| BTO Septum- 11 mm | 5183-4757 |
| Gold-plated seal | 18740-20885 |
| Liner - general purpose split | 5183-4711 |
| Split/Splitless liner | 5188-3316 |

# Verifying EI System Performance

### Material needed

1 pg/µL (0.001 ppm) OFN sample (5188-5348)

## Verify the tune performance

1. Verify that the system has been pumping down for at least 60 minutes.
2. From the ChemStation, load the OFN_SN.M method.
3. In the **Instrument Control** view, select **Checkout/Checkout Tune** .

   The software will perform an autotune and print out the report.
4. When the autotune has completed, save the method, and then select **Checkout/Evaluation Tune**.

   The software will evaluate the last autotune and print a System Verification – Tune report.

## Verify the sensitivity performance

1. Gather the following:
   - Evaluation column, HP-5msUI 30 m × 0.25 mm × 0.25 µm 5975T Column Module(G3900-63001)
   - Performance evaluation (checkout) sample OFN, 1pg/µL (5188-5348)
   - Chromatographic-grade isooctane
   - 4-mL solvent and waste bottles or equivalent for autoinjector
   - 2-mL sample vials or equivalent for sample
2. Verify the following:
   - Chromatographic-grade helium plumbed and configured as the carrier gas
   - Empty waste vials loaded in sample turret
   - 4-mL solvent vial with diffusion cap filled with isooctane and inserted in Solvent A injector position
3. If needed, install the evaluation column. (See the procedure in the *5975T LTM GC/MSD Troubleshooting and Maintenance Manual*.)

- Bake out the evaluation column for at least 30 min at 180 °C. (See the procedure in the *5975T LTM GC/MSD Troubleshooting and Maintenance Manual.*)
- Be sure to configure the column.

4 Load the OFN_SN.M method.

5 Resolve this method with the configured system.

6 Save this method as checkout.M.

7 Prepare a sample vial containing the 1pg/µL OFN (5188-5348) and load it in the ALS turret,

8 Prepare the data system to perform one run using the loaded checkout method.

9 Start the run.

If performing an injection using an autosampler, start the run using the data system or press **[Start]** on the instrument.

If performing a manual injection, press **[Prep Run]** on the local control panel to prepare the inlet for split injection.

When the instrument becomes ready, inject 1 µL of the checkout sample and simultaneously press **[Start]** on the instrument.

10 In the **Instrument Control** view, select **Checkout/Sensitivity Check**.

11 Click the appropriate icons in the **Instrument Edit** window to edit the method for the type of injection.

12 Click **OK** to run the method.

13 When the method is completed, an evaluation report will print out.

Verify that rms signal-to-noise ratio meets the published specification.

# Verifying High Mass System Performance

Refer to the *5975T LTM GC/MSD Operation Manual*.

To check high mass performance, the system makes 1 injection of the high mass checkout sample and analyzes the results.

For high mass systems, verify high mass system performance as follows:

1. Load the high mass checkout method, PFHT.M, and resolve any configuration conflicts.
2. Save this method as HighMass.M.
3. Load the high mass checkout sample into vial 2.
4. When the GC and MSD are ready, from the **Instrument** view select **Checkout/High Mass Check**.
5. Verify that the rms signal-to-noise ratio meets the specification.

# Initial Installation Checklist

## Verifying that site preparation is complete

- ❒ Adequate space is available for the system - Suitable supporting bench or space for the unit secured on top of the reusable shipping container.
- ❒ Adequate electrical power is available at the correct voltages and frequencies.
- ❒ Environmental control systems are adequate to maintain a correct, stable operating environment.
- ❒ Safe exhaust venting preparations are adequate.
- ❒ Supplies necessary for instrument operation are available, including solvents, carrier gasses, and printer paper.
- ❒ Conveniently located telephone.

## Unpacking and inspecting the shipped materials

- ❒ Shipping containers must be opened only with an Agilent Technologies representative present to verify the contents of each container.
- ❒ Check each item off on the packing list and verify serial numbers.
- ❒ Record the serial numbers in the installation documentation.

_____

_____

_____

- ❒ Retain shipping containers and material until contents are checked for completeness and instrument performance is verified.
- ❒ Notify the distribution center of any missing or damaged items.
- ❒ Shipment damaged or incomplete:

**Distribution center notified (date):**

_____

**Person contacted:**

_____

**DM notified (date):**

_____

**Damaged or missing material:**

_____

_____

_____

## 5975T LTM GC/MSD installation

- ❒ Placed on an appropriate bench or secured to base of reusable shipping container

### Connecting helium lines to the instrument

- ❒ Cylinder brackets attached to back of instrument
- ❒ Carrier gas supply plumbed with copper tubing
- ❒ Plumbing purged with helium at 35 to 55 kPa (5 to 8 psi) for 5 to 10 minutes
- ❒ Gas purifier plumbed and purged
- ❒ Carrier gas plumbed
- ❒ Check for leaks

### Preparing the vacuum system

- ❒ Foreline pump unpacked and placed on the floor near instrument
- ❒ Foreline pump line voltage verified to match available AC power
- ❒ Line voltage identification sticker installed on MSD
- ❒ Plugs removed from the foreline pump
- ❒ Foreline hose connected to the pump
- ❒ Pump exhaust vented to a fume hood or the outlet filter installed
- ❒ Foreline pump power cord plugged into instrument
- ❒ Instrument top cover removed
- ❒ Vent valve opened to equalize pressure
- ❒ PFTBA vial for EI cal valve filled
- ❒ Optional High Vacuum Gauge Controller installed

### MSD ChemStation PC installation

- ❒ PC, monitor, and printer unpacked
- ❒ PC installed

- ❒ Network switch unpacked and plugged in
- ❒ LAN cable from the MSD connected to switch Port #1
- ❒ LAN cable from the GC connected to switch Port #2
- ❒ LAN cable from the PC connected to switch Port #3
- ❒ Printer installed
- ❒ Printer, monitor, and PC turned on (in that order)
- ❒ Software installed per the software installation manual

### Connecting the LTM column

- ❒ Instrument power turned off
- ❒ Sideplate thumbscrews loosened completely; analyzer opened
- ❒ Column installed in the GC/MSD interface
- ❒ Instrument power on (press on the sideplate)
- ❒ Foreline pump and the front fan operation verified
- ❒ Foreline pump stops gurgling within 60 seconds verified
- ❒ Instrument turned off after 10 minutes of pumping down
- ❒ GC heated zones turned off
- ❒ GC carrier gas flow set to 1.0 mL/min with constant flow enabled

### Configuring the instrument

- ❒ ALS installed (optional), and shipping clamp removed from the syringe carrier
- ❒ Merlin Microseal installed (optional)
- ❒ Instrument plugged in and turned on
- ❒ Instrument passes self test
- ❒ LTM Column parameters configured
- ❒ Carrier gas line pressure set to approximately 414 kPa (70 psi)
- ❒ LTM Column flow rate set to 5 mL/min (split flow to 200 mL/min)

### Conditioning the column

- ❒ LTM module installed
- ❒ New inlet liner and septum installed if necessary
- ❒ MSD transfer line capped off
- ❒ Inlet guard column installed and connected to LTM
- ❒ Inlet turned on and set to splitless
- ❒ Column flow set to 30 cm/s
- ❒ Carrier gas flow through column verified for 5 min
- ❒ Guard column enclosure temperature set to 10 °C below maximum LTM column temperature
- ❒ LTM column temperature ramped to 10 °C above maximum LTM temperature at 5 °C per minute
- ❒ Once above 80 °C, 5 µL of methanol injected into GC; repeated two more times at 5-minute intervals
- ❒ Inlet set to 10 °C above maximum temperature, gas flow set to 30 cm/s for 3 hours
- ❒ Enclosure cooled down, MSD guard column attached to LTM outlet

## Performance verification

### EI system verification

- ❒ Pumpdown for at least 60 minutes
- ❒ GC oven set to 150 °C and the column flow to 1.0 mL/min
- ❒ Checkout Tune performed
- ❒ Tune Verification performed
- ❒ Sensitivity Check verification of EI Sensitivity performance

## Instrument Log Book updated

- ❒ MSD serial number recorded on S/N report
- ❒ S/N Report(s) and Tune Report(s) faxed to GCMS LSCA Technical Marketing at (USA) 408-553-3188 or your region's local Technical Marketing Support Provider

**5975T LTM GC/MSD serial number/product number:**

_____

**EI serial number:**

_____

# Customer Familiarization Checklist

The purpose of customer familiarization is to demonstrate the steps required to:

- Perform a basic analysis using an Agilent standard sample or an internal data file
- Evaluate the acquired data
- Perform routine maintenance

Much of the familiarization is accomplished while the hardware is being installed and checked out. For this reason, at least one operator must be present throughout installation and familiarization.

Familiarization is intended to give operators a basic overview of the operation and maintenance of new instruments, systems, and applications software. It is not a substitute for a full operator training course.

## Topics not included in familiarization

- Training on the PC, the mouse, Windows Operating System, DOS, Excel, Access, or any other Windows applications
- Advanced mass spectral processing
- Analysis of unknown samples
- Analysis of customer standards or samples
- Network setup of the MSD ChemStation with other PCs
- Network setup of the MSD ChemStation with the building network
- Methods development
- Commands and their use in creating macros using a text editor
- Customization of the system (including macro writing)
- Executing a macro via methods (deuser.mac) or from the command line
- Special macros
- Any US EPA quantitation functions
- Aromatic gasoline quantitation functions
- Intelligent sequencing – Drug Analysis Acquisition
- Any Drug Analysis quantitation functions

## Hardware overview

- MSD
- Gas Chromatograph
- ALS (if applicable)
- PC hardware and peripherals

## System operation

- Switching on instruments, PC, and peripherals
- Starting Windows Operating System and using online help
- Starting MSD ChemStation software

## MSD ChemStation software overview

- Software configuration of the instruments (MS Config) demonstrated
- Different Quantitation Packages and how to switch between them demonstrated
- Views and menu structure demonstrated

## MSD ChemStation software autotune descriptions

- ❒ Various autotunes described
- ❒ Importance of retaining tuning records emphasized
- ❒ Ion source contamination, diagnosis of contamination, and use of control charts discussed
- ❒ EI autotune demonstrated and tune report explained
- ❒ Manual tune explained
- ❒ View Tunes utility demonstrated and its importance explained
- ❒ Optimization of reagent gas and application dependency on gas flow, source temperature, and emission current discussed
- ❒ Importance of retaining tuning and maintenance records discussed
- ❒ Importance of backing up data, including tune files

## Methods

- ❒ Edit entire method demonstrated with OFN_SN.M, explaining the GC and MS Scan Parameters.
- ❒ Method save demonstrated

## Data acquisition

- ❒ Analytical method developed to run both scan and SIM
- ❒ Steps involved in acquiring data and editing an entire method described
- ❒ File designated to store the data; data file naming demonstrated
- ❒ Acquisition parameters saved as part of a method
- ❒ Use Scan/SIM (amu range 50:300/amu ion 272) on OFN for acquisition
- ❒ Snapshot demonstrated

## Data analysis

- ❒ Screen layout explained (TIC, spectral windows, command line, title bar, etc.)

- ❒ Loading data files demonstrated
- ❒ TIC, spectra, and extracted ion profiles demonstrated
- ❒ Integration performed and explained
- ❒ Library search (searching a spectrum) demonstrated
- ❒ Difference between standalone and online data analysis explained

## Sequence

- ❒ Sequence loading demonstrated
- ❒ Sample Log Table editing demonstrated
- ❒ Sequence saving demonstrated
- ❒ Running, halting, and position and run demonstrated

## MSD ChemStation maintenance

- ❒ Directory structure and maintenance of MSDCHEM files discussed
- ❒ Data backup options discussed
- ❒ Use of Windows Operating System DEFRAG and SCANDISK utilities discussed

## EI instrument user maintenance

- ❒ GC inlet, column installation and maintenance, flows, and parts replacement described
- ❒ MSD vent and pumpdown procedures performed and described using the ChemStation software
- ❒ Maintenance section of Hardware manual demonstrated
- ❒ Ion source cleaning demonstrated
- ❒ Electron multiplier horn replacement demonstrated
- ❒ Vacuum system preventive maintenance demonstrated; special precautions for certain reagent gases discussed

## Troubleshooting (Diagnostics)

- ❒ Tune charts under **Qualify** menu demonstrated
- ❒ Online help for troubleshooting demonstrated

## Tune charts

- ❒ Displaying results explained
- ❒ Ion Source parameters explained
- ❒ Mass Filter parameters explained

## Additional support information

- ❒ Use of manuals and online help explained
- ❒ Warranty and warranty enhancements explained
- ❒ Agilent Technologies Support services and how to obtain help explained
  - Hardware
  - Software
  - Assist Packages
  - Additional Training
  - Consulting

**Company name:**

_____

**Customer signature/date:**

_____

**Engineer signature/date:**

_____

**Sales order number:**

_____

# 3 Packing the Instrument for Transport



The best way to keep your GC/MSD functioning properly is to keep it pumped down and hot, with carrier gas flow. If you plan to move or store your GC/MSD, a few additional precautions are required.

This chapter describes how to pack and transport your 5975T LTM GC/MSD and its accessories.

# Loading the 5975T and its Accessories

The two Agilent shipping containers shown below in Figure 6 are a very easy and safe way to package and transport your 5975T LTM GC/MSD and its accessories. Figure 9 on page 70 shows a more detailed view of how the accessory container can be packed.

Contact your sales representative if you would like to purchase these optional reusable shipping containers.


**Figure 6** 5975T LTM GC/MSD reusable shipping container and accessory container

# Attaching the Instrument to the Shipping Container

### Materials needed

- GC ship kit
- 6 Washers (2190-0421)
- 6 Bolts (0570-0106)
- Metal strap kit (G3880-80018)
- 5975T LTM GC/MSD Hardware Manuals
- Wrench, 1/4-inch × 5/16-inch open end
- 5975 Series MSD shipping kit

### Procedure

1. Place the base of the reusable shipping container on a bench or on the top of the reusable shipping container top cover.
2. Place the 5975T LTM GC/MSD mainframe on top of the base of the reusable shipping container. Align the holes in the rails on the instrument base with the holes in the plastic insert on the reusable shipping container base.
3. Place the metal straps on top of the instrument rails and align the holes.
4. Bolt the straps and rails on the base of the 5975T LTM GC/MSD to the plastic insert in the base of the container.

**WARNING** **Bolt the instrument to the brackets in the base of the container before lifting the unit by the base of the container.**

**WARNING** **To prevent injury, get lifting assistance.**

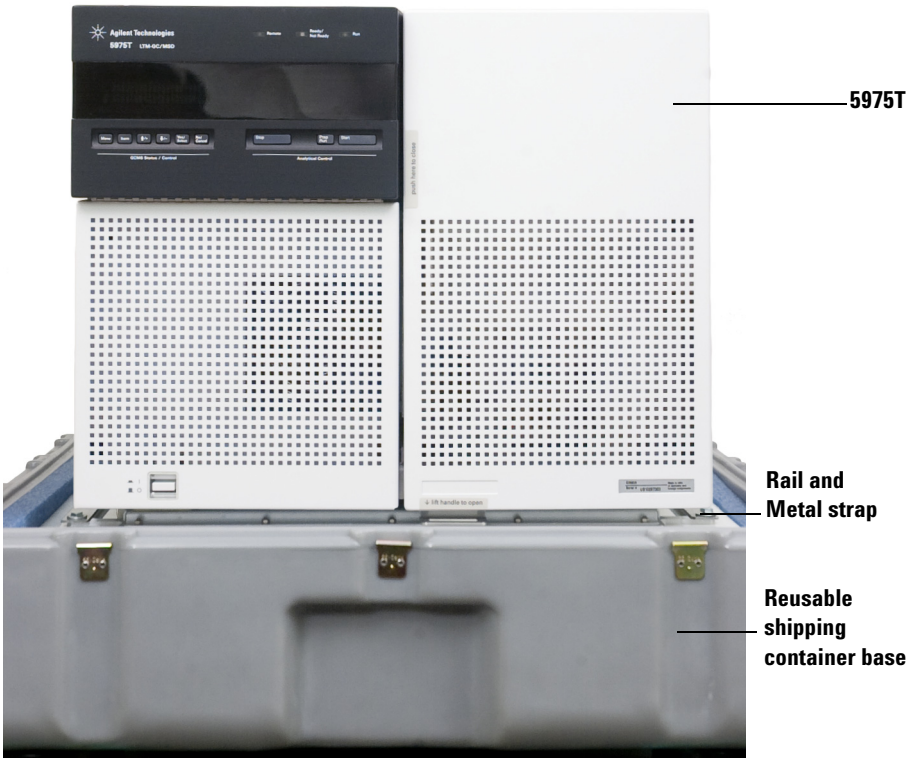


**Figure 7** Instrument mounted to reusable shipping container base

## Preparing the System for Transport

The following describes how to prepare the 5975T LTM GC/MSD for transport after it has been up and running. (That is, it is currently running under a vacuum state.)

**WARNING** **Be careful! The guard column heated enclosure or internal accessories may be hot enough to cause burns. If either is hot, wear heat-resistant gloves to protect your hands or allow the parts to cool before beginning the work.**

1. Remove the analyzer top cover.
2. Vent the system. See the *5975T LTM GC/MSD Operation Manual.*

**WARNING** **Always wear safety glasses when handling capillary columns. Use care to avoid puncturing your skin with the end of the column.**

**CAUTION** Wear clean, lint-free gloves to prevent contamination of the parts.

3. Open the LTM column module door and remove the MSD guard column that runs between the LTM column module outlet and the MSD transfer line. Place it in a plastic bag, then into one of the cardboard boxes in the reusable accessory box. See Figure 9 on page 70.
4. Cap the transfer line with a wire and blanking ferrule.
5. Cap the column module outlet using an interface nut and blanking ferrule.
6. Check the condition of the ion source and, if necessary, clean it, or replace it with a clean ion source while the analyzer is vented. (See the

*5975T LTM GC/MSD Troubleshooting and Maintenance Manual* for details on cleaning and replacing the ion source.)

7 Hand-tighten the front and rear thumbscrews on the analyzer door to secure it for transport.

8 Install the dry foreline pump vacuum valve.

- **a** Disconnect the foreline hose from the dry vacuum pump inlet.
- **b** Place the vacuum valve o-ring on top of the pump flange.
- **c** Align the vacuum keeping valve to ensure the correct direction of flow and place the valve on top of the o-ring.
- **d** Attach the valve to the pump flange with a c-clamp. Hand-tighten the wing nut firmly.
- **e** Attach the foreline hose to the other end of the vacuum keeping valve with a c-clamp. Hand tighten the wing nut firmly.

**CAUTION** Be sure the pump valve is opened before continuing. If you operate the system with the pump valve closed, you could damage the 5975T.

9 Check that the pump valve is open, then pump down the system. See the *5975T LTM GC/MSD Operation Manual*.

10 Press the power switch on the front of the instrument to shut down the system.

11 Immediately close the vacuum keeping valve on the foreline pump inlet.

12 Replace the analyzer top cover. If an optional micro-ion gauge controller is attached to the analyzer top cover, it can remain in place during transport.

# Packing the System for Transport

After the system has been readied and placed under vacuum as described in "Preparing the System for Transport" on page 65, disconnect the removable parts listed below. Carefully pack these parts in the reusable accessory container. (See Figure 9 for a recommended packing order.) During the process, remember, the instrument must remain upright at all times.

1. Disconnect the power supply cable from the 5975T LTM GC/MSD and place it in a cardboard box. Label the box "Power Cords".
2. Disconnect and pack the ALS. See the Agilent 7693A Automatic Liquid Sampler Installation, Operation, and Maintenance Manual.
   - **a** Unplug the ALS from the back of the instrument.
   - **b** Remove the vials from the ALS and store them in one of the small boxes in the shipping container. Label the box "ALS parts".
   - **c** Remove the ALS from the parking post. Remove the parking post and put it in the cardboard box with the other ALS parts.
   - **d** Remove the syringe and store it in a small parts box.
   - **e** Using a T-10 Torx driver, install the shipping clamp on the syringe carrier to keep it in place. See Figure 8 on page 67.
   - **f** Put the ALS into its original ALS shipping cardboard box, and place it in the compartment at the bottom of the reusable shipping container. See Figure 9 on page 70.

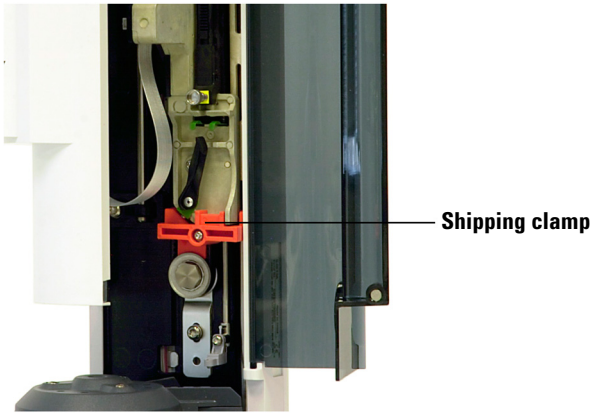


**Figure 8** Shipping clamp installed on ALS

3 Check the inlet o-ring and septum. Install new ones if needed.

4 Inspect the gold seal, and replace if necessary.

5 Disconnect and pack the foreline pump.

   a Close the foreline pump vacuum valve.

   b Disconnect the valve from the foreline pump and leave the valve attached to the vacuum hose.

   c Secure the hose to the back panel of the instrument using a plastic strap or cable ties.

   d Install protective caps on the inlet and outlet of the foreline pump.

   e Place the foreline pump in space provided for it in the bottom of the reusable shipping container. See Figure 9.

6 Disconnect and pack the switch.

   a Disconnect the power supply from the switch.

   b Place both the power supply and the switch in one cardboard box.

   c Label the box “LAN”.

7 Disconnect and pack the computer.

   a Disconnect the power cord and LAN cables from the back of the computer.

   b Put the cables and power cord into the brown box labeled “LAN”.

   c Put the computer into the space provided for it in the reusable shipping container.

8 Disconnect and pack the carrier gas lines.

   a Close the shutoff valve from the carrier gas supply to the tank.

   b Disconnect the carrier gas lines from the compresses gas cylinder.

   c Remove the 1/8 inch copper tubing that runs between the regulator and the purification filters on the back of the instrument.

   d Coil the tubing line and put it in the cardboard box designed for the copper tubing. See Figure 9 on page 70.

   e Remove the 1/8 inch copper tubing that runs between the purification filters and the EPC inlet on top of the instrument. Coil the tubing and put it in the copper tubing cardboard box.

9 Disconnect the gas regulator.

   a Close the main shutoff valve on the carrier gas supply.

   b Remove the coil of copper tubing from the shutoff valve located near the dual stage regulator to the Big Universal Trap.

   c Cap the carrier gas inlet for the Big Universal Trap.

   d Coil the copper tubing and place it in a brown box in the reusable shipping container.

   e Place the gas regulator in the bottom tray. See Figure 11 on page 72.

10 Disconnect the printer.

   a Place the printer power cable and USB cord into one of the small brown boxes.

   b Label the box “Printer”.

   c Place the printer in the shipping container.

11 Store miscellaneous items, such as consumables, the EPC module, multi-meter, ion source, and flow meter in the top and bottom trays of the reusable accessory shipping container. See Figure 9 on page 70, Figure 10 on page 71, and Figure 11 on page 72.

12 Secure the unit to the reusable shipping container base. See “Attaching the Instrument to the Shipping Container” on page 63 for more information.

13 Carefully lower the unit to the floor.

14 Replace the cover, and secure the latches.

Figure 9 shows Agilent's recommended packaging order for this container. Modify this configuration as required for optional spare parts and tools that you are transporting with your system.

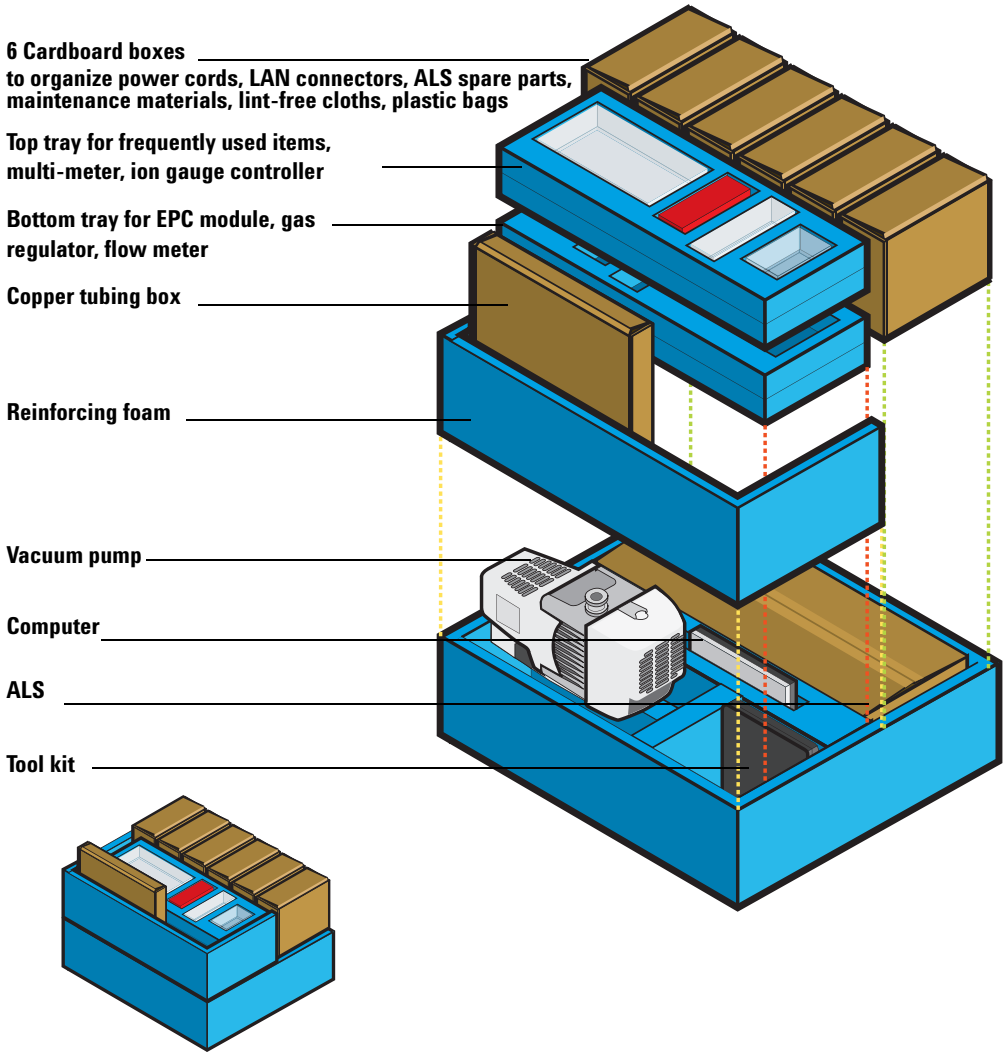


**Figure 9** Recommended packing order of the 5975T LTM GC/MSD accessory container

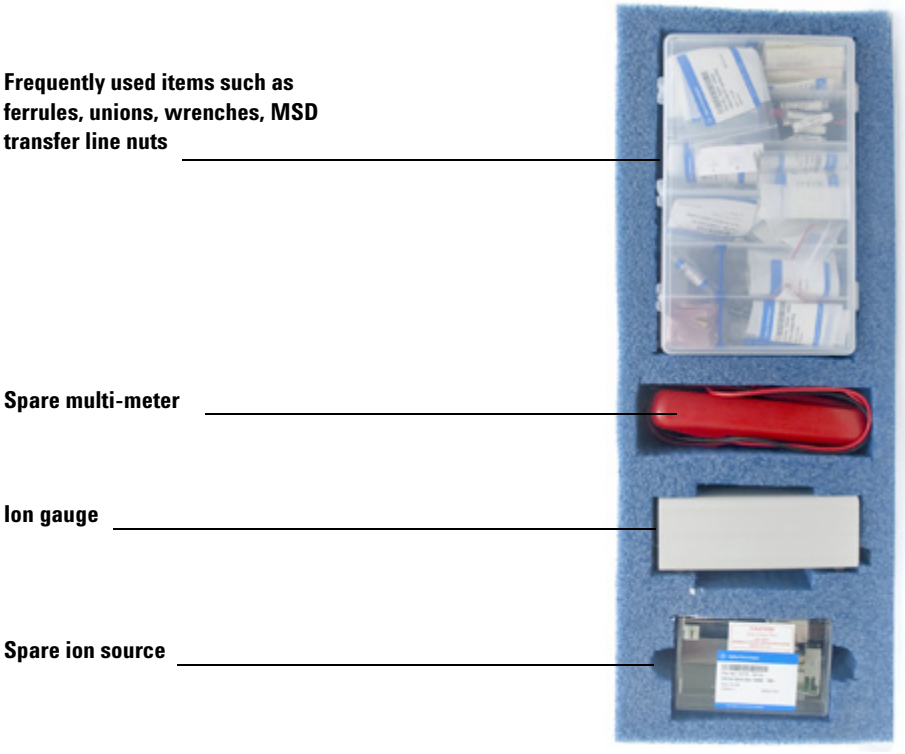


**Figure 10** An example of the packing configuration for the top tray of the 5975T LTM GC/MSD reusable shipping container

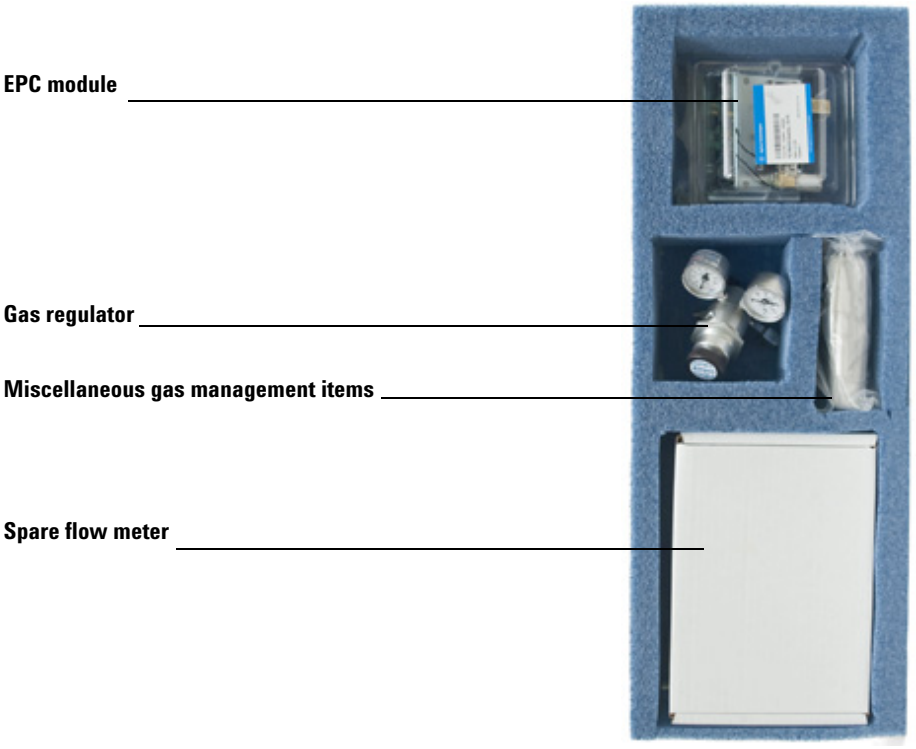


**Figure 11** An example of the packing configuration for the bottom tray of the 5975T LTM GC/MSD reusable shipping container

# Packing for Transport Checklist

## Preparing the system for transport

- ❒ System vented
- ❒ MSD transfer line capped
- ❒ Front and rear analyzer door thumbscrews hand tight
- ❒ Ion source clean
- ❒ Foreline pump vacuum keeping valve installed and open
- ❒ System pumped down
- ❒ Foreline pump vacuum keeping valve closed after pump down to maintain vacuum
- ❒ System shut down
- ❒ Analyzer top cover replaced

## Packing the system for transport

- ❒ System under vacuum
- ❒ Power supplies disconnected and packed
- ❒ Syringe removed from ALS
- ❒ ALS removed and syringe carrier secured
- ❒ ALS packed
- ❒ Inlet o-ring, septum, gold seal inspected and replaced if necessary
- ❒ Foreline pump disconnected, capped and packed
- ❒ Computer and printer disconnected and packed
- ❒ Main shutoff valve from carrier gas supply to tank closed
- ❒ Carrier gas lines disconnected from cylinders
- ❒ 1/8 inch copper tubing between regulator and purification filters , and between filters and EPC module removed and packed

- ❒ Copper tubing from the dual stage regulator to the Big Universal Trap removed and packed.
- ❒ Carrier gas inlet capped
- ❒ Gas regulator packed
- ❒ All other miscellaneous accessories such as consumables, the EPC module, ion source, flow meters packed in accessory box.
- ❒ Accessory box lid secured on accessory box.

## Packing the unit for transport

- ❒ 5975T instrument secured on transportable storage box base
- ❒ Base placed on floor
- ❒ Transportable storage box lid in place and latches secured.

# 4
# Setting Up in a Field Laboratory

# Setting up the 5975T LTM GC/MSD

This procedure assumes the following:

- The instrument is shipped under vacuum secured in the reusable shipping container to a field laboratory location.
- The carrier gas purification cylinders are attached by brackets to the back of the instrument and plumbed to each other.
- The inlet to the Big Universal Trap and the outlet from the indicating oxygen trap are plugged for shipment.
- If an optional micro-ion gauge controller is used it is attached to the top of the analyzer cover and shipped in the reusable shipping container attached to the instrument. See the *5975T LTM GC/MSD Troubleshooting and Maintenance Manual* for more information.

### Procedure

1 Remove the top cover from the reusable shipping container and place it on the floor, top side up, in the location where the instrument is to be used. This top cover is used as a base to elevate the instrument to operating height.

**WARNING** **Be sure this instrument is bolted to the brackets in the base of the container before lifting the unit by the base of the container.**

**WARNING** **To prevent injury, get lifting assistance.**

2 Lift the bottom part of the reusable shipping container with the instrument attached and place it on top of the reusable shipping container's top cover.

**Figure 12** Using the cover to elevate the instrument to operating height

3 If used, attach the 7693A ALS parking post to the instrument's inlet.

4 Place the 7693A ALS on the inlet and plug the ALS cable into the rear of the instrument. Remove the shipping clamp from the syringe carrier. See Figure 8 on page 67.

# Setting Up the Carrier Gas

This procedure assumes the carrier gas lines were previously attached to the instrument and placed in the reusable accessory container for this field installation. It also assumes the checkout column module is installed, the guard column is installed between the inlet and column module, and the column module outlet and transfer lines are capped.

1. If necessary, attach a dual stage regulator with shut off valve to a helium compressed gas supply cylinder.
2. Run the pre-assembled 1/8-inch pre-cleaned copper tubing between the shutoff valve located downstream of the pressure regulator to the area near the inlet to the Big Universal Trap. Do not connect the copper tubing to the Big Universal Trap inlet until you purge the carrier gas supply line.
3. With the Big Universal Trap inlet tubing disconnected, set the carrier gas pressure at 5 psig and allow the carrier gas supply line to purge with helium for 5 to 10 minutes.
4. Remove the shipping cap from the outlet of the indicating oxygen trap and run the pre-assembled 1/8-inch pre-cleaned copper tubing from this outlet to the EPC inlet on top of the instrument.
5. Remove the shipping cap from the Big Universal Trap inlet and attach the previously purged run of 1/8-inch copper tubing to this inlet.
6. If analyzing toxic chemicals or using hydrogen as a carrier gas, run exhaust lines from the split vent and purge vent outlet connections to a safe location outside the building.
7. Check for and repair any leaks found at all fittings between the compressed air tank and the EPC inlet on top of the instrument.

## Setting up the Data System Hardware

This procedure assumes that the IP addresses for the 5975T LTM GC/MSD and the PC were previously set.

1. Remove the PC and printer from the reusable accessory container and place them on a bench near the instrument.
2. Place a power outlet surge protector on the bench near the PC. Do not connect to the sites AC power supply at this time.
3. Remove the box containing the LAN cables, LAN switch, switch power supply, printer USB cable, and PC power supply from the reusable shipping container.
4. Position the LAN switch on the bench, and attach its power supply to the switch and plug into the surge protector.
5. Connect a shielded LAN cable between the **LAN-MSD** connector on the side of the instrument and connector #1 on the LAN switch. See Figure 4.
6. Connect a shielded LAN cable between the **LAN-GC** connector on the side of the instrument to connector #2 on the LAN switch. See Figure 4.
7. Connect a shielded LAN cable between the RJ-45 LAN connector on the PC and connector #3 on the network switch.
8. Attach the power supply to the printer and plug it into the surge protector.
9. Attach the USB cable to the printer. Attach the other end of the printer USB cable to the PC.

   See the printer installation documentation.
10. Plug the surge protector into an approved AC power source.
11. Turn on the printer and PC, in that order. The LAN switch does not have a power switch; it is “on” whenever it is connected to AC power.

## Setting up the Vacuum System and Column

This procedure assumes the checkout LTM column module is installed, and was previously conditioned. The system must be vented in order to remove the vacuum valve and install the guard column to the MSD.

1. Remove the foreline pump from the reusable shipping container and place it near the rear of the instrument. Remove the shipping plugs from the pump inlet and discharge ports.
2. Plug the electrical cord from the vacuum pump into the designated outlet on the side of the instrument.
3. Remove the top analyzer cover.
4. Loosen the side plate thumbscrews.

   The rear side plate thumbscrew should always be unfastened during normal use. It is only fastened during shipping.

   The front side plate thumbscrew should only be fastened if hydrogen or other flammable or toxic substances are used for carrier gas.
5. Open the vent valve and vent the analyzer. The system should not be left in a vented condition but should be pumped down as soon as this procedure is completed.
6. After the instrument is vented, open the vacuum valve attached to the foreline pump inlet hose. Remove this valve from the foreline pump inlet hose. The instrument will not perform properly with the vacuum valve installed in the line to the foreline pump.
7. Remove the caps on the transfer line and LTM column module outlet and store these caps for reuse.
8. Install the MSD guard column between the LTM column module outlet and the MSD interface transfer line. See the *5975T LTM GC/MSD Operation Manual* for details.
9. Close the vent valve.
10. Attach the foreline pump inlet hose to the foreline pump inlet. If analyzing toxic chemicals or using hydrogen as a carrier gas, run an exhaust line from the foreline pump outlet to a safe location outside the building.

## Starting the Instrument

1. If a toxic fume exhaust system is used, turn on the exhaust system to vent the foreline pump, split vent, and purge vent to a safe location outside the building.
2. Plug the female end of the electrical cord into the male connector on the back of the 5975T LTM GC/MSD and plug the male end into a building outlet properly rated for this power supply. See the *5975T LTM GC/MSD Site Prep Manual*.
3. Press the power button on the front of the instrument to start the system.
4. Run the ChemStation and select **View/Tune and Vacuum Control/Pump Down**.
5. To ensure a correct seal, when the pump starts up, press lightly on the metal box attached to the side board.

   The foreline pump will make a gurgling noise. This noise should stop within a minute. If the noise continues, there is a *large* air leak in your system, probably at the side plate seal, the interface column nut, or the vent valve.
6. Install the analyzer top cover and close the LCP/Analyzer window.

7 Once communication with the PC has been established, click **OK**.

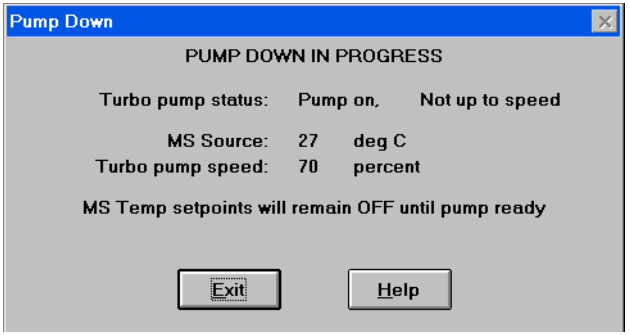


**Figure 13** Pumping down

**CAUTION** Within 10 to 15 minutes the turbo pump speed should be up to 80%. The pump speed should eventually reach 95%. If these conditions are not met, the MSD electronics will shut off the foreline pump. In order to recover from this condition, you must power cycle the MSD. If the MSD does not pump down correctly, see the manual or online help for information on troubleshooting air leaks and other vacuum problems.

8 When prompted, load the checkout.M method to turn on the GC/MSD interface heater, guard column heated zone, and LTM column. Click **OK** when you have done so.

The software will turn on the ion source and mass filter (quad) heaters. The temperature setpoints are stored in the current autotune (*.u) file.

**CAUTION** Do not turn on any GC heated zones until carrier gas flow is on. Heating a column with no carrier gas flow will damage the column.

9 After the message **Okay to run** appears, wait 2 hours for the MSD to reach thermal equilibrium. Data acquired before the MSD has reached thermal equilibrium may not be reproducible.

# Verifying System Performance in the Field

### Materials needed

1 pg/µL (0.001 ppm) OFN sample (5188-5348)

### Verify the tune performance

1. Verify that the system has been pumping down for at least 60 minutes.
2. Verify that the checkout.M method is loaded, the LTM column temperature is 150 °C, and the column flow is 1.0 mL/min.
3. In the **Instrument Control** view, select **Checkout/Checkout Tune**. The software will perform an autotune and print the report.
4. When the autotune has completed, save the method and then select **Checkout/Evaluate Tune**.

   The software will evaluate the last autotune and print a System Verification – Tune report.

### Verify the sensitivity performance

1. Set up to inject 1 µL of OFN, either with the ALS or manually.
2. In the **Instrument Control** view, select **Checkout/Sensitivity Check**.
3. Click the appropriate icons in the **Instrument | Edit** window to edit the method for the type of injection.
4. Click **OK** to run the method.

   When the method is completed, an evaluation report will be printed.

   Verify that rms signal-to-noise ratio meets the published specification. Please see the Agilent Web site at www.agilent.com/chem for specifications.

# Field Setup Checklist

## Verify that site preparation is complete

- ❒ Adequate space is available for the system - Suitable supporting bench or space for the unit secured on top of the reusable shipping container.
- ❒ Adequate electrical power is available at the correct voltages and frequencies.
- ❒ Environmental control systems are adequate to maintain a correct, stable operating environment.
- ❒ Safe exhaust venting preparations are adequate.
- ❒ Supplies necessary for instrument operation are available, including solvents, carrier gasses, and printer paper.
- ❒ Conveniently located telephone.

## Unpacking and setting up equipment

- ❒ Shipping containers opened and the contents of each container inspected for damage.
- ❒ Cover from reusable shipping container placed as a base to elevate the instrument.
- ❒ Instrument attached to container base and placed securely on top of reusable shipping container lid.
- ❒ Optional ALS installed, and the shipping clamp removed from the syringe carrier.

## 5975T LTM GC/MSD installation

### Connecting carrier gas to the instrument

- ❒ Checkout column module installed
- ❒ Guard columns installed
- ❒ MSD transfer line capped
- ❒ Cylinder brackets attached to back of instrument
- ❒ Carrier gas supply plumbed with copper tubing
- ❒ Plumbing purged with helium at 35 to 55 kPa (5 to 8 psi) for 5 to 10 minutes
- ❒ Gas purifier plumbed and purged
- ❒ Carrier gas plumbed
- ❒ Check for leaks

### Setting up data system hardware

- ❒ PC, monitor, and printer unpacked
- ❒ IP addresses for 5975T and PC set up
- ❒ Network switch unpacked and plugged in
- ❒ LAN cable from the MSD connected to switch Port #1
- ❒ LAN cable from the GC connected to switch Port #2
- ❒ LAN cable from the PC connected to switch Port #3
- ❒ Printer installed
- ❒ Printer, monitor, and PC turned on (in that order)
- ❒ Software installed per the software installation manual

### Setting up the vacuum system and column

- ❒ LTM column installed and conditioned

- ❒ Foreline pump unpacked and placed on the floor near instrument
- ❒ Foreline pump line voltage verified to match available AC power
- ❒ Line voltage identification sticker installed on MSD
- ❒ Foreline pump plugs removed
- ❒ Foreline pump power cord plugged into instrument
- ❒ Instrument top cover removed
- ❒ Analyzer sideplate thumbscrews loosened
- ❒ Vent valve opened to equalize pressure
- ❒ Vacuum keeping valve removed from foreline hose
- ❒ MSD transfer line cap removed
- ❒ MSD guard column attached to LTM outlet
- ❒ Vent valve closed
- ❒ Foreline hose connected to the pump
- ❒ Pump exhaust vented to a fume hood or the outlet filter installed

## Starting the instrument

- ❒ Exhaust system turned on and vented to safe location
- ❒ Power supply plugged in and instrument turned on
- ❒ ChemStation turned on
- ❒ Instrument pumped down
- ❒ Analyzer sideplate thumbscrews hand tight
- ❒ Analyzer cover replaced
- ❒ Checkout.M method loaded
- ❒ Instrument has reached thermal equilibrium

## Performance verification

### EI system verification

- ❒ Pumpdown for at least 60 minutes
- ❒ GC oven set to 150 °C and the column flow to 1.0 mL/min
- ❒ Checkout Tune performed
- ❒ Tune Verification performed
- ❒ Sensitivity Check verification of EI Sensitivity performance

## Instrument Log Book updated

- ❒ MSD serial number recorded on S/N report
- ❒ S/N Report(s) and Tune Report(s) faxed to GCMS LSCA Technical Marketing at (USA) 408-553-3188 or your region's local Technical Marketing Support Provider

**5975T LTM GC/MSD serial number/product number:**

_____

**EI serial number:**

_____

# 4 Setting Up in a Field Laboratory

Agilent Technologies



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