Vista-PRO and Vista-MPX ICP-OES Spectrometers

Operation manual

Installation category II
Pollution degree 2
Safety class 1 (EN 61010-1)

VARIAN

8510165900
April 2005

Varian, Inc. offices

Varian, Inc. has offices in most countries. The major offices for optical spectroscopy products are listed below:

Varian Australia Pty Ltd (Manufacturing site)
679 Springvale Road
Mulgrave, Victoria 3170
Australia
International telephone: + 61 3 9560 7133
International fax: + 61 3 9560 7950

Varian Instruments
2700 Mitchell Dr
Walnut Creek, CA 94598
Telephone: 1 800 926 3000
International telephone: +1.925.939.2400
International fax: +1.925.945.2102

Varian BV
Herculesweg 8
4338 PL, Middelburg, Netherlands
International telephone: +31 118 67 1000
International fax: +31 118 62 3193

Internet

The Varian, Inc. Internet home page can be found at:
www.varianinc.com

First published March 1998 in Australia. Updated in October 1998, May 1999, June 2000, November 2000, July 2001, April 2005. Comments about this manual should be directed to the Marketing Communications Manager, Varian Australia at the address above or by e-mail to webmaster@osi.varianinc.com.

Varian Australia is ISO9001 certified.

CE

Declaration of Conformity

We hereby declare that the equipment listed below complies with the requirements of:
The Low Voltage Directive 73/23/EEC (93/68/EEC)
The EMC Directive 89/336/EEC (92/31/EEC and 93/68/EEC)

Applicable Standards

LVD	BS EN 61010-1:1993		
EMC	BS EN 61326:1998	EN 55011:1991	EN 61000-4-2:1995
	EN 61000-4-3:1998	EN 61000-4-4:1995	IEC 1000-4-5:1995
	IEC 1000-4-6:1996		

Equipment Model Number: Vista PRO Simultaneous ICP-OES Series

Authorized Representative in the EU

Name: G. A. Wassink
Signed:
Position: Quality Manager
Date: 1 October 2004

Company Name: Varian BV
Address: Herculesweg 8
4330 EA Middelburg
The Netherlands
Telephone: +31 (0) 118 671 000
Facsimile: +31 (0) 118 633 118

Manufacturer

Name: Phil Binns
Signed:
Position: Director of Operations
Date: 1 October 2004

Company Name: Varian Australia Pty Ltd
Address: 679 Springvale Road
Mulgrave VIC 3170
Australia
Telephone: +61 (0) 3 9560 7133
Facsimile: +61 (0) 3 9560 7950

VARIAN

Publication number 8510165800 10/04

CE

Declaration of Conformity

We hereby declare that the equipment listed below complies with the requirements of:
The Low Voltage Directive 73/23/EEC (93/68/EEC)
The EMC Directive 89/336/EEC (92/31/EEC and 93/68/EEC)

Applicable Standards

LVD	BS EN 61010-1:1993		
EMC	BS EN 61326:1998	CISPR 11	EN 61000-4-2:1995
	IEC 1000-4-3:1995	EN 61000-4-4:1995	IEC 1000-4-5:1995
	IEC 1000-4-6:1996		

Equipment Model Number: Vista MPX Simultaneous ICP-OES Series

Authorized Representative in the EU

Name: G. A. Wassink
Signed:
Position: Managing Director
Date: 1 October 2004

Company Name
Address

Telephone
Facsimile

Varian BV
Herculesweg 8,
4330 EA Middelburg
The Netherlands
+31 (0) 118 671 000
+31 (0) 118 633 118

Manufacturer

Name: Phil Binns
Signed:
Position: Director of Operations
Date: 1 October 2004

Company Name
Address

Telephone
Facsimile

Varian Australia Pty Ltd
679 Springvale Road
Mulgrave VIC 3170
Australia
+61 (0) 3 9560 7133
+61 (0) 3 9560 7950

VARIAN

Publication number 8510185200 10/04

Publication date: 04/05

Contents

Publication date: 04/05

This page is intentionally left blank.

1. Safety practices and hazards

Operation of a Vista Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES) involves the use of compressed gases, high voltage radio frequency energy and hazardous materials including corrosive fluids and flammable liquids. Careless, improper or unskilled use of this spectrometer can cause death or serious injury to personnel, and/or severe damage to equipment and property.

The spectrometer incorporates interlocks and covers which are designed to prevent inadvertent contact with any potential hazards. If the instrument is used in any manner not specified by Varian, this protection may be impaired. It is good practice to develop safe working habits which do not depend upon the correct operation of the interlocks for safe operation.

It is essential that no interlock or cover is bypassed, damaged or removed.

The safety practices described below are provided to help the user operate the instrument safely. Read each safety topic thoroughly before attempting to operate the instrument and ALWAYS operate the spectrometer in accordance with these safety practices.

1.1 Plasma

The plasma is extremely hot (about 10 000 K) and radiates dangerous levels of radio frequency (RF) and ultraviolet (UV) energy. The work coil operates at 1 500 V RMS and about 40 MHz. Exposure to the RF and UV energy can cause severe skin damage and cataracts of the eyes, while close contact with the operating plasma can result in severe heat burns to the skin, and an electrical discharge which can jump a considerable distance and may cause death, severe electric shock or sub-surface skin burns.

The plasma must NEVER be operated unless:

- the torch compartment door is closed, with the locking lever fully latched; and
- the space above the chimney is clear of objects.

The shielding around the torch compartment is designed to reduce UV, visible and RF radiation to safe levels while still permitting easy access to, as well as installation and viewing of, the torch. The spectrometer has an interlock system that is designed to extinguish the plasma if either the mains supply fails or the handle on the torch compartment door is opened. DO NOT attempt to bypass the interlock system.

Before opening the torch compartment door, ALWAYS extinguish the plasma by pressing F4 on the keyboard or by clicking the **Plasma Off** icon in the software Toolbar.

The torch and its surroundings remain hot for up to five minutes after the plasma is extinguished. Touching this area before it has cooled sufficiently may result in burns. Allow the torch and torch compartment to cool before carrying out any work in this area, or wear heat resistant gloves.

The plasma system has been carefully designed to operate safely and effectively when using torches and related components that conform to Varian's design criteria. Use of non-approved components in the plasma compartment may render the system inoperative and/or hazardous. It may also invalidate the warranty on the instrument. Use only torches and related components supplied or authorized by Varian.

1.2 Heat, vapors and fumes

Heat, ozone, vapors and fumes generated by the plasma can be hazardous, and must be extracted from the instrument by means of an exhaust system. Ensure that an exhaust system of the appropriate type is fitted (as specified in the Pre-installation instructions). The system must be vented to the outside air in accordance with local regulations and never within the building. Regularly check the exhaust system by smoke test to ensure that the exhaust system is functioning correctly. The exhaust fan must always be switched on BEFORE igniting the plasma.

1.3 Compressed gas hazards

All compressed gases (other than air) can create a hazard if they leak into the atmosphere. Even small leaks in gas supply systems can be dangerous. Any leak (except that of air) can result in an oxygen-deficient atmosphere which can cause asphyxiation. The area in which cylinders are stored and the area surrounding the instrument must be adequately ventilated to prevent such gas accumulations.

Gas cylinders must be stored and handled strictly in accordance with local safety codes and regulations. Cylinders must be used and stored only in a vertical position and secured to an immovable structure or a properly constructed cylinder stand. Move cylinders only by securing them to a properly constructed trolley.

Use only approved regulator and hose connectors (refer to the gas supplier's instructions). Keep gas cylinders cool and properly labelled. (All cylinders are fitted with a pressure relief device which will rupture and empty the cylinder if the internal pressure is raised above the safe limit by excessive temperatures.) Ensure that you have the right cylinder before connecting it to the instrument.

The primary gas to be used with the spectrometer is argon which is the conductive gas for the plasma. Argon or nitrogen can be used as the polychromator purge gas. Other gases may be required for future options and accessories. Use only 'instrument grade' gases with your spectrometer.

If using cryogenic gases (for example, liquid argon) prevent severe burns by wearing suitable protective clothing and gloves.

1.4 Electrical hazards

The spectrometer system and some accessories contain electrical circuits, devices and components operating at dangerous voltages. Contact with these circuits, devices and components can cause death, serious injury or painful electric shock. Panels or covers which are retained by screws on the spectrometer and accessories may be opened ONLY by Varian-trained, Varian-qualified or Varian-approved customer service representatives (unless specifically specified otherwise). Consult the manuals or product labels supplied with your PC, monitor, printer/plotter, water-cooling system to determine which parts are operator-accessible.

Replace blown fuses with ones of the size and rating shown in the text near to the fuse holder or in the supporting documentation or online Help where listed.

1.5 Other precautions

Use of the spectrometer system and accessories may involve materials, solvents and solutions which are flammable, corrosive, toxic or otherwise hazardous.

Careless, improper or unskilled use of such materials, solvents and solutions can create explosion hazards, fire hazards, toxicity and other hazards which can result in death, serious personal injury or damage to equipment.

Always ensure that laboratory safety practices governing the use, handling and disposal of hazardous materials are strictly observed. These safety practices should include wearing appropriate safety clothing and safety glasses.

Air flow to the cooling fans of the spectrometer and accessories must be unobstructed. Do not block the ventilation grills on the spectrometer and accessories. Consult the manuals supplied with your PC, monitor, printer and water-cooling system for their specific ventilation requirements.

Great care should be taken when working with glass or quartz parts to prevent breakage and cuts. This is especially important when attaching plastic tubing to glass barbs, or removing and replacing pieces of broken torch or bonnet.

The maximum permissible weight on the sample tray is 5.5 kg (12 lb).

The spectrometer weighs approximately 226 kg (500 lb). To avoid injury to personnel or damage to the instrument or property, always use a forklift or other suitable mechanical lifting device to move the instrument.

Use only Varian-supplied spares with your instrument.

1.6 Warning and Caution messages

A Warning message is used in the text when failure to observe instructions or precautions could result in death or injury. The list of symbols that appear in conjunction with warnings are detailed in section 1.7.

A Caution message is used when failure to observe instructions could result in damage to equipment (Varian supplied and/or other associated equipment).

Publication date: 04/05

1.7 Warning symbols

The following is a list of symbols that appear, in conjunction with warnings, in this manual or on the spectrometer. The hazard they describe is also shown.

A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation or on the instrument itself are as follows:


Electrical shock


Eye hazard


Noxious gases


Fire hazard


Broken glass


Corrosive liquids


Heavy weight (danger to feet)


Heavy weight (danger to hands)


Hot surface


Cold surface


RF radiation

The following symbol may be used on warning labels attached to the instrument. When you see this symbol you must refer to the relevant operation or service manual for the correct procedure referred to by that warning label.

The following symbols appear on the instrument for your information.

I	Mains power on
O	Mains power off
	Fuse
	Single phase alternating current
	Direct current
CE	When attached to the rear of the instrument, it indicates that the product complies with the requirements of one or more EU directives.
	'Out' position of a bi-stable push switch.
	'In' position of a bi-stable push switch.
	Plasma on
	Plasma off
	'On' for part of equipment.
	'Off' for part of equipment.

1.8 Color coding

The various indicator lights appearing on Varian instruments and associated accessories are color coded to represent the status of the instrument or accessory.

- A green light indicates the instrument is in normal/standby mode.
- An orange light indicates that a potential hazard is present.
- A blue light indicates that operator intervention is required.
- A red light warns of danger or an emergency.

1.9 US FCC advisory statement

This equipment generates, uses and can radiate radio frequency energy, and if not installed and operated in accordance with the instruction manual may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user will be required to take whatever measures may be necessary to correct the interference at his or her expense.

1.10 Spurious and harmonic radiation compliance

Your Varian Inductively Coupled Plasma-Optical Emission Spectrometer complies with the requirements of FCC rules and Regulations part 18, subpart H-Miscellaneous Equipment, at the date of manufacture.

1.11 CE compliance

Your Vista instrument has been designed to comply with the requirements of the Electromagnetic Compatibility (EMC) Directive and the Low Voltage (electrical safety) Directive (commonly referred to as the LVD) of the European Union. Varian has confirmed that each product complies with the relevant Directives by testing a prototype against the prescribed EN (European Norm) standards.

Proof that a product complies with these directives is indicated by:

- the CE Marking appearing on the rear of the product, and
- the documentation package that accompanies the product containing a copy of the Declaration of Conformity. The Declaration of Conformity is the legal declaration by Varian that the product complies with the directives listed above, and shows the EN standards to which the product was tested to demonstrate compliance. It is also signed by Varian's Authorized Representative in the EU, and by the representative of the manufacturing plant.

This page is intentionally left blank.

2. Introduction

2.1 Pre-installation requirements

Prior to receiving your instrument you will have been provided with a Vista Pre-installation manual (PRO publication number 8510164100; MPX publication number 8510184400), that describes the environmental and operating requirements of the Vista system. You must prepare your laboratory according to these instructions before the Vista can be installed. You should keep the Pre-installation manual for future reference. If you have misplaced your copy, you can obtain a free replacement from your local Varian office.

2.2 Vista documentation

You have been provided with the following documentation to help you set up and operate your Vista system:

- This operation manual, with Safety practices and hazards information, instructions for finding information about installing and maintaining the components of the Vista and a brief operation overview.
- An extensive online Help containing context-sensitive Help, step-by-step instructions for frequently performed operations and instructions for using any accessories you ordered.

2.2.1 Conventions

The following conventions have been used throughout the documentation:

- Menu items, menu options and field names (e.g., select **Copy** from the **Edit** menu) have been typed in **bold**. Bold is also used to signify the pushbuttons appearing throughout the software (e.g., click **OK**).

- ALL CAPITALS indicate keyboard and mouse commands (e.g., press the F2 key) and text you must type in from the keyboard (e.g., type SETUP at the prompt).

- References to "Vista" are applicable to both Vista-PRO and Vista-MPX unless otherwise stated.

2.2.2 Notes and Hot Tips

A Note is used to give advice or information. A Note is denoted by the following symbol: ➨

A Hot Tip is used to give practical hints to help you achieve the best possible performance from your Vista spectrometer. A Hot Tip is denoted by the following symbol: ☆☆☆

2.3 Specifications

2.3.1 Environmental conditions

The instrument is only suitable for indoor use and is classified suitable under the following categories (EN 61010-1):

Installation category II

Pollution degree 2

Safety class 1

Condition	Altitude	Temp (°C)	Humidity (%RH) non-condensing
Non-operating (Transport)	0–3 050 m (0–10 000 ft)	5–45	20–80
Non-operating & meeting dielectric strength tests	sea level	40	90–95
Operating but not necessarily meeting specifications	0–3 050 m (0–10 000 ft)	5–31 31–35	≤ 80 ≤[80–3.33 (temp–31)] Where: temp = temperature in °C
Operating within specifications	0–3 050 m (0–10 000 ft)	10–35	8–80

Publication date: 04/05

Note For **optimum analytical performance**, it is recommended that the ambient temperature of the laboratory be between **20 and 25 °C** and be held constant to within ±2 °C throughout the entire working day.

2.3.2 Electrical power supplies

Power

All power supplies should be single phase AC, 3 wire system (active, neutral, ground or two active and ground) and should be terminated at an appropriate connection receptacle that is within reach of the system power cable.

Spectrometer power connections

Power supply phase	Single
Cable rating	750 VAC, 58 A

	Plug supplied	Required wall socket
Australia	250 V 32 A Wilco 56PA332	250 V 32 A Wilco 56SO332
USA	Nema L6-50P Hubbell # 8265	Nema L6-50R Hubbell # CS8269
Europe	Customer supplied (no plug fitted)	Match selected plug

Other electrical connections:
IEEE 488

Note Basic insulation is provided for single fault protection on the IEEE connector.

Fuses

1FS1 & 1FS2	T6.3AH250V, IEC 127 sheet 5, 5 x 20 mm
1CB1	Circuit breaker 30A Fast trip

Note For safety reasons, any other internal fuse or circuit breaker is not operator accessible, and should only be replaced by Varian-authorized personnel.

Fuse information on the rear of the instrument is the most up to date.

Electrical requirements

The installation of electrical power supplies must comply with the rules and/or regulations imposed by the local authorities responsible for the use of electrical energy in the workplace.

All power supplies for the spectrometer, accessories and water cooler should be single phase, AC, 3 wire systems (active, neutral, ground or two active and ground). Each connection should be terminated at an appropriate receptacle within reach of each assembly's power cable. Use of power boards or extension cables is not recommended.

It is recommended that separate mains circuits, (individually protected by fuses or circuit breakers) are utilized for each component in the system such as the water cooler, autosampler and printer.

Avoid using power supplies from a source that may be subject to electrical interference from other services (such as large electric motors, elevators, welders and air conditioning units).

Vista spectrometers are supplied with a 2 metres long (6' 6"), mains supply cable. The power cable is hardwired to the rear of the instrument. The cable is manufactured by Titanex and rated to 750 VAC at 58 amps.

Local regulations in several European countries do not permit the use of a breakable wall mounted power supply connection for high current single phase mains supplies. In these areas, the mains power supply to the Vista should be hardwired to the wall.

For Canada only, the power cable shipped from the factory must be replaced with a locally sourced UL/CSA cable such as Carol 02728.

In areas where 208/220/240 volt single phase power supplies are not commonly available, two active phases from a two or three phase system may be used.

The instrument supply draws a maximum of 28 Amps RMS at 187 volts with a power factor of approximately 0.70. In areas where 208 to 240 VAC supplies are not available at the required rating, a 380/415 volt, phase-to-phase, to 220 volt single phase step down transformer may be installed.

System unit	Required supply voltage	Nominal rating
Spectrometer	208 VAC ±10%	5.1 kVA
	220 VAC ±10% provides 230 VAC +6%, −14%	
	240 VAC ±10% provides 230 VAC +14%, −6% Frequency 50/60 Hz ±1 Hz	
Water cooler[1] *(Typical)*	220–240 VAC, 50 Hz 115/230 VAC, 60 Hz Voltage ±10%, Frequency ±1 Hz	2 400 VA 2 100 VA
SPS3 autosampler	96-264 VAC 50-60 ±1 Hz	~220 VA
SPS-5 autosampler	100 VAC, ±10% 120 VAC, ±10%	80 VA
	220 VAC, ±10% provides 230 VAC +6%, −14%	
	240 VAC, ±10% provides 230 VAC +14%, −6% Frequency 49 to 61 Hz	
VGA-77P	100 VAC, ±10% 120 VAC, ±10%	24 VA
	220 VAC, ±10% provides 230 VAC +6%, −14%	
	240 VAC, ±10% provides 230 VAC +14%, −6% Frequency 49 to 61 Hz	
Personal computer *(Typical)*	115, 120, 220, 240 VAC, 50/60 Hz	300 VA
Printer *(Typical)*	115, 120, 220, 240 VAC, 50/60 Hz	85 VA

[1] MPX instruments can be used with water coolers that have the electrical properties specified here but a non-refrigerated water cooler of approximately 200 VA is recommended.

2.3.3 Gas supplies

The installation of compressed or liquid gas supplies must comply with the rules and/or regulations imposed by the local authorities responsible for such use in the workplace.

Liquid or gaseous argon and nitrogen may be used with the Vista spectrometer systems. Varian recommends the use of liquid gases which are more pure, more convenient and cheaper per unit volume.

The main gas supply requirement is argon for supply to the plasma, nebulizer, optics interface purge and camera purge (Vista-PRO only). Gas is also required to purge the polychromator assembly, and this may be either argon or nitrogen. On instruments built prior to March 2005, a separate gas line is used that may be connected to either the argon supply (with the supplied 'T' piece), or connected directly to a nitrogen supply. For instruments built after March 2005, it will be connected internally to the argon supply unless the optional nitrogen purge kit is fitted (either factory or field).

	Argon	Nitrogen
Purity	99.996%	99.996%
Oxygen	<5 ppm	<5 ppm
Nitrogen (argon only)	<20 ppm	-
Water vapor	<4 ppm	<4 ppm
Permissible pressure range	400–600 kPa (57 to 88 psi)	
Recommended pressure	550 kPa (80 psi) regulated	
Required flow rates	0.7–32 L/min	3.5 L/min (if nitrogen is used to purge the polychromator)

The spectrometer is fitted with PTFE gas supply hose assemblies, 1.8 metres (6 feet) in length fitted with Swagelok hardware. Gas supply adaptors are included with each instrument to connect the instrument to regulated gas supplies.

Publication date: 04/05

Storage cylinder instructions

Cylinders containing gas under pressure should be firmly secured to a rigid structure, and the storage area must be adequately ventilated.

Never locate gas cylinders near a source of ignition, or in a position that is subject to direct heat. Gas storage cylinders often incorporate a pressure release device which will discharge the gas at a predetermined temperature, usually around 52 °C (125 °F).

If gases are to be plumbed from a remote storage area to the instrument site, ensure that the local outlets are fitted with stop valves, pressure gauges and suitable regulators which are easily accessible to the instrument operator. The gas outlets must be provided within 1.5 metres (5 feet) of the instrument.

Cryogenic liquids

Cryogenic liquid gases are stored under pressure at very low temperatures in Portable Liquid Cylinders (PLC).

Warning
Contact with the super-cold liquid, gas or pipe surfaces can cause severe skin damage. The Portable Liquid Cylinders should be located in a shielded position, and all piping should be routed or covered to prevent skin contact.

For high gas flow rates and/or low ambient temperatures, it may be necessary to obtain the gas by passing the liquid through an external evaporator rather than use the internal pressure building facility of the Portable Liquid Cylinders.

Liquid argon and liquid nitrogen may not be stored for extended periods and often have special storage requirements. Contact your local authorities and cryogenic gas supplier for more detailed information on storage requirements and boil-off rates for local types of Portable Liquid Cylinders.

2.3.4 Water cooling system

Vista instruments require a temperature-controlled source of cooling water. Refer to you Pre-installation manual for compatible water cooling systems.

The Varian customer service representative will connect the Vista instrument to your water cooling system. Connection of the water cooling system to the spectrometer, installation and adjustment of the internal pressure regulator and cut-out valve (where fitted) are

included as part of the system installation. Installation of the required power connections and the unpacking of the cooler/recirculator must be performed prior to installation of the instrument.

Note The operation manual, mounting and assembly hardware for the cooling system are included in the water cooler packaging. Care should be exercised to locate all of these articles before the pack is discarded.

Cooling capacity	Axial system: 1 kW Radial system: 200 W
Flow rate	1.1 L/min (0.3 gpm) minimum
Recommended inlet temperature	20 °C (68 °F) (Max. for PRO: 30 °C (86 °F) (Max. for MPX: 45 °C (113 °F)
Minimum inlet pressure	55 kPa (8.0 psi)
Maximum inlet pressure	310 kPa (45 psi)

Note Pressure regulation is recommended for supplies where the cooling water pressure may be subject to fluctuations. Pressure regulation is necessary for supplies which may exceed the maximum permissible pressure of 310 kPa (45 psi).

The instrument is equipped with a water flow sensor which will stop operation of the plasma and camera Peltier assembly if the cooling water flow through the instrument drops below 1.1 L/min (0.3 gpm).

Caution **Always ensure** the water cooling system is on before igniting the plasma.

Provided that the flow rate can be maintained above 1.1 L/min, and maximum supply pressure is below 310 kPa (45 psi), the cooling water supply may be taken from an in-house domestic water system, if local regulations permit.

An alternative is to install a recirculating water cooler system. The system should provide cover for the reservoir to prevent evaporation and stop contamination by dust or other impurities. Algaecide should be used.

A recirculating water cooling system has the advantage of reducing the volume of water that will be required over the life of the instrument's operation. Because of the limited size of the water

cooler's reservoir, in the case of accidental damage the amount of water damage that can occur will also be limited.

Location of water cooling system

Many water coolers are designed to be located and operated indoors. Consult the water cooler's literature for more information before installing.

The coolant supply and return hoses of the spectrometer are 3.0 metres long (10'). The inner diameter of the return hose is 7 mm (1/4"). The inner diameter of the supply hose is 9.5 mm (3/8"). The supply and return connection to the water cooling source will require suitable metal barbs that accommodate these diameter hoses. For most countries, the appropriate barbs for connecting the instrument to coolers are included with the instrument in kit form (part number 9910088600).

2.3.5 Drain vessel

The Vista spectrometer system needs a drain vessel for disposal of excess fluids and vapors from the spraychamber. Suitable tubing is supplied with the spectrometer for use with inorganic solvents. When using organic solvents, different drain tubing that is suitable for the solvent in use will be required.

A chemically inert container, not glass or of a narrow necked style, to hold a minimum of 2 litres (4 pints) of waste must be provided by the instrument user. It should be located underneath the sample compartment (or on the right hand side of the spectrometer), where it is protected by the bench and in full view of the operator.

2.3.6 Laboratory conditions

The area selected for the operation of a Vista spectrometer system **must be free from drafts, corrosive atmospheres and vibration.** Sample preparation areas and materials storage facilities should be located in a separate room.

The area should be a dust free, low humidity environment. Air-conditioning is strongly recommended for control of the environment. For optimum analytical performance it is recommended that the ambient temperature of the laboratory be between 20 and 25 °C.

Temperature control

The heat generated by the Vista system into the laboratory is about 3 650 watts, (joules per second) or 13 140 kilojoules per hour (12 455 BTU per hour).

Note — Most of the 3 650 watts generated by the system is vented outside the laboratory by the exhaust system.

The water cooler generates up to 1 000 watts, (joules per second) or 3 600 kilojoules per hour (3 412 BTU per hour).

Total load with both the water cooler and spectrometer in the same room would be up to 4 650 watts or 16 740 kilojoules per hour (15 867 BTU per hour).

2.3.7 Cleanliness

Limit dust levels to less than 36 000 000 particles (0.5 microns or larger) per cubic metre of air.

2.3.8 Instrument cooling air supply

The spectrometer requires **clean, dry, non-corrosive air for cooling purposes.** This is supplied to the instrument through an air supply vent located at the top, rear of the instrument. The vent has been fitted with a dust filter, to filter out particulate matter from the surrounding environment.

The air supply is used to cool the RF generator and the electronics of the instrument. Several of these assemblies contain parts prone to corrosion. The introduction of cooling air contaminated with high levels of acid, vapors or other corrosive substances may cause damage to the instrument.

Due to the corrosive nature of some analytical work, it is recommended that in applications demanding high usage of corrosive materials, an external cooling air supply system is provided. It is **strongly recommended** that the cooling air be supplied from an environmentally controlled area that is away from the instrument exhaust and any other area where corrosive materials are stored or used.

The cooling air system with flue, fan, ducting and supply cowl, must provide a minimum positive flow of 6 cubic metres per minute (200 cfm). The ducting should be corrosion resistant and fire-proof.

Note — If an external cooling air supply system is required, an air inlet duct attachment (part number 0110595300) must be ordered with the instrument.

Publication date: 04/05

2.4 Weights and dimensions

System unit	Width	Depth	Height	Weight
Vista	1 375 mm	720 mm	992 mm	226 kg
	54.5"	28.5"	39"	500 lb
Shipping dimensions	1 660 mm	960 mm	1 420 mm	325 kg
	65.5"	37.8"	56"	716.5 lb
Personal computer				
IBM compatible	450 mm	770 mm	520 mm	(n/a)
(typical)	18"	30"	20"	(n/a)
Printer				
Laser jet	500 mm	650 mm	200 mm	(n/a)
(typical)	18"	30"	20"	(n/a)
Water cooling system				
Lytron MCS-20 G03 and	439 mm	384 mm	338 mm	15 kg
Lytron MDC-20 H03	17.3"	15.1"	13.3"	33 lb
Van der Heijden Typ 001VD for ICP and	350 mm	405 mm	505 mm	42 kg
Van der Heijden Typ Minore IIVD	13.8"	15.9"	19.9"	93 lb
Neslab CFT 33	375 mm	560 mm	622 mm	72.6 kg
	14.8"	22"	24.5"	160 lb
Neslab M-33	321 mm	511 mm	606 mm	68 kg
	13"	20.1"	23.9"	150 lb
Affinity RAA-003-0CB	483 mm	687 mm	457 mm	80 kg
	19"	27"	18"	175 lb
				Continued...

System unit	Width	Depth	Height	Weight
SPS3	490 mm	285 mm	510 mm	15 kg
	19.3"	11.2"	20.1"	33.1 lb
Shipping dimensions	760 mm	500 mm	840 mm	31 kg
	29.9"	19.7"	33.1"	68.4 lb
SPS3 with diluter	572 mm	285 mm	510 mm	18 kg
	22.5"	11.2"	20.1"	39.7 lb
Shipping dimensions	760 mm	500 mm	840 mm	34 kg
	29.9"	19.7"	33.1"	75.1 lb
SPS trolley	580 mm	412 mm	400 mm	
	23"	17"	16"	
SPS-5	525 mm	610 mm	570 mm	19 kg
	21"	24"	23"	42 lb
Shipping dimensions	580 mm	670 mm	660 mm	35 kg
	23"	26"	26"	77 lb
SPS-5 diluter	160 mm	80 mm	410 mm	3 kg
	21"	7"	22"	7 lb
Shipping dimensions	300 mm	180 mm	570 mm	5 kg
	6"	3"	16"	11 lb
VGA-77P	250 mm	200 mm	220 mm	5.5 kg
	10"	8"	9"	12 lb
Shipping dimensions	385 mm	340 mm	400 mm	8.5 kg
	15"	14"	16"	19 lb
AGM1	550 mm	430 mm	245 mm	
Shipping dimensions	22"	17"	9.5"	
Ultrasonic Nebulizer (trolley mounted)	780 mm	540 mm	1150 mm	
	31"	21"	45"	

Publication date: 04/05

2.4.1 Moving the Vista instrument

Warning
The spectrometer weighs approximately 226 kg (500 lb). To avoid injury to personnel or damage to equipment, always use a fork lift or other suitable lifting device when moving the instrument.

This page is intentionally left blank

3. Installation

The Vista instrument must be installed by a Varian-trained, Varian-qualified or Varian-authorized customer service representative.

You should have completed and returned the form in the Vista pre-installation manual stating that you have prepared the laboratory in accordance with the requirements detailed in that manual. A Varian representative will then arrange a suitable installation date with you.

Details for unpacking the instrument and what to do in case it has been damaged in transit are also detailed in the Vista Pre-installation manual.

3.1 PC requirements

The recommended and minimum PC specifications are listed in the Vista specifications brochure (PRO publication number 8710166200; MPX publication number 8710185300). They can also be found on Varian's website at www.varianinc.com. The minimum configuration represents the absolute minimum that is required to run the software. This PC configuration may be out of manufacture, but you may want to use a PC you already have. The recommended configuration should be followed when buying a new PC.

To operate the instrument using the ICP Expert software, you must have completed the following:

Step	Instructions to follow
Non-21 CFR 11 software: Installed either Windows® 2000 operating system with Service Pack 4 (or later), or Windows® XP operating system with Service Pack 1 (or later); and checked that all devices (e.g., sound card, CD-ROM) are working.	Refer to the documentation supplied with your operating system software.
21 CFR 11 software: Installed either Windows NT® operating system with Service Pack 6, or Windows® 2000 operating system with Service Pack 2; and checked that all devices (e.g., sound card, CD-ROM) are working.	Refer to the documentation supplied with your operating system software.
Installed the ICP Expert software and the Help (second CD).	Refer to section 3.1.1.
Installed the GPIB drivers, GPIB card and cable connecting the Vista to the PC.	Refer to section 3.1.2 (version 4.x software) or 3.1.3 (21 CFR 11 software) and 3.1.4.
Re-booted the PC.	Refer to your operating system documentation.

3.1.1 Installing the ICP Expert software

Although the Varian-trained, Varian-qualified or Varian-authorized customer service representative will install the ICP Expert software for you during the installation process, you may need to install the software yourself at some later stage, for example if you change the PC.

To install the ICP Expert software:

1. Insert the ICP Expert software CD in your CD-ROM drive. The software will automatically start[1].
2. Follow the instructions appearing on the screen. During the installation you will be asked to specify, amongst other things, the drive on which to install the software.

When the installation is complete you should have an ICP Expert program group on the desktop containing a number of icons. The installation also places an ICP Expert folder in the **Start ▶ Programs** menu.

Note — If you are running Windows NT® and do not have Administrator privileges, the installation will fail. To successfully complete the installation, log on as an Administrator and start the installation process again.

3. Remove the ICP Expert software CD from the CD-ROM drive and insert the ICP Expert Help and Videos CD, as prompted.
4. After successful installation of the software, shut down the PC and install the National Instruments PCI-GPIB card into the PCI slot. Refer to section 3.1.4 for instructions on how to do this.

Note — For version 4.x software, when installing the ICP Expert software for the first time, it is very important to install the PCI-GPIB card driver BEFORE plugging the PCI-GPIB card into the slot. The driver is automatically installed during ICP Expert installation, so do not plug the PCI-GPIB card into the slot before installing the ICP Expert software.

☆☆☆ Hot Tip — To familiarize yourself with the ICP Expert software, you should now click the Windows **Start** button and choose **Programs ▶ ICP Expert ▶ ICP Expert Help**. When the ICP Expert Help appears, click the **How to** link to view step-by-step instructions on how to use the Vista instrument and software.

[1] If you have turned off the auto-start capability of your CD-ROM drive you will need to run the setup.exe file on the CD-ROM.

3.1.2 PCI-GPIB driver installation (version 4.x software)

Once you have installed the ICP Expert software then plugged in the PCI-GPIB card (see section 3.1.1):

1. Turn on the PC. A message will appear alerting you that the system has found the PCI-GPIB card.
2. Follow the prompts and restart your PC for the GPIB driver installation to be completed.

When upgrading from a previous version of ICP Expert where the GPIB driver and GPIB card are already installed, you only need to update the GPIB driver. This update will occur automatically during ICP Expert software installation.

Refer to the Release Notes (Release Notes.txt) for further information.

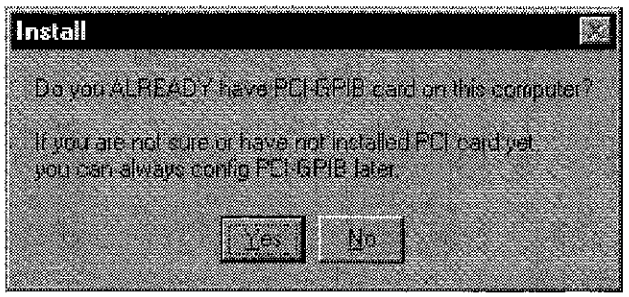
3.1.3 PCI-GPIB driver installation (21 CFR 11 software)

For all Windows® operating systems except Windows NT® 4, the installation of the PCI-GPIB driver occurs automatically during software installation. After installing the software, you only need to install the PCI-GPIB card (refer to section 3.1.4) to complete setting up the GPIB.

For Windows NT® 4, the PCI-GPIB driver is also installed automatically during software installation, however it needs to be configured.

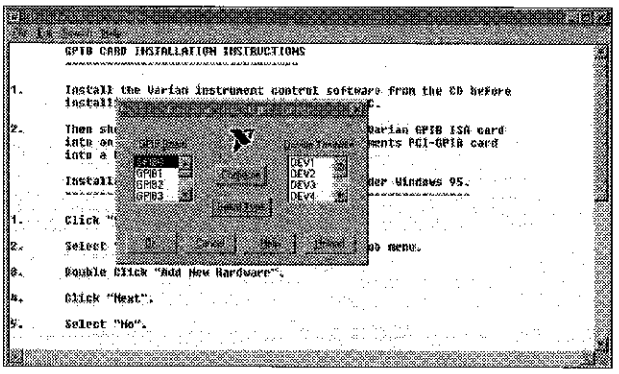
Note Although the Varian-trained, Varian-qualified or Varian-authorized customer service representative will configure the PCI-GPIB driver for you during the installation process, you may need to configure the driver yourself at some later stage, for example if you change the PC.

You will be prompted to configure the driver at the end of the installation, by a dialog box as follows:



If you have a PCI-GPIB card in your computer:

1. Click **Yes**. The following screen will be displayed.



2. Follow the instructions in the Notepad window displayed (GPIB_Install.txt) to complete the installation.

If you do not have a PCI-GPIB card in your computer:

1. Click **No**.
2. Once you have installed the PCI-GPIB communications card, (refer to section 3.1.4 for details), you can configure the PCI-GPIB card at any time. To do this, click the Windows® **Start** button and choose **Programs** ▶ **ICP Expert** ▶ **Config GPIB_PCI**, then follow the prompts.

3.1.4 PCI-GPIB communications card installation

The National Instruments PCI-GPIB card (part number 9910102100) must be installed in your PC to interface the PC and Vista spectrometer.

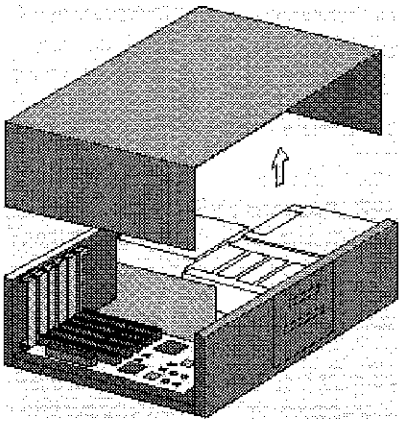
Note Although the Varian-trained, Varian-qualified or Varian-authorized customer service representative will install the GPIB communications card for you during the installation process, you may need to configure the driver yourself at some later stage, for example if you change the PC.

Caution The components on the communications card and in the PC are highly static-sensitive. To avoid damaging these components you must drain any static charges from your body before installing the board, and prevent the generation of any new static charges during the installation.
This can be done by wearing an ESD (electrostatic discharge) wrist strap attached to a grounding point. You can obtain a disposable

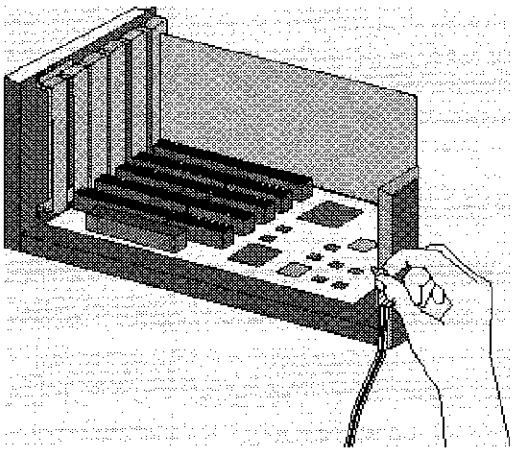
ESD strap from Varian (part number 7910031300); or you can obtain one from your local electronics supplier.

To install a National Instruments PCI-GPIB communications card:

1. Turn off and unplug the computer.
2. Remove the cover, following the instructions in the manual provided with the computer.

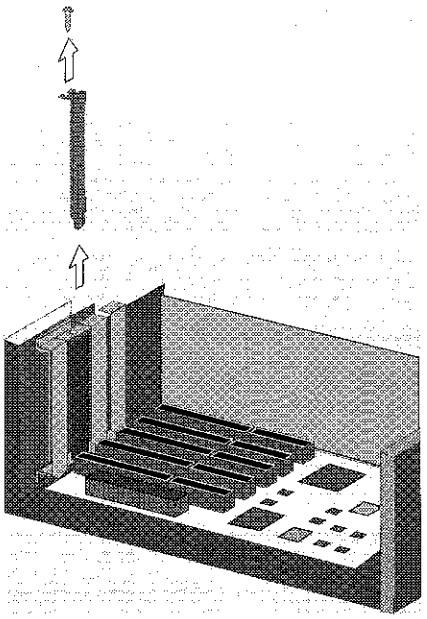


3. Attach one end of the ESD strap to a bare metal part of the PC chassis and wrap the other end around your wrist.

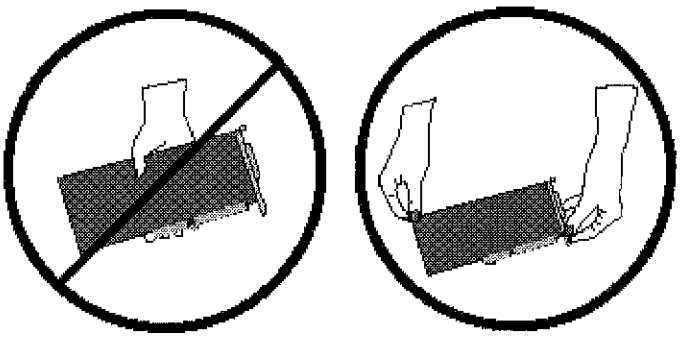


Publication date: 04/05

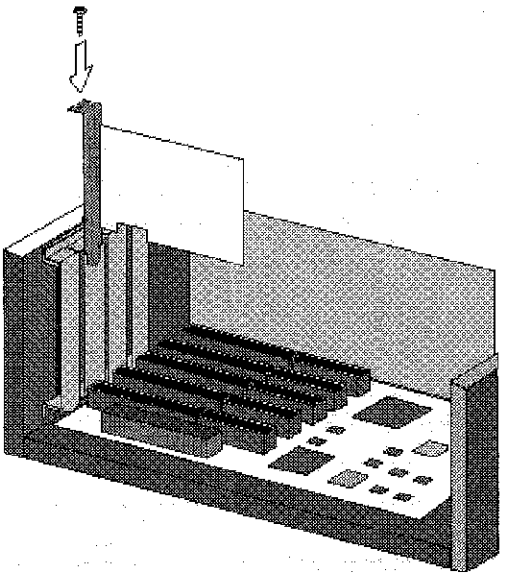
Remove a blanking plate from one of the empty slots in the computer.



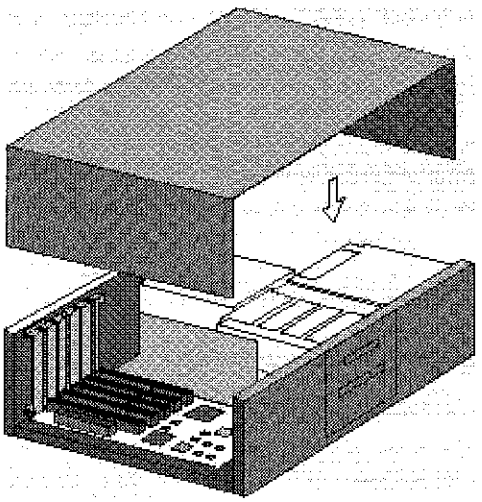
4. Remove the card from its static-shielded packaging. Do not touch the gold edge connectors.



6. Press the card firmly into the empty PC slot. The gold edge connectors should slide firmly into the matching sockets of the PC slot. Secure the card with the screw.



7. Replace the computer cover.



8. Connect the cable between the instrument and the computer (one end plugs into the interface board in the computer, and the other plugs into the socket in the rear of the instrument).
9. Connect the computer to the mains power.
10. Turn the computer on.

3.2 Hardware installation

Your Vista instrument should be ready to operate after the Varian customer service representative has installed it. However, you may need to change items such as the nebulizer, torch or spraychamber. For instructions on how to do this, please refer to the online Help. Specifically:

1. Click the Windows **Start** button and choose **Programs** ▶ **ICP Expert** ▶ **ICP Expert Help**.
2. When the ICP Expert Help software appears, click the **Hardware** link to view step-by-step instructions (including videos) on how to remove and install the various instrument components.

This page is intentionally left blank.

4. Operation

You will find step-by-step instructions for common operations in the ICP Expert online Help. To access this information:

1. Select the Windows **Start** button and choose **Programs ▶ ICP Expert ▶ ICP Expert Help.**
2. When the ICP Expert Help appears, click the **How to** link to view the available step-by-step instructions.

Below is a quick guide to getting the instrument set up and running samples.

4.1 Analysis checklist

You need to complete the following steps in turn to measure a sample(s). You will find details on each step in this chapter.

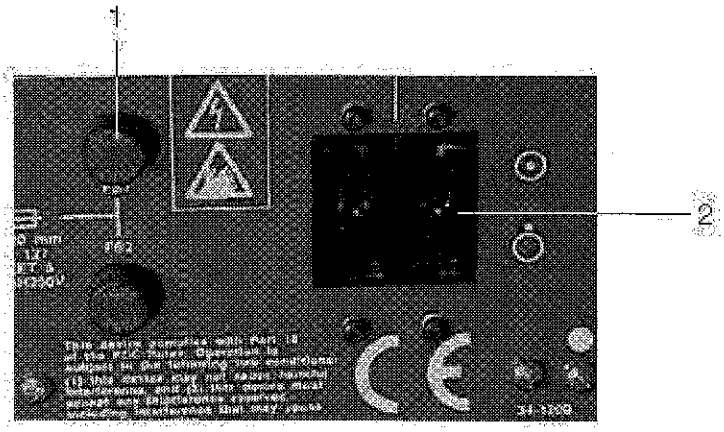
- ❑ Turn on the instrument and software
- ❑ Calibrate the detector
- ❑ Align the torch
- ❑ Develop a method
  - ❑ Check for potential interferences
  - ❑ Set operating conditions
  - ❑ Set up standards
- ❑ Run samples
- ❑ Print a report

4.2 Turning on the instrument and software

Before starting the system, carefully read the Safety practices and hazards section at the front of this manual and ensure that the laboratory is set up according to the details specified in the Vista Pre-installation guide.

4.2.1 Turning on the instrument for the first time (or from Shutdown mode)

1. Check that all tubing on the torch, spraychamber, nebulizer and peristaltic pump is correctly connected.
2. Close the torch compartment door, ensuring that the locking lever is fully latched.
3. Switch on the computer, monitor and printer.
4. Switch on the water cooler.
5. Turn on the gas supply at the cylinder.
6. Plug the cable into the wall socket and set the switch to 'on'.
7. To turn on the spectrometer, set the RF supply circuit breaker located on the rear right-hand side of the instrument to the 'on' (up) position.



Fuses and RF circuit breaker
1. Fuse
2. RF circuit breaker

8. Set the instrument power switch, located at the front left of the instrument, to 'I' (the green power indicator should light).

Note Both the RF supply circuit breaker and instrument power switch must be switched on for the instrument to work.

9. Switch on the laboratory exhaust system.

Publication date: 04/05

Warning
The plasma emits heat, ozone and fumes which can be hazardous. Always switch on the exhaust system **before** lighting the plasma.

10. To start the ICP Expert software, click the Windows Start button and then choose **Programs** ▶ **ICP Expert** ▶ **ICP Expert**. The Main Index window will appear.

4.2.2 Turning on the instrument from Standby mode

1. Check that all tubing on the torch, spraychamber, nebulizer and peristaltic pump is correctly connected.
2. Close the torch compartment door, ensuring that the locking lever is fully latched.
3. Switch on the monitor and printer (if off).
4. Switch on the water cooler (if off).
5. Switch on the Peltier (if it was set to off) by choosing **Peltier on** from the Analyze menu.

Note You can check if the Peltier is on by looking at the Instrument Setup window Status page. It may take some time to reach operating temperature. It is recommended that you wait three to five minutes before starting an analysis.

6. If you have accessories fitted, switch them on.
7. Switch on the laboratory exhaust system.

Warning
The plasma emits heat, ozone and fumes which can be hazardous. Always switch on the exhaust system **before** lighting the plasma.

4.3 Preparing for analysis

1. Place the sample tubing from the peristaltic pump into the wash solution and the drain tubing into the drainage vessel.
2. Turn on the plasma by clicking the **Plasma On** or by pressing the SHIFT+F4 keys on the keyboard. The pump will be initialized and the solution will begin aspirating.

Note The plasma will take between 30 to 40 seconds to ignite. If it fails to ignite, refer to the Troubleshooting section in the online Help for further information.

3. Adjust the pressure bars on the peristaltic pump for even sample flow if you have not already done so.

Note See the online Help for instructions on how to adjust the pressure bars.

4.3.1 Wavelength calibration

Refer to the online help for information about what a wavelength calibration is, and how to prepare the wavelength calibration solution.

To perform a wavelength calibration:

4. Check that the Polychromator Boost purge is on. To do this, click the **Instrument Setup** icon on the Main toolbar to bring up the Instrument Setup window. Click the **Status** tab and check that under the Polychromator listing Poly Boost is 'On'. If the Poly Boost purge is 'Off' you should turn it on. To do this, choose **Poly Boost On** from the Analyze menu in the main window. Reopen the Instrument Setup window. Under Polychromator, Poly Boost should now say 'On'. Leave the poly boost purging for at least 20 minutes prior to performing the wavelength calibration.

Note It is highly recommended that the Poly Boost purge is on when performing a wavelength calibration. If you do not intend to measure wavelengths under 190 nm, you may wish to turn the Poly Boost purge off. To do this, choose **Poly Boost Off** from the Analyze menu in the main window. Note that the calibration may not cover the entire wavelength range, or may fail if the Poly Boost is not on.

5. Open the Instrument Setup window (if it is not already open), by clicking the **Instrument Setup** icon on the Main toolbar, and click the **W/L Calib** tab.

6. With the wash solution aspirating, click **Calibrate Detector**. It will take roughly 1 to 2 minutes to calibrate the detector. Once completed, a message will appear indicating the dark current measurement has been completed.

Note You can save the dark current measurement data by clicking **Store Detector Calib.**

7. Remove the sample tubing from the wash solution. Wipe the tubing and transfer it into the wavelength calibration solution.
8. Once the wavelength calibration solution is aspirating, click **Calibrate Wavelength** to perform the wavelength calibration. After a short while, a message will appear stating that the wavelength calibration is complete, as well as indicating the wavelength calibration range.

Note By default a wavelength calibration uses the Wavelength Calibration .vws (Vista-PRO) or Wavelength Calibration.sws (Vista-MPX) worksheet.

9. If the calibration fails prepare a new wavelength calibration solution and try again, or consult the Troubleshooting section of the help.
10. (Vista-MPX only) Perform a hardware calibration. To do this, ensure that the wavelength calibration solution is aspirating, and click **Calibrate Hardware**. A dialog box will appear once the calibration has been completed.

Note Preferably, this step should be performed by a Varian customer support representative.

4.3.2 Torch alignment

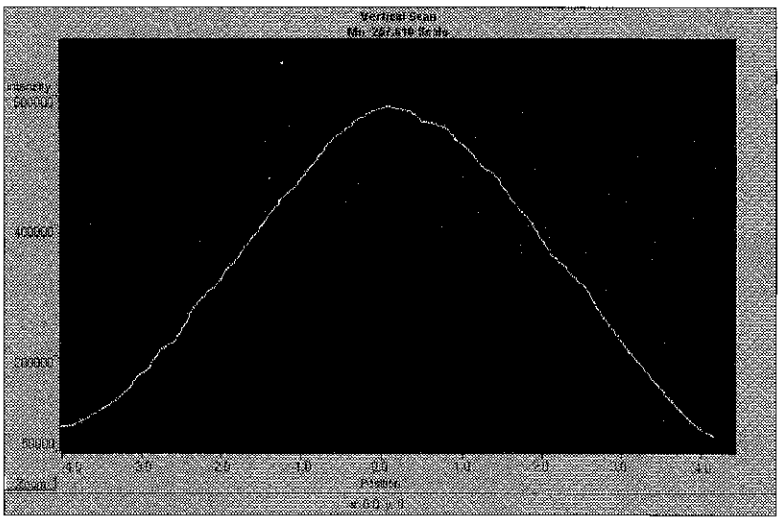
You now need to align the torch before using a new method. To do this:

11. Place the sample pump tubing into a 5 ppm Mn solution.
12. From the Main Index window of the ICP Expert software, choose **Instrument Setup** from the **Window** menu. The Instrument Setup window is displayed.
13. Click the **Torch Align** tab.
14. Ensure that the **Scan Method** path points to the TorchAlignment.vws file (Vista-PRO) or TorchAlignment.sws (for

Vista-MPX). The file is located in the \Program Files\Varian\ICPExpert\Supplied Worksheets directory on the drive the ICP Expert software is installed.
The TorchAlignment file consists of a single line, Mn 257.610 nm, which is recommended because it gives a representative viewing range scan for most analytical lines.

15. If the TorchAlignment file is not listed in the Scan Method path, click the **Browse** button and choose the file from the Load Method dialog box.
16. Perform a horizontal scan by clicking the **Torch Scan** button on the Torch Align page.
17. If you have an axial unit, perform a vertical torch scan after you have performed the horizontal scan. When the instrument scans the torch, it will move the pre-optics to the optimum positions for viewing the plasma. The optimum positions are displayed on the slide-bars. If the horizontal or vertical positions have changed by more than ±1 from the previous setting, perform another horizontal scan.

When you perform a torch alignment scan, you should expect to see a scan result similar to the following:



An ideal torch alignment scan

Publication date: 04/05

4.4 Developing a method

1. From the Main Index window, click the **Worksheet** button. The Load Worksheet dialog box will be opened.
2. Click **New** in the Load Worksheet dialog box. The New Worksheet dialog box is displayed.
3. In the **New Worksheet** dialog box (ICP Expert version 3 or higher: on the New page), enter a name for the worksheet. This will be the name that the worksheet is ultimately saved as.
4. Click **Save**. The Worksheet window will appear with the new worksheet loaded.
5. Open the Method Editor by clicking the **Method Editor** icon on the Toolbar. The **Element** page of the Method Editor will be displayed. The editor consists of a series of pages that allow you to develop the method.
6. On the **Element** page, ensure that the Periodic Table is displayed. If it is not visible, choose **Periodic Table** from the **View** menu.
7. Select the required elements by clicking on each element in the Periodic Table. This will display the Add Analysis Line dialog box, which shows thing such as wavelengths, internal standards and potential interferences.

Note You can also add multiple elements by holding down the CONTROL key and clicking the required elements in the Periodic Table. The most prominent line will be automatically added to the method as an analyte.

Selected analytes will be highlighted in blue.

4.4.1 Checking for potential interferences

8. In the Add Analysis Line dialog box under Potential Interferences, check that there are no interferent or other analytical lines close to the selected analytical line. Their relative intensity will govern how close the lines can be to each other. For example, if your matrix contains an element that is not of analytical interest, but is a potential interferent that has a low intensity line close to one of your analytical lines, the concentration of that element in your matrix will determine whether you need to choose another analytical line. Click **OK** once you have made any required adjustments in the Add Analysis Line dialog box.

9. Repeat steps 7 and 8 to add additional elements.

Note If you are unable to select a line that is free of interferences, you can use the FACT (Fast Automated Curve-fitting Technique) or Inter-Element Corrections (IEC) facilities of the software. Refer to the online Help for more details.

Note Physical interferences arise from solutions having different viscosities and surface tensions. This produces variable nebulization rates and alters conditions in the plasma. This situation is best corrected by matching the blank and standards to the sample matrix and sample solvent.
Changes in the peristaltic pump tubing with usage can also be a source of physical interference. This is best corrected with Internal Standards. You may have to use either several internal standards and/or several analytical lines for specific internal standards in order to match as closely as possible the behavior of the different analyte lines.

4.4.2 Setting operating conditions

11. Once you have finished selecting the analytical lines, click the **Conditions** tab.

12. Ensure that **All Lines Share Same Conditions** is selected in the **Options** menu. Click the **Multiple Graphs** icon from the graphics window so that multiple graphs can be viewed at once.

13. Remove the sample tubing from the wash solution. Wipe the tubing and transfer it into the solution to be analyzed. Once the solution is aspirating, click the **Read Spectrum** icon to perform a scan.

14. When the scan is complete, you may alter the settings for the selected line, and perform another wavelength scan to compare the effects of different operating conditions on the analytical signal. This will allow you to determine the optimum settings for the selected line. Ensure that **Overlay** is selected in the Graphics menu so that you can compare the signals.

Note The AutoMax feature (Vista-PRO only) of the software will automatically set operating conditions for each line. Refer to the online Help for further details.

Publication date: 04/05

Caution High plasma operating powers can result in torch meltdown. When running the torch at a power setting above 1.4 kW, always monitor the torch and decrease the power if it starts to overheat.
Plasma gas flows that are too low may also cause the torch to overheat and melt.

Note Recommended values for the line settings are given in the Conditions used by, Sample introduction and General settings online Help pages. Use these values as a guide when entering your own values until you become more familiar with the system.

15. Repeat the above steps until you are satisfied with your results. Generally, this involves finding the optimum intensity.

4.4.3 Setting up standards

16. Click the **Standards** tab to display the Standards page. Ensure the Calibration mode is Quantitative, not Standard Additions.
17. Enter the number of calibration standards required. As you add standards, columns will be added to the Standard concentrations table.
18. Enter the concentration of each standard in the table.
19. Select the units required by clicking on the required cell and choosing the units from the drop-down menu.

Leave the Correlation coefficient at its default value of 0.995000. The MultiCal parameters table can remain unchanged.

Note Clicking on the element name in the Standard concentrations table will highlight the row. If your standards have the same values, you can quickly copy and paste the row values by right-clicking on the table and using the **Copy** and **Paste** options.

20. Click the **Notes** tab to add any additional information regarding the method, sample preparation, calibration preparation, the matrix, user information or any other general information required. The Notes page is a simple text editor.
21. Choose **Exit** from the **File** menu to close the Method Editor. Click **Yes** when you are prompted to save your changes.

You can now run an analysis using the method you have just developed.

4.5 Running samples

1. From the Worksheet window, click the **Sequence** tab and do the following:
2. Ensure the **Sample source** is set to **Manual.**
3. Click the **Sequence Editor** button. Enter the required number of samples in the **Sample count** field.
4. Select **Begin with calibration** and **Include a blank in calibration.** Select the other boxes as required.
5. Click **OK**. You will be prompted to confirm your selections.
6. From the **Sequence** page, click the **Sequence Parameters** button.
7. Set **On calibration failure** to **Stop.**
8. Click **OK** to exit. When you are asked to confirm your selections, click **Yes.**
9. Click the **Analysis** tab and do the following:

Ensure your samples are selected. This will be indicated by a yellow highlight. To select all solutions, click the **Tube** cell in the top left corner of the table.

Click the **Start Analysis** icon in the Toolbar to begin the analysis and follow the subsequent prompts.

Note If the **Start** icon is grayed out, hold the cursor over the icon until the hint text (enabled in the **View** menu) is revealed. This will indicate what action is required to enable the icon.

The **Start** icon will only be available under the following circumstances:

- the torch is on;
- the Peltier has cooled down and has stabilized;
- at least one worksheet is open;

Publication date: 04/05

- solutions are selected for analysis;
- the **Analysis** page is open;
- a worksheet is not currently being run;
- the autosampler is online, if an autosampler sequence is selected.

4.6 Printing a report

1. From the **File** menu, choose **Report Settings**.

Note When printing a report, you can simply select **Print** from the **File** menu. However, if you do so, a report will be generated based only upon the last used **Report Settings**. You will not be able to select the data to be included in the print out.

2. In the Report **Settings** dialog box (ICP Expert version 3 or higher: on the General page), specify the following:
   - whether to generate a native or HTML report (ICP Expert version 3 or higher);
   - the report style;
   - whether to report all of the results or only those highlighted;
   - the data content to be included;
   - what calibration data is to be included;
   - include a match sample label string, if required; and
   - the appearance of the report, including whether you want to print the report in color, and the size of the graphs (ICP Expert version 3 or higher: This is done on the Customize page. A header, footer and logo can also be added on this page.)

Note When selecting the report style, please note the following:

Tabular produces a report in the same form as the worksheet. Calibration data cannot be selected for printing.
Mean Only reports are designed for analysts who are only interested in final results. As a result, many of the Content options and the option to print Calibration data are disabled.
An **All Data** report allows you to select all of the Report Settings options to include in your report.

Note You can preview the report if required by clicking the **Preview** button. Previewing the report allows you to ensure that you have included all of the data you require.

3. Click the **Print** button to generate a report as specified. A message will appear briefly indicating the progress status of the report being generated.

4. The **Print** dialog box will then be opened. You can select to print all of the report, or a range of pages. Reports are printed to your default printer, unless you specify otherwise. You can specify your printer options in the **Print Setup** dialog box, accessible from the **File** menu.

As the **Print** dialog box is a standard Windows® dialog box, you can obtain "What's this" Help on an item by clicking the question mark icon in the top right corner and then clicking the item of interest.

4.7 Turning the instrument off

There are two modes of turning off your Vista instrument. For day-to-day use, it is recommended that the instrument be set to Standby mode (which keeps the polychromator thermostating system and purge systems operational). When the Vista is not going to be in use for prolonged periods, the Shutdown mode may be used (which turns off all purging as well as the polychromator thermostating system).

4.7.1 Using standby mode

To set the instrument to **Standby** mode:

1. Rinse the spraychamber by aspirating water for a few minutes.

Note When running organic samples it is recommended that the spraychamber be cleaned and dried thoroughly between analyses.

2. Extinguish the plasma by clicking the **Plasma Off** icon, pressing F4 on the keyboard or choosing **Plasma Off** from the **Analyze** menu. The peristaltic pump stops automatically when the plasma is extinguished.

Note The yellow **Plasma Emergency Off** button, located next to the mains power switch on the front of the instrument, is designed to be used only in an emergency–for example if the torch is melting. It is not intended to be used every time you want to extinguish the plasma. If used to extinguish the plasma, you will need to reset the **Plasma**

Emergency Off button to the 'on' position before the plasma can be re-ignited.

3. Leave the mains power switch on to keep the polychromator thermostating system operational.

4. To save on argon costs, it is recommended to turn the polychromator boost off overnight, by choosing **PolyBoost Off** from the **Analyze** menu.

5. To increase the pump tubing lifetime, loosen the peristaltic pump tubes by releasing the pressure bars and lift the tubes out of the grooves. To do this:
(a) Unclip the pressure bar screws leaving the pressure bars resting loosely against the rollers.
(b) Lift the tubing out of the grooves so that they are not being stretched over the rollers.

6. You may switch off the water cooler if you wish.

Note If the water cooler is turned off, the Peltier will automatically turn off.

7. For Vista-PRO instruments in particular, if you would like immediate operation next time the instrument is started, leave the computer and gas on to eliminate the need to purge the detector. Close the worksheet by selecting **Close** from the File menu but leave the ICP Expert software running. You may switch off the printer, monitor and any accessories if desired. Ensure that the powersave option on your PC is disabled.

Warning
The exhaust system **MUST** remain on if the gas supplies are on.

4.7.2 Using Shutdown mode

To Shutdown your instrument:

1. Rinse the spraychamber by aspirating water for a few minutes.

Note When running organic samples it may be necessary to disconnect the spraychamber and clean and dry it thoroughly between analyses.

2. Extinguish the plasma by clicking the **Plasma Off** icon, pressing F4 on the keyboard or choosing **Plasma Off** from the **Analyze**

menu. The peristaltic pump stops automatically when the plasma is extinguished.

Note The yellow **Plasma Emergency Off** button, located next to the mains power switch on the front of the instrument, is designed to be used only in an emergency—for example if the torch is melting. It is not intended to be used every time you want to extinguish the plasma. If used to extinguish the plasma, you will need to reset the **Plasma Emergency Off** button to the 'on' position before the plasma can be re-ignited.

3. Turn off the Peltier by choosing **Peltier off** from the **Analyze** menu.

Caution The Vista gas control unit supplies uninterrupted gas purge to the camera (Vista-PRO only) and polychromator assemblies to minimize the ingress of moisture. It is strongly recommended that gas supplies be left on at all times except during long periods of non-use. It is recommended to turn off the camera Peltier before turning off the instrument gas supply.

4. Switch off the mains power switch (the green light will go off). This will turn off the complete instrument, including the Peltier (if not done so manually earlier) as well as the polychromator heater.

5. Loosen the peristaltic pump tubes by releasing the pressure bars and lift the tubes out of the grooves. To do this:
(a) Unclip and lower the pressure bar screws leaving the pressure bars resting loosely against the rollers.
(b) Lift the tubing out of the grooves so that they are not being stretched over the rollers.

6. Switch off the water cooler, laboratory exhaust system and any accessories (where applicable), and shut down the argon gas supply at the cylinder.

Caution The Vista gas control unit supplies uninterrupted gas purge to the camera (Vista-PRO only) and polychromator assemblies to minimize the ingress of moisture. It is strongly recommended that gas supplies be left on at all times except during long periods of non-use. It is recommended to turn off the camera Peltier before turning off the instrument gas supply.

7. Exit the ICP Expert software, if it is no longer required, by choosing **Exit** from the **File** menu. Switch off the printer and monitor.

8. Restarting the instrument will take several hours due to gas purge and polychromator thermal stabilization time.

This page is intentionally left blank.

5. Maintenance

This chapter includes the maintenance requirements for the Vista that may be carried out by an operator. Any maintenance procedures not specifically mentioned in this chapter should be carried out only by Varian-trained, Varian-qualified or Varian-authorized customer service representatives.

Warning
The plasma is an intense light source. Direct viewing of the light source will cause eye damage. Operators and other unauthorized personnel must NEVER remove the main covers or disable the safety interlock system.

Warning
This instrument contains electrical circuits, devices and components operating at dangerous voltages. Contact with these circuits, devices and components can result in death, cause serious injury, or painful electrical shock.

Warning
The plasma radiates dangerous levels of radio frequency (RF) energy. Exposure to the RF energy can cause severe skin damage and cataracts of the eyes, while close contact with the operating plasma can result in severe heat burns to the skin, and an electrical discharge which can jump a considerable distance and may cause death, severe electric shock or sub-surface skin burns.

Note This section refers only to maintenance procedures for the Vista instrument. You should refer to your PC and printer manuals for their maintenance procedures, and to the ICP Expert online Help for the maintenance procedures for any accessories you ordered.

5.1 Routine maintenance

The ICP Expert online Help details all the maintenance procedures and includes instructional video clips. The following parts of the Vista require routine maintenance and instructions on how to do this are included in the online Help. To access these instructions, click the Windows **Start** button, then **Programs** ▶ **ICP Expert** ▶ **ICP Expert Help**. Click the Maintenance link.

Hourly

- ❑ Check and, if necessary, empty the drain vessel.

Daily

- ❑ Check the water level in the Argon Saturator Accessory (ASA) before every use (if applicable).
- ❑ Clean the surface of your Vista (spills should be cleaned up immediately).
- ❑ Inspect the pump tubing and replace if it has lost its elasticity. Unclip the pump tubes when the pump is not in use.

Weekly

- ❑ Clean the torch.
- ❑ Clean the cone (axial instruments).
- ❑ Clean the snout (radial instruments).
- ❑ Clean the bonnet (radial instruments).
- ❑ Clean the spraychamber.
- ❑ Clean the nebulizer.

Monthly

- ❑ Clean the cooling air intake filter on top of your instrument.
- ❑ Inspect the state of the induction coil. Contact your local Varian office or representative if maintenance is required.
- ❑ Check the water level in the water cooler (refer to manual supplied with the water cooler for details).
- ❑ Perform a wavelength calibration.

Publication date: 04/05

5.2 Maintenance of consumables

For information on maintaining consumables (such as replacing the torch, cleaning the cone, replacing the peristaltic pump tubes and replacing fuses), refer to the online Help. Specifically:

1. Click the Windows **Start** button and choose **Programs** ▶ **ICP Expert** ▶ **ICP Expert Help.**
2. When the ICP Expert Help software appears, click the **Maintenance** link to view step-by-step instructions on how to maintain instrument consumables.

5.3 Cleaning

Any spills in the sample compartment should be wiped up immediately.

The exterior surfaces of the Vista should be kept clean. All cleaning should be done with a soft cloth. If necessary, this cloth can be dampened with water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

This page is intentionally left blank.

6. Troubleshooting

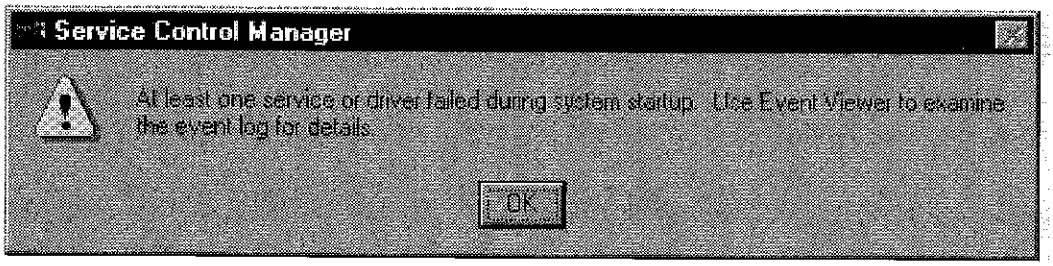
Information regarding troubleshooting of the installation of the Vista GPIB is given here. If you have any other problems with your Vista instrument you will find troubleshooting information in the online Help. Click the Windows **Start** button, then **Programs** ▶ **ICP Expert** ▶ **ICP Expert Help**. Click the Troubleshooting link.

6.1 Installation troubleshooting

6.1.1 Windows® service or driver failure

Problem

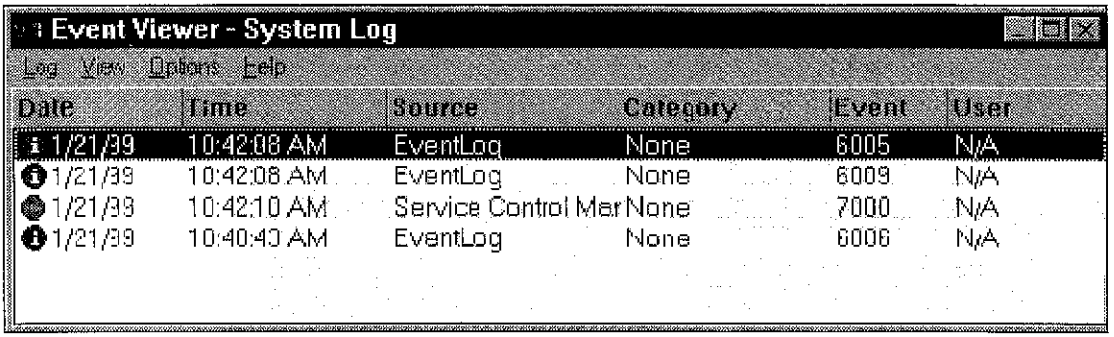
When you start Windows® you see the following message:



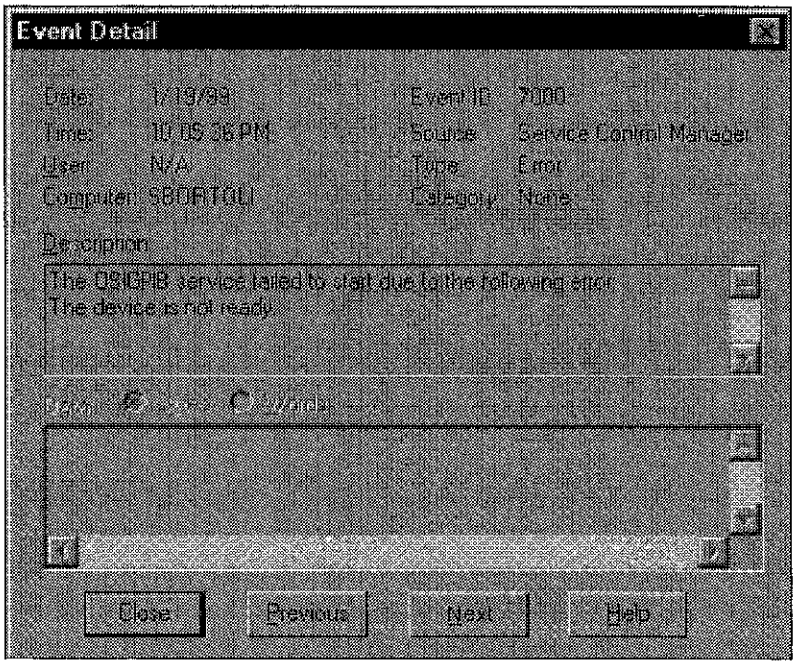
Solution 1

1. Click the Windows® Start button and choose **Programs** ▶ **Administrative tools** ▶ **Event Viewer**.

2. Find the hardware device driver that failed to load during startup event (indicated by a red STOP on the left hand side).



3. Double-click on the failed event to determine the cause of the failed device. If it was the Vista that failed to load you will see the following description:



4. This generally means that the device driver loaded but there was no response from the Vista instrument. This indicates that the Vista interface hardware is not responding.

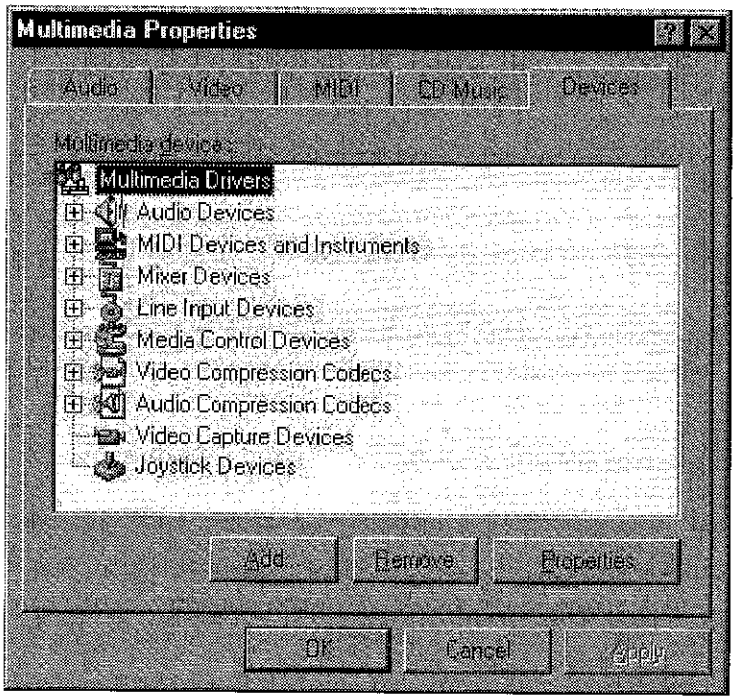
5. Ensure that the Vista card is installed correctly and that the interconnecting cable is secure.

Solution 2

Another cause of this error may be due to a conflict between the Vista driver and another driver on the system. This is more likely to happen on a Windows NT® system. The most common cause is a sound card for which a driver has not been installed. The PC may have a sound card built into the motherboard as well as a separate sound card which the PC recognizes but doesn't have a driver installed for.

You will need to:

1. Uninstall the ICP Expert software.
2. Uninstall the Vista driver (refer to section 6.5).
3. Click **Start, Settings, Control Panel, Multimedia** (for a Windows NT® system) or **System** (for other Windows® operating systems). Click the Devices tab (Windows NT®) or Device Manager tab (other Windows® operating systems).

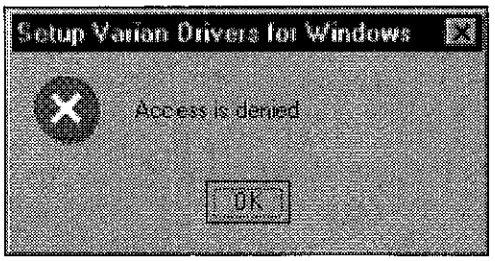


4. If you see a ! mark next to one of the devices you need to fix the problem (usually by installing the latest driver) before installing the ICP Expert software.

6.2 Access denied

Problem

During the installation of the ICP Expert software you may see the following message:



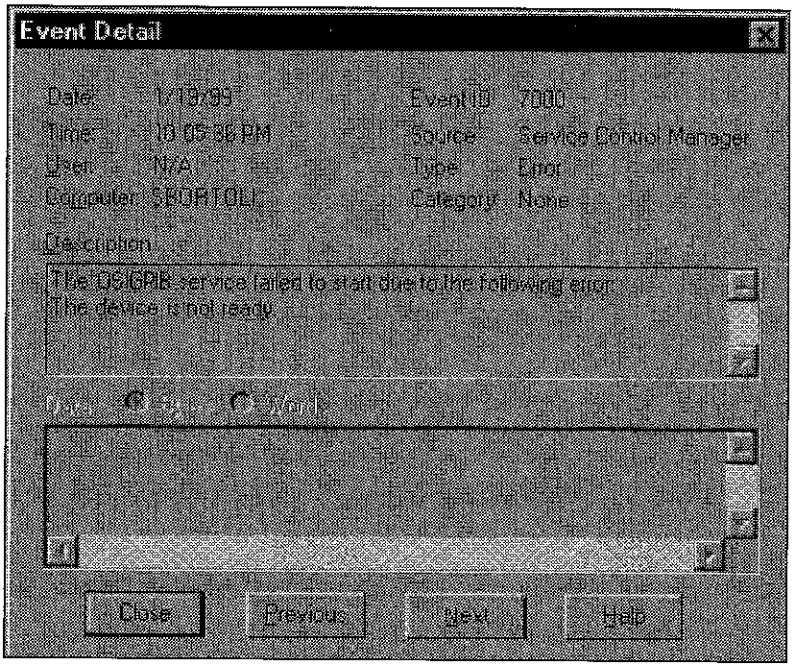
Solution

You must be logged on with administrator rights to install the ICP Expert software. Click the Windows® **Start** button, then **Shutdown** and **Close all programs** and log on as a different user. When prompted, log on as an administrator or ask your administrator to log on for you. Start the ICP Expert installation process again.

6.3 OSIGPIB service failed to start

Problem

After the installation of the ICP Expert software the following message is displayed:



Solution

This indicates the Vista GPIB device driver was not copied to the correct directory.

It is possible you may not have access rights to the installation drive.

Log on with administration rights (refer to section 6.2) and perform the ICP Expert installation again.

6.4 ICP Expert software failed to start

Problem

When you open the ICP Expert software the following message is displayed:

Solution

This may indicate that there is a conflict with the Vista GPIB device driver. The action you take will depend upon which version of the Windows® operating system you are using.

To rectify this conflict in Windows® 2000 or Windows® XP, try uninstalling the software then re-install it.

To rectify this conflict in Windows NT®, do the following:

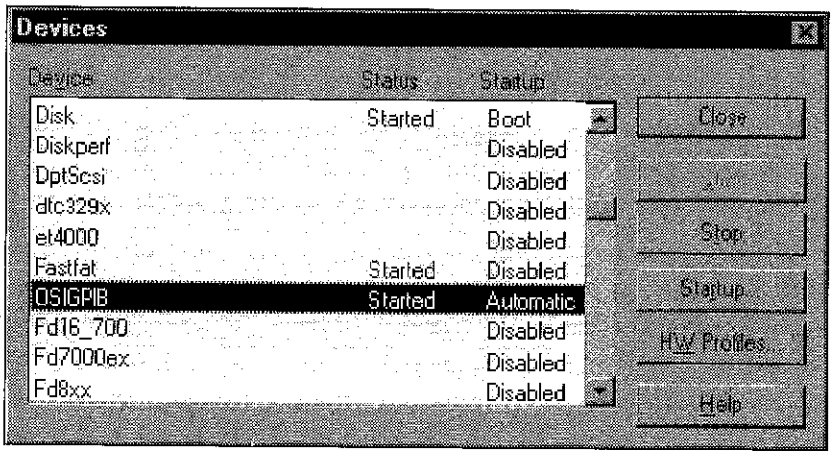
1. Click the Windows **Start** button and then choose **Settings** ▶ **Control Panel.**
2. In the **Control Panel,** click the **Devices** icon.
3. In the **Devices** dialog box, ensure the following:
   - ❑ The Varian Simple GPIB driver is set to **Disabled.**
   - ❑ The OSIGPIB driver is set to **Automatic.**

   To change the settings of a driver, do the following:
   1. Highlight the driver in the list and select **Startup.** The **Device** dialog box appears.
   2. From the **Device** dialog box, select the appropriate **Startup Type** for the driver (e.g., **Disabled** or **Automatic**).
   3. Click **OK** to return to the **Devices** dialog box and **Close** to exit.
   4. You now need to to restart the computer. To do so, click the Windows **Start** button then **Shutdown** and **Restart the computer. Click OK** and wait for the computer to restart. The Vista driver will be enabled when the computer restarts.

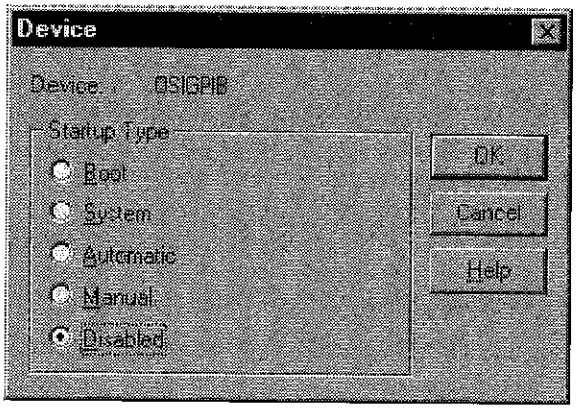
Publication date: 04/05

6.5 Uninstalling the Vista GPIB drivers for Windows NT®

1. Click the Windows® **Start** button and choose **Settings** ▶ **Control Panel**.
2. In the **Control Panel**, click **Devices**. The **Devices** dialog box appears.



3. Use the scroll bar to locate the OSIGPIB device and highlight it.
4. Click **Startup**. The **Device** dialog box is displayed.
5. From the **Startup Type** list, select **Disabled** and then click **OK** to return to the **Devices** dialog box.



6. Click **Close** to exit.

7. You now need to to restart the computer. To do so, click the Windows® **Start** button then **Shutdown and Restart the computer**. Click **OK** and wait for the computer to restart. The Vista driver will be disabled when the computer restarts.

7. Accessories, options, spare parts

The options, accessories and spare parts that are available for the Vista are listed in the online Help of the ICP Expert software. To access these details, click the Windows **Start** button, and then choose **Programs ▶ ICP Expert ▶ ICP Expert Help**. Click **Parts and Supplies** from the window that is displayed. Varian's website at www.varian.com contains a complete list as well, which is regularly updated.

This page is intentionally left blank.