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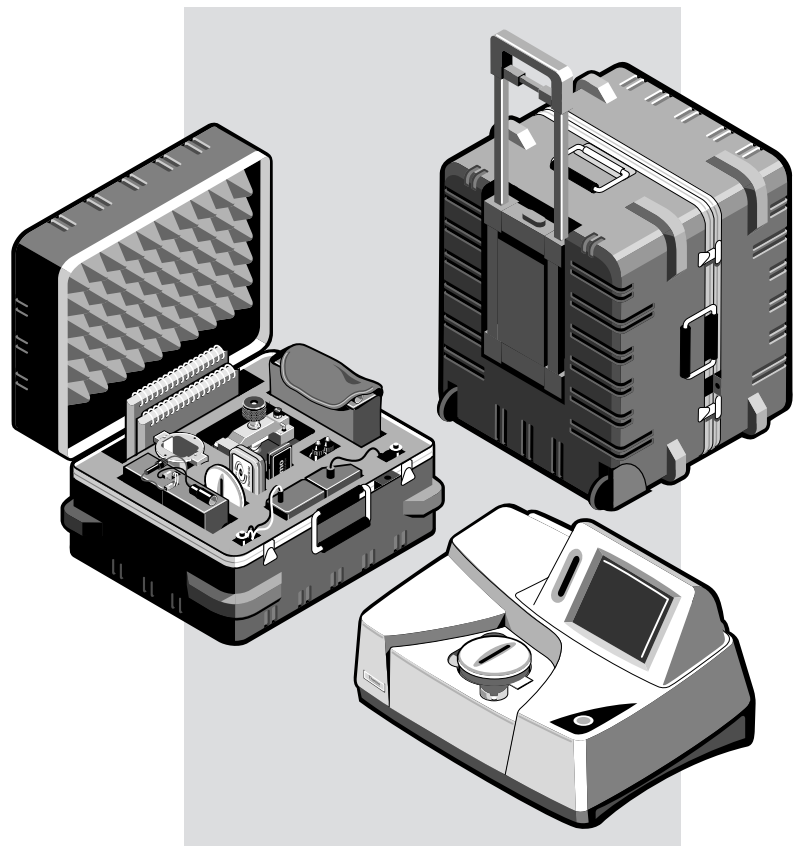
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Introducing the Transport Kit

This manual explains how to set up and use Thermo Electron's Transport Kit. This portable and rugged spectrometer lets you collect and analyze sample spectra while on location. The system includes two impact-resistant travel cases that make it easy to bring the spectrometer and accessories to a hazardous material site, forensic investigation scene or clandestine laboratory location. Since sample analyses are nondestructive, evidence needed for criminal prosecutions is preserved.



The spectrometer includes an integrated computer and touch-screen display that lets you view the spectra you collect and process. Easy-to-use Encompass™ software provides a full range of features, from data collection to spectral library searching. Also included is Encompass Macros software, which lets you create and run macros to automate your frequently performed spectroscopy operations.

A CompactFlash® flash memory card provided with the system includes spectral libraries containing spectra of a variety of materials, such as those commonly analyzed in forensic investigations and hazardous materials. You can use these libraries to identify spectra collected with the Transport Kit. See “Searching a spectral library” in the “Analyzing Spectra” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide* for more information.

If you use the Transport Kit Golden Gate™ Module, you can quickly collect sample spectra and search them against the libraries by using a special macro, TRANSPORT.MAC, included on the flash memory card. See “Transport Kit Golden Gate” in the “Using the Transport Kit” chapter for details.

Before you set up and use the system, read the *Spectrometer Safety Guide*. The information it provides for the Nicolet IR100 applies to the Transport Kit. Also read the “Safety” and “Before You Use the System” chapters of this manual. Then continue with the “Setting Up the Spectrometer” chapter.

 **Warning**

The *Spectrometer Safety Guide* that came with your system contains important safety information. This guide is available in several languages. Contact your local Thermo Electron office for information about the languages that are available. Before you use the system, read the entire guide, as well as the “Safety” chapter of this manual. To prevent personal injury and damage to equipment, follow the safety precautions contained in the guide and in this manual whenever you use the system. ▲

For complete information about using Encompass and the standard features of the spectrometer, see the *Nicolet IR100 and Nicolet IR200 User's Guide* that came with your system. Follow the instructions given for the Nicolet™ IR100 spectrometer. For information about using Encompass Macros, read the *Encompass Macros User's Guide*.

You can power the spectrometer using a standard wall outlet (85 to 240 VAC), a motor vehicle's 12-volt DC power supply or a rechargeable 12-volt battery. The cables needed for connecting your spectrometer to a power source are included with the system.

See the documentation that came with the rechargeable batteries for information about recharging, using and maintaining them. Be sure to read and follow all the safety precautions. Also see “Recharging the batteries” in the “Maintaining and Servicing the System” chapter of this manual for additional information.

Your system includes two sampling accessories:

- The Transport Kit Golden Gate Module is a versatile attenuated total reflection (ATR) accessory that lets you analyze almost any solid, liquid or paste that can be applied to the rugged diamond crystal. See “Transport Kit Golden Gate” in the “Using the Transport Kit” chapter for a procedure explaining how to use the accessory with the Transport Kit. See the *MKII Golden Gate Single Reflection ATR System User Manual* for more information about using the accessory.
- The Nicolet IR Series Transmission Module lets you perform standard transmission experiments. Follow the instructions in the “Transmission Swap-Top Operation” chapter of the *Foundation Series User's Manual* for general information on installing and using the accessory. See “Transmission” in the “Using the Transport Kit” chapter of this manual for a procedure explaining how to use the accessory with the Transport Kit.

Conventions used in this manual

This manual includes safety precautions and other important information presented in the following format:

Note Notes contain helpful supplementary information. ▲

Important Follow instructions labeled “Important” to avoid damaging the system hardware or losing data. ▲

▲ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. ▲

▲ Warning Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. ▲

▲ Danger Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. ▲

Questions and concerns

In case of emergency, if you have questions or concerns about safety or operating the spectrometer, or if you need assistance with repairs or replacement parts, contact Thermo Electron at the numbers listed below. If you are outside the U.S.A., call your local sales or service representative.

- Telephone (U.S.A.): 800-642-6538 or 608-276-6373
- Fax: 608-273-6883
- World Wide Web: <http://www.thermo.com/nicolet>
(Choose ABOUT US and then click the desired location under “Contact Us” at the left side of the page.)
- E-mail: careplan.techsupport@thermo.com



Before You Use the System

This chapter provides important information about the components of the system and the environmental conditions under which you can use it. Be sure to read this chapter, and the “Safety” chapter, before using the system for the first time.

 **Warning**

Use the spectrometer only under the conditions described in this chapter. Using the spectrometer under other conditions could cause personal injury and damage equipment. Such damage is not covered by your Thermo Electron warranty. ▲

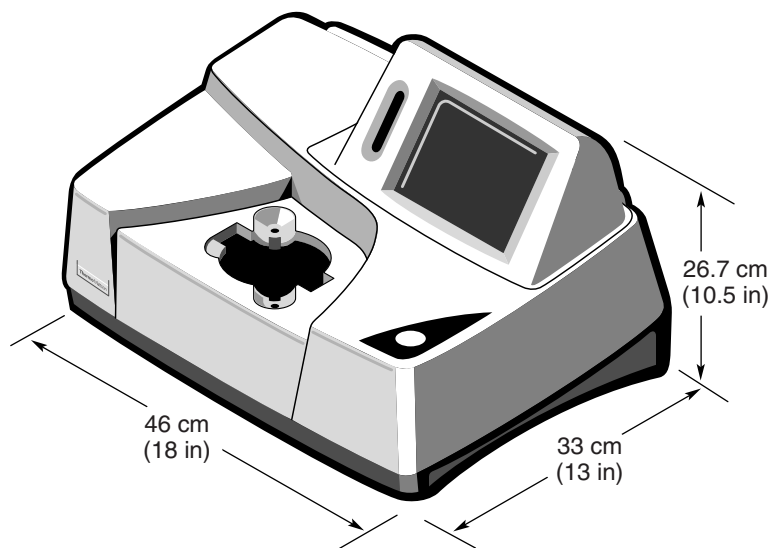
About the system

This section provides information about the system dimensions, weight and power consumption and about purging the spectrometer.

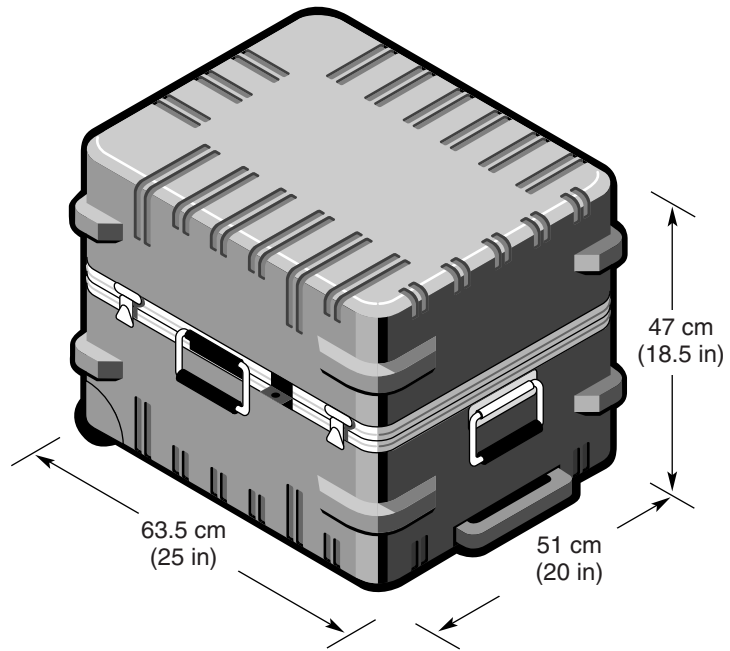
Dimensions and weights

The dimensions of the Transport Kit spectrometer and travel cases are shown below. The spectrometer weighs about 14.6 kg (32 lb). The entire system, including the cases, batteries and other components, weighs about 46 kg (102 lb). The weight of the larger case and the components it contains (including the spectrometer) is about 28 kg (62 lb). The weight of the smaller case and the components it contains is about 18 kg (40 lb).

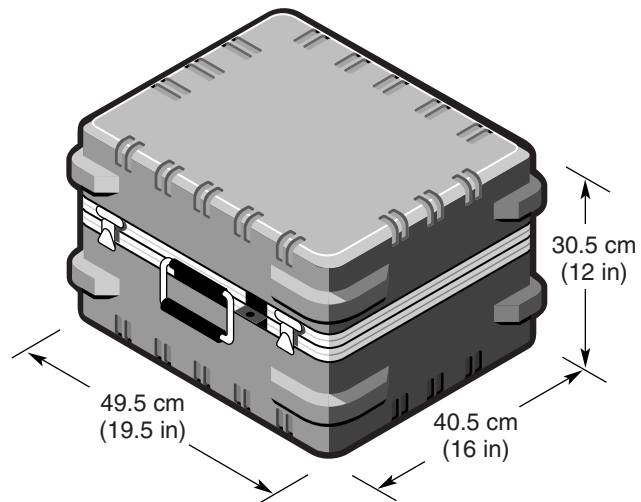
Note For convenience, you can connect and operate the spectrometer without removing it from its case. The needed connections are explained in the “Setting Up the Spectrometer” chapter. ▲



Spectrometer dimensions



Dimensions of larger travel case



Dimensions of smaller travel case

Power consumption The spectrometer typically consumes 30 watts of power. This corresponds to a heat dissipation of 102 Btu/hr.

Purge The Transport Kit is sealed and desiccated to protect the optics from water vapor and other contaminants and to help reduce the effects of water vapor on your data. If you want to provide additional protection or remove a greater amount of water vapor and remove carbon dioxide, purge the spectrometer. For more information, including important precautions about selecting purge gas, see “Purging the spectrometer” in the “Setting Up the Spectrometer” chapter.

Operating conditions

While the Transport Kit is designed to work well in a variety of environments, you need to follow some guidelines to operate it safely, obtain the best results and prevent damage to the system. This section lists important operation guidelines, below, and then provides additional information about the environmental conditions under which you can operate the system.

Warning

To prevent personal injury and damage to equipment, use the Transport Kit only under the conditions specified in this chapter. ▲

- ***Keep the system dry:***

Use the spectrometer only where rain, sleet, snow or any other form of precipitation will not fall, or be blown by wind, onto system components.

Use the spectrometer only where water or other liquids will not run onto system components.

Place system components only where water or other liquids will not accumulate.

Use the system only where the humidity is not above 80% noncondensing. Avoid rapid changes in ambient temperature or humidity that could cause water to condense on system components. See “Humidity” for more information.

- Use the spectrometer only where sand, dust, dirt or other materials will not enter system components.
- Operate the spectrometer only on a flat and level surface.
- Operate the system in a low-vibration environment. See “Vibration” for more information.
- To prevent damage to the system due to changes in its environment, do not leave it exposed and unattended for an extended period.

Temperature

Use the Transport Kit only if the ambient temperature is between 0° and 30°C (32° and 86°F). Temperature variation during operation may result in long-term drift in the system response.

Try to avoid placing the spectrometer where there are significant temperature fluctuations; unstable temperatures can have an impact on performance. Collect a new background spectrum frequently if the ambient temperature fluctuates significantly. See the “Humidity” section for important information about preventing condensation due to temperature changes.

Long-term stability improves with the length of time the spectrometer has been on. A constant internal temperature optimizes the stability and, as a result, the quality of collected data.

Note

If you use a rechargeable battery, we recommend turning off the spectrometer power and disconnecting the cable that connects the battery to the power inverter if you will not be using the system for longer than an hour before the next analysis. This will allow you to use the system longer before the battery needs to be recharged. ▲

Humidity

The Transport Kit is sealed and desiccated to protect optical components from the effects of humidity. If, however, you are in a location with high humidity, we recommend checking the humidity indicator often and replacing the desiccant as soon as the indicator shows the desiccant is starting to lose effectiveness. See “Replacing the desiccant canister” in the “Servicing Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer* for instructions.

Never expose the system to rapid changes in ambient temperature or humidity that could cause condensation on or inside system components. To prevent condensation, seal the spectrometer inside the provided plastic shipping bag before moving it to a warmer location. Allow adequate time for the temperature of the spectrometer to reach the new ambient temperature before opening the bag.

Leaving the spectrometer power on reduces the likelihood of condensation in humid environments. Also, in cases where the ambient temperature is constant but the humidity level is high, setting up the spectrometer and turning on its power as soon as possible after arriving at a location will help prevent condensation.

Vibration

Floor vibration or acoustical noise from heavy manufacturing equipment or other sources can affect spectrometer performance. Minimize or eliminate noise and vibration wherever possible. Do not operate the spectrometer inside a motor vehicle while its engine is running. Engine vibrations could affect spectrometer performance.

If vibration is a problem at a site, consider placing the spectrometer in a vibration isolation system, or turn off the equipment that is the source of the vibration.

Magnetic fields

Intense magnetic fields, such as those produced by superconducting magnets, can affect spectrometer performance. Keep the spectrometer at least 5.5 meters (18 feet) away from these fields. (Magnetic fields produced by equipment on floors directly above or below the spectrometer can have an impact on performance.) Minimize or eliminate exposure to magnetic fields whenever possible.

Static electricity

Since static electricity can destroy electronic components, your spectrometer was specially designed to meet the international standard: IEC 801-2; electrostatic discharge immunity requirements for industrial process, measurement and control equipment.

Ventilation

Standard building ventilation is generally acceptable for the Transport Kit when it is used indoors. If, however, you perform analyses that use highly toxic samples, or solvents that interact with infrared sources, special ventilation is required.

Chlorinated solvents, perfluorochlorinated solvents, and other solvents containing halogenated hydrocarbons are often used as FT-IR solvents. The pyrolysis of these solvents by an infrared source may produce hydrochloric acid (HCl), hydrofluoric acid (HF), or phosgene (COCl₂). Both hydrochloric acid and hydrofluoric acid are highly corrosive and may cause accelerated corrosion of the metallic components in your spectrometer if the seal on the optical compartment is not properly maintained or if the concentration level of corrosive gases in the air is excessively high due to improper sampling techniques.

⚠ Warning Hydrochloric acid, hydrofluoric acid and phosgene are highly toxic. If you plan to regularly use solvents containing halogenated hydrocarbons, be sure your work area is properly ventilated. ▲

Be sure to store solvents containing halogenated hydrocarbons away from the spectrometer. Do not leave such solvents in the sample compartment for an extended time. If measurements require the sample compartment cover to be closed, purge the sample compartment while using the solvents. For more information about purging the spectrometer, see “Purge” in this chapter.

⚠ Warning If you power the spectrometer using the battery of a running motor vehicle, make sure engine exhaust gases do not accumulate. To avoid the effects of engine vibration, use the spectrometer outside the vehicle. ▲

Safety

Using the Transport Kit safely requires that you follow the safety precautions described in the system documentation. Please heed the following Warning.

⚠ Warning

To prevent personal injury or loss of life, read and follow all the safety precautions included in this manual and in the other documentation that came with the system. The *Spectrometer Safety Guide* contains important safety information; before you use the system, read the entire guide. Be sure to read and follow all of the precautions and instructions in the manufacturer’s documentation that came with the rechargeable batteries. ▲

Safe use of the system requires that you operate it only under the conditions stated in the “Operating conditions” section of the “Before You Use the System” chapter.

⚠ Warning

To prevent injury due to electric shock, do not allow system components to become wet:

- Do not allow rain, sleet, snow or any other form of precipitation to fall, or be blown by wind, onto system components.
- Avoid conditions, such as rapid changes in ambient temperature or humidity, that would cause water to condense on system components.
- Do not allow water or other liquids to run onto system components.
- Do not place system components where water or other liquids may accumulate. ▲

⚠ Warning If you power the spectrometer using the battery of a running motor vehicle, make sure engine exhaust gases do not accumulate. ▲

▲ Caution The weight of the larger case and the components it contains (including the spectrometer) is about 28 kg (62 lb). Lifting it safely requires two people. ▲



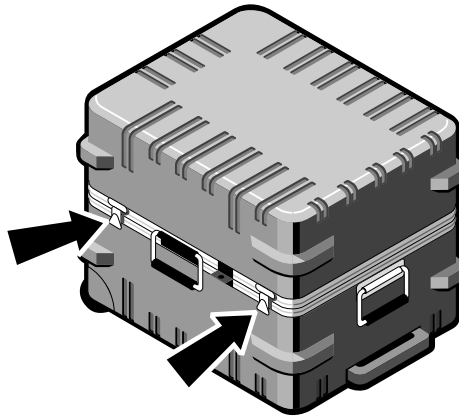
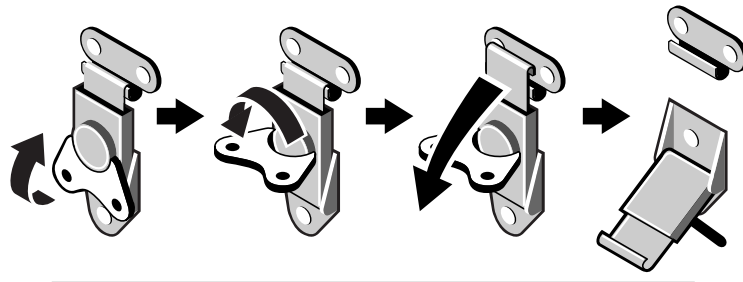
Setting Up the Spectrometer

This chapter explains how to connect your spectrometer to a power source and prepare it for collecting data. Before using this chapter, be sure to read the “Before You Use the System” and “Safety” chapters.

Important

Whenever the spectrometer has been stored in one of the provided plastic bags, allow adequate time for it to adjust to ambient temperature before opening the bag. If the spectrometer is below ambient temperature, exposure to humid air could cause condensation damage. ▲

Before you open a travel case, be sure to position it so that the lid is at the top (see the illustration below). The case has two latches on the front. To open a latch, lift the latch wing, rotate it one-half turn counterclockwise, and then pull it away from the case. (To close a latch, reverse these actions.)

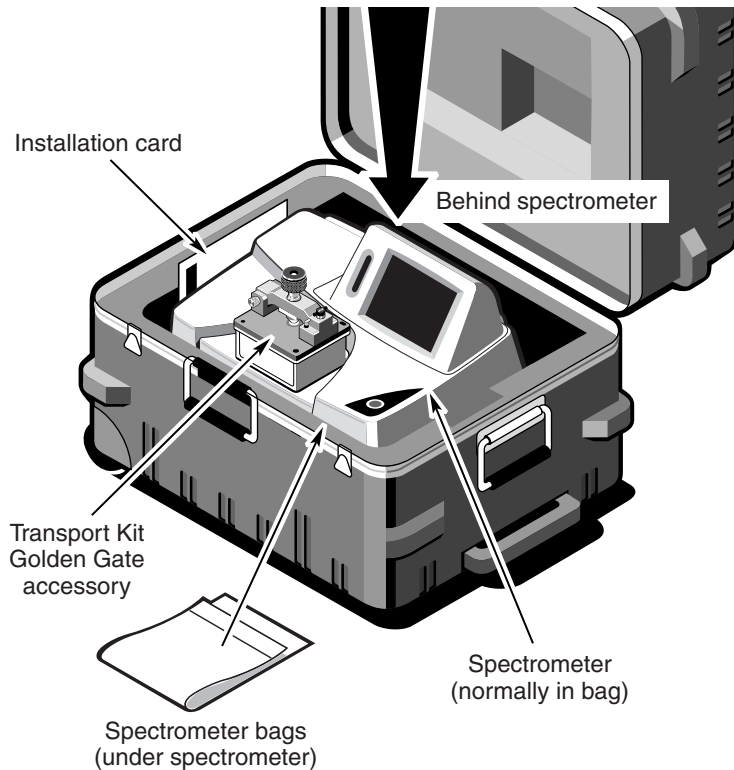
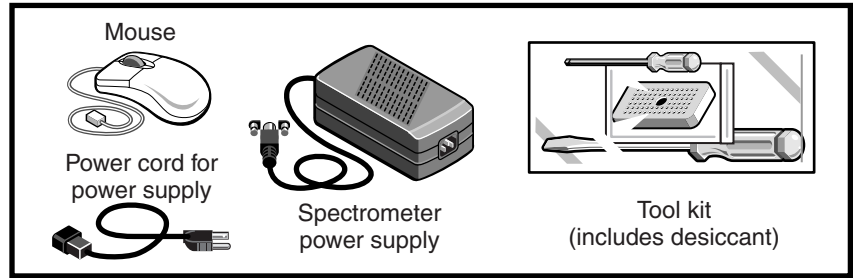


You can connect and operate the spectrometer without removing it from the case. If you want to remove it from the case, grasp it under its base using two hands and lift it straight up.

Note If you prefer, you can connect the mouse and optional printer before connecting the power source. The next sections provide detailed instructions. ▲

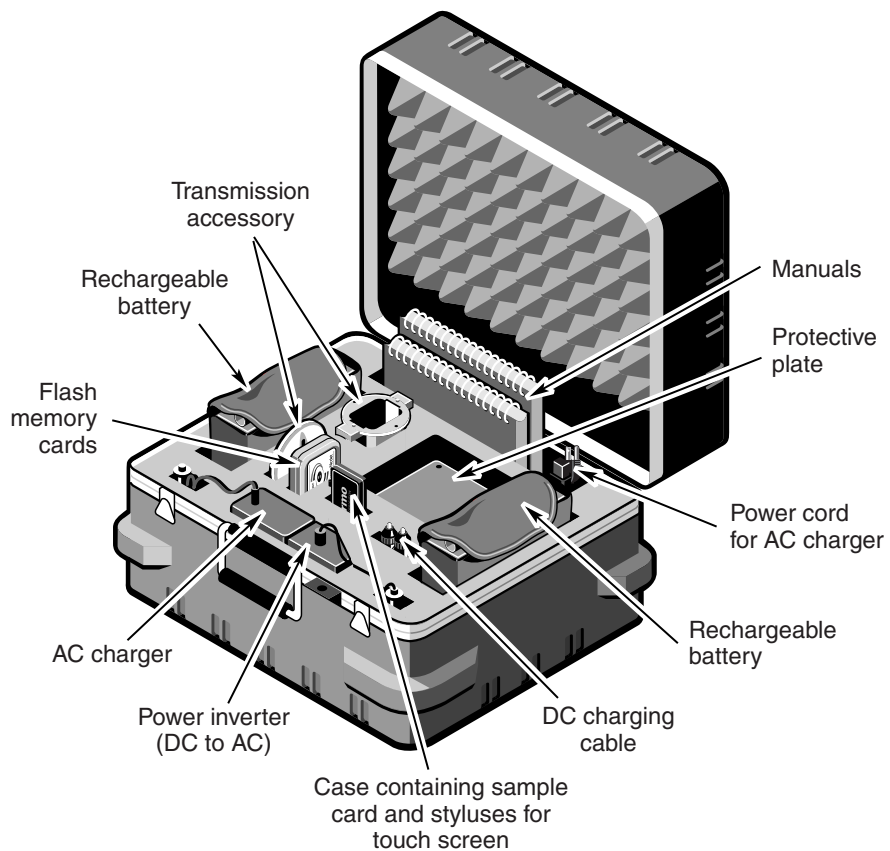
The following illustrations identify the system components contained in the travel cases. (The exact appearance of some items provided with your system may vary from those shown here.)

If you purchased the system for use outside the U.S.A., it may also include special power cords required for the electrical outlets in your country.



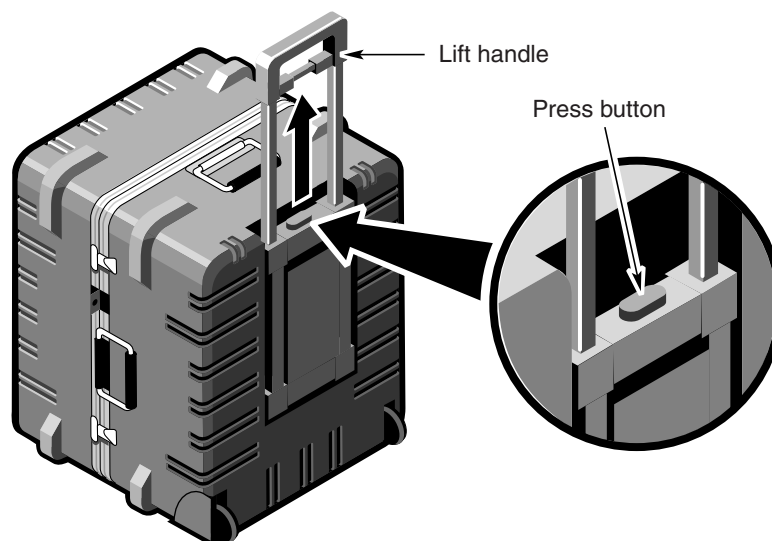
Larger travel case

The compartment that holds the protective plate can also be used to store the Transport Kit Golden Gate accessory.

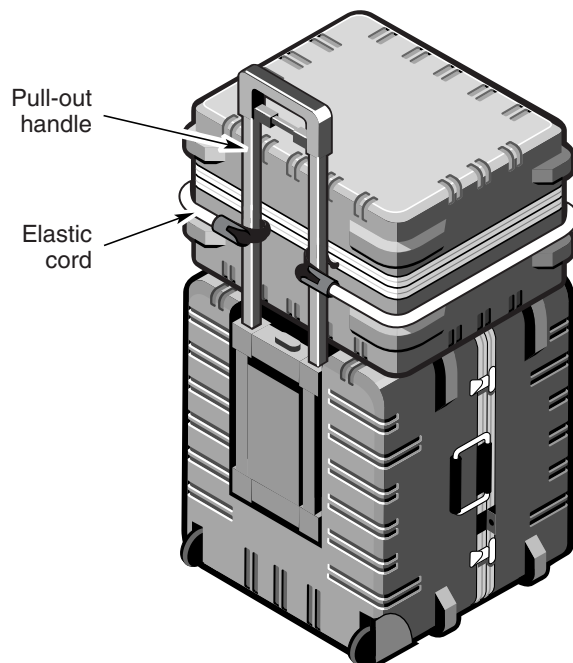


Smaller travel case

The larger travel case includes built-in wheels and a pull-out handle for moving the spectrometer into a site. To extend the handle, press the button and then pull the handle out until you feel or hear a click. When you are finished using the handle, push it back into its retracted position. (If the handle is fully extended, press the button before pushing the handle in.)



You can stack the smaller case on top of the larger case and pull them both using the larger case's pull-out handle, as shown below. Use the provided elastic cord to hold the smaller case in place.



Connecting the power source

You can power the spectrometer using a standard wall outlet (85 to 240 VAC), the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle, or a rechargeable 12-volt battery.

Note The provided batteries are charged enough to operate the spectrometer but may not be fully charged. Before you first power the spectrometer with one of these batteries, we recommend fully charging it as explained in the manual that came with the batteries. ▲

To extend the life of a battery, recharge it within a few hours when it has become depleted from use. If you store the battery for a long period, recharge it every 4 months. See “Recharging the batteries” in the “Maintaining and Servicing the System” chapter for more information.

If you use a rechargeable battery, we recommend turning off the spectrometer power and disconnecting the cable that connects the battery to the power inverter if you will not be using the system for longer than an hour before the next analysis. This will allow you to use the system longer before the battery needs to be recharged.

If you power the spectrometer using the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle with its engine off, the number of hours the system will operate depends on the capacity of the vehicle’s battery, the ambient temperature, etc. The system will shut off automatically before the vehicle’s battery is discharged to the point where the engine cannot be started. You then need to charge the battery by running the engine as soon as possible to prevent battery damage. For most vehicles repeated deep discharge cycles will reduce the battery life.

Note If you power the spectrometer using the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle, the power to the spectrometer will be interrupted briefly when you start the vehicle. The spectrometer will be reset automatically, just as when you turn on the spectrometer power. Let the instrument finish collecting a spectrum and analyze and save the data before starting the engine. The current background stored in memory will be lost, so you will need to collect a new one after power has been restored. (This can require removing the sample, cleaning the sample material from the ATR crystal, etc.) Turning off the vehicle's engine will not affect spectrometer operation. ▲

Important Do not plug anything other than the external power supply cable into the AC output of the power inverter. ▲

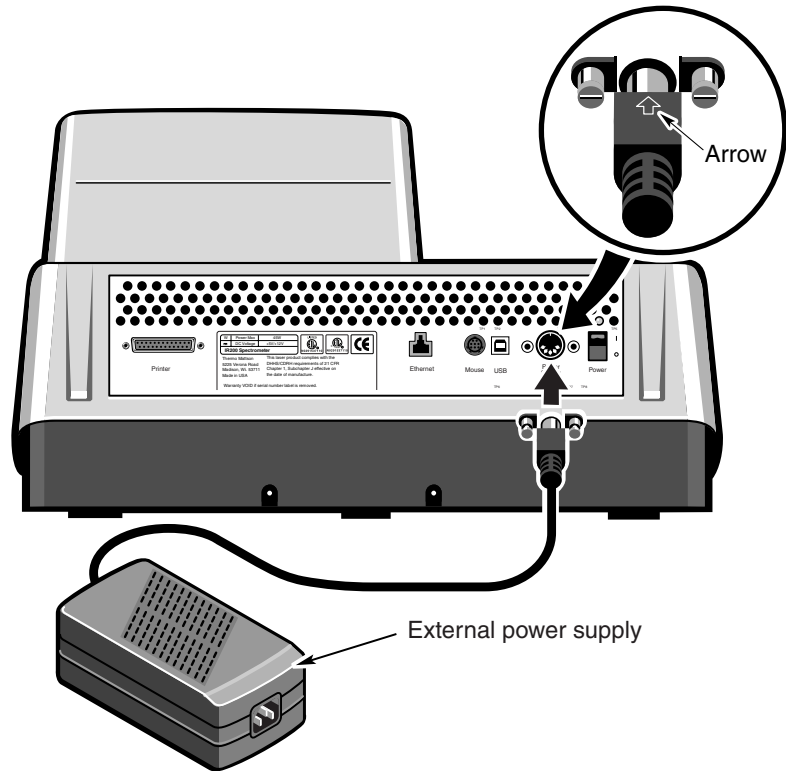
The next sections explain how to connect the spectrometer power using an AC wall outlet or a 12-volt power source.

Using an AC wall outlet

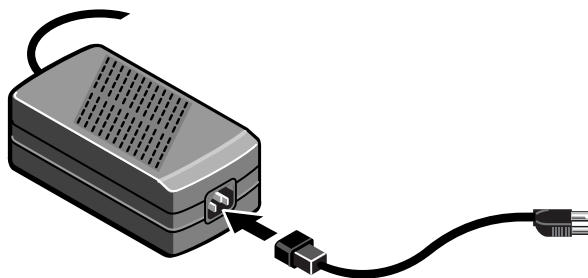
Follow these steps to connect the spectrometer to an AC wall outlet:

1. Connect the external power supply to the spectrometer.

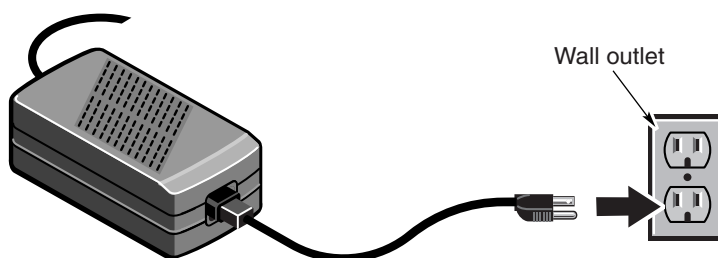
Use a small, flat-blade screwdriver to tighten the thumbscrews on the power cable. (Do not overtighten.)



2. **Connect the power cable to the external power supply.**



3. **Connect the power cable to a wall outlet or power strip.**



Important Do not turn on the spectrometer power until all other devices (such a mouse or a printer) have been connected as explained later in this chapter. ▲

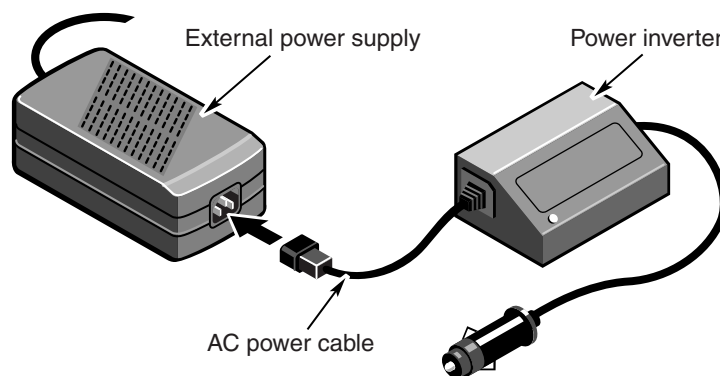
Using a 12-volt DC power source

Follow the steps below to connect the spectrometer to a 12-volt DC power source (a cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle, or a rechargeable 12-volt battery).

Note The Transport Kit comes with two rechargeable batteries. This allows you to switch batteries when the one you are using is nearly depleted. To switch batteries, turn off the spectrometer power, unplug the cable from the battery you are using, plug the cable into the other battery and then turn on the spectrometer power. See “Recharging the batteries” in the “Maintaining and Servicing the System” chapter and the documentation that came with the batteries for information on charging them. ▲

1. Connect the power inverter to the spectrometer’s external power supply.

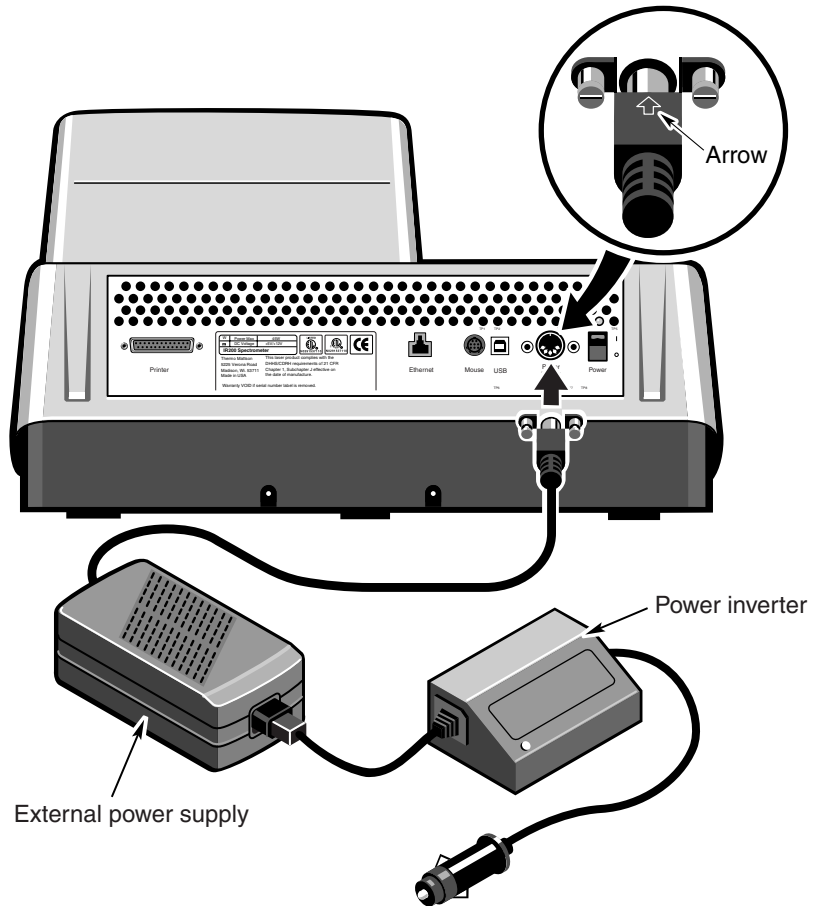
Connect the female end of the AC power cable to the external power supply.



If the other end of the cable is not permanently installed in the inverter, connect it to the inverter.

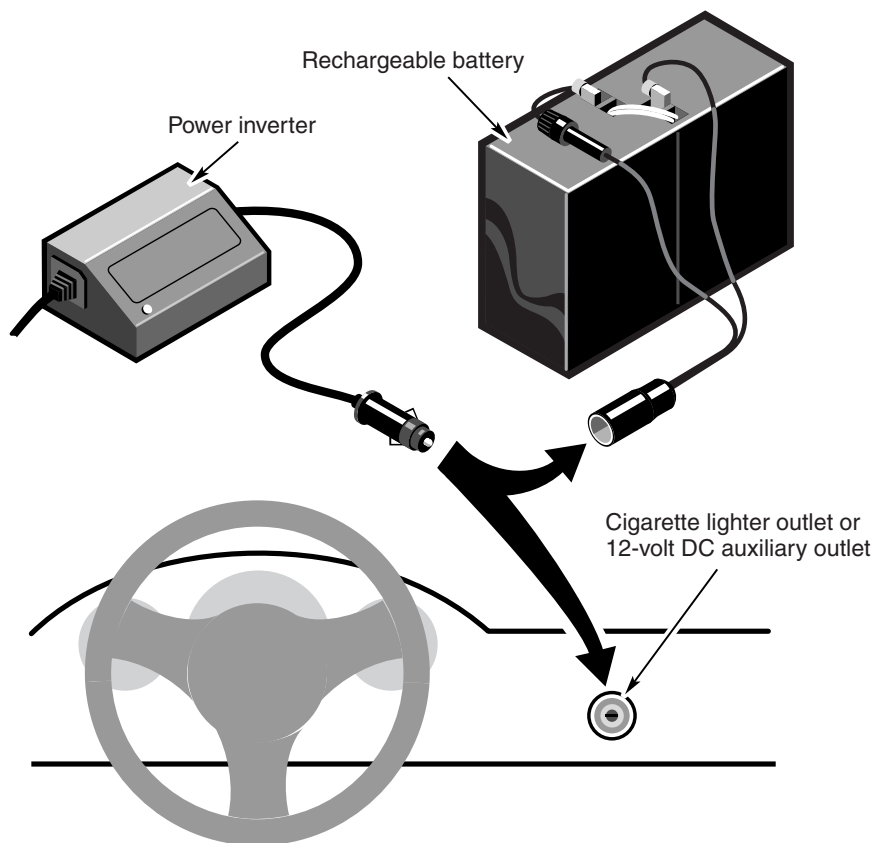
2. Connect the external power supply to the spectrometer.

Use a small, flat-blade screwdriver to tighten the thumbscrews on the power cable. (Do not to overtighten.)



Important For proper operation, be sure to perform step 1 *before* step 3. ▲

3. Connect the power inverter to the 12-volt power source.

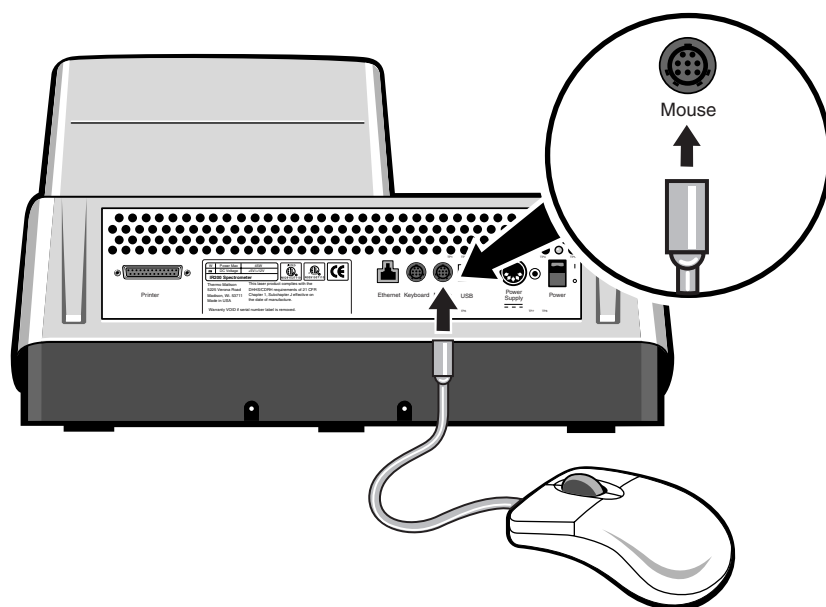


The green indicator lights on the power inverter and external power supply should illuminate. See the “Troubleshooting” chapter if they do not.

Important Do not turn on the power to your spectrometer until all other devices (such as a mouse or a printer) have been connected as explained later in this chapter. ▲

Connecting the mouse

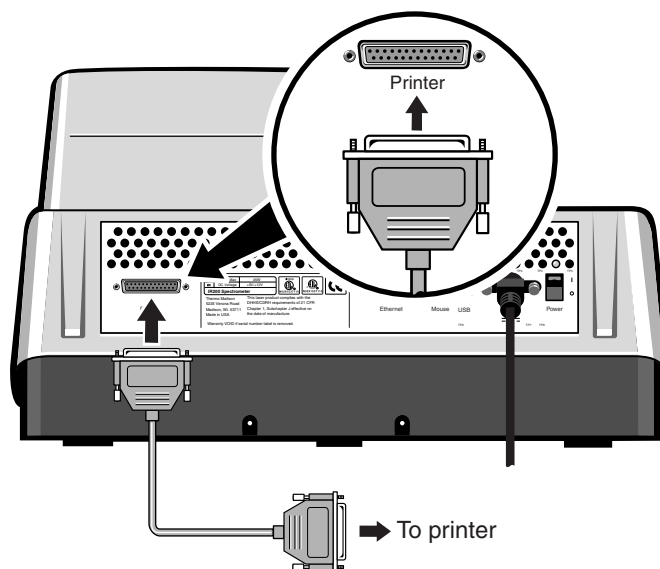
The Transport Kit includes a PS/2®-style mouse. (Since the spectrometer has a touch screen, using the mouse is optional. If you connect the mouse, you will be able to use both the mouse and the touch screen.) Before you connect the mouse, make sure the spectrometer is turned off by pressing the power switch on the back to the \bigcirc position (otherwise, the mouse will not function). Then connect the mouse as shown below.



Note If your spectrometer has a “Keyboard” connector on the rear panel, you can use it to connect a compatible computer keyboard. This lets you enter any needed text into software prompts and dialog boxes using a full size keyboard instead of the software keyboard provided in Encompass. ▲

Connecting a printer

You can connect the spectrometer to an optional printer that has a parallel connector and uses PCL (Printer Command Language). This makes it possible to print the results of an analysis. To connect a printer, make sure the spectrometer power is turned off, and then attach the printer's parallel connector to the printer connector on the back of the spectrometer. There is no need to install any printer drivers. (For information about the compatibility of a specific printer, contact Thermo Electron Customer Support.)

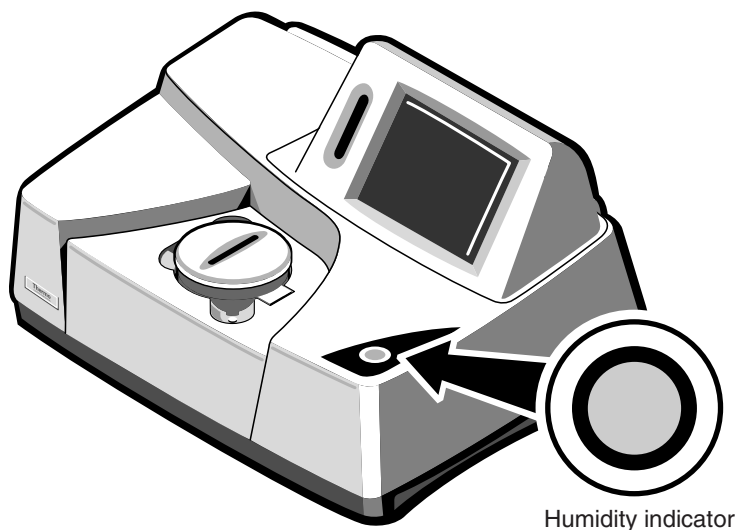


See “Setting the print options” in the “Software Management” chapter and the “Printing Spectra and Reports” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide* for information about printing.

Checking the desiccant

Before you use the spectrometer to collect data, check the humidity indicator to make sure the desiccant is still protecting the instrument.

Check the humidity indicator every day you use the system.



If the indicator is blue, the desiccant is still effective. If the indicator has turned white or pink, the desiccant is no longer effective and must be replaced or dried. See “Replacing the desiccant canister” in the “Servicing Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer* for instructions.

Important

Replace or dry the desiccant when the indicator begins to change from blue to white, before it turns pink. Failure to replace or dry the desiccant soon enough can damage the KBr beamsplitter in your spectrometer. ▲

Purging the spectrometer

The Transport Kit's interferometer is sealed and desiccated to protect the optics from water vapor and other contaminants and to help reduce the effects of water vapor on your data. If you want to provide additional protection, you can purge the spectrometer.

Important

If you use chlorinated solvents, perfluorochlorinated solvents, or solvents containing halogenated hydrocarbons (Freon® for example), you must purge your spectrometer. The interaction of these solvents with an IR source can corrode spectrometer components. Do not leave these solvents exposed around the spectrometer any longer than necessary. Optical damage caused by failure to purge the spectrometer is not covered under your spectrometer warranty. ▲

You can use either nitrogen or dried air as a purge gas, but if your goal is to eliminate carbon dioxide, nitrogen is more effective. To remove particulate matter and oil, you may need to install a 10-micrometer filter at your purge gas source. For best performance, dry the air or nitrogen to a dew point of -70°C (-94°F) or below.

▲ Danger

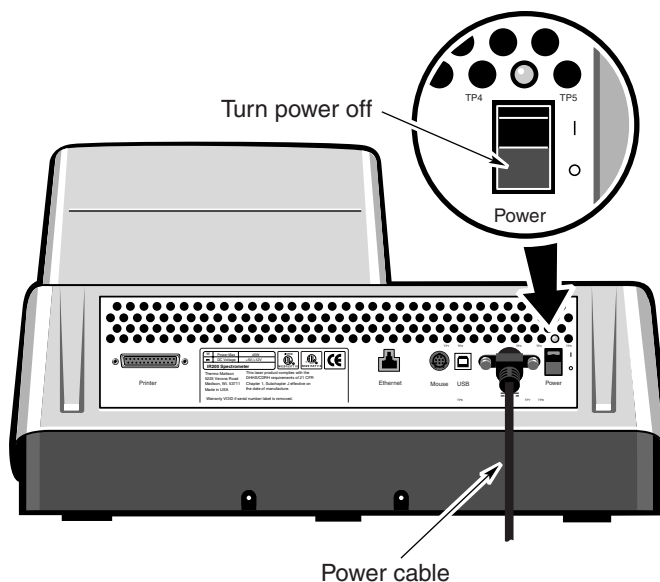
Never use a flammable gas to purge the spectrometer. Heat from the source or from laser absorption could ignite the gas. The purge gas must be free of moisture, oil and other reactive materials. Use dried air or nitrogen to purge the instrument. Other gases, even inert gases such as argon (Ar) or helium (He), can damage the spectrometer. ▲

The purge gas lines that connect your spectrometer to the purge gas source should be made of ¼ inch Poly-Flo® tubing. This brand of tubing is recommended because it is what the fittings on your spectrometer are designed to use. (You can use a different brand of tubing, but it might not fit as well as Poly-Flo tubing.) When setting up your purge gas source, keep in mind that it must be able to connect to the purge gas lines and maintain a flow rate of 10 to 35 scfh.

Follow these steps to connect the purge gas lines:

1. **Turn off the spectrometer power and disconnect the power cable.**

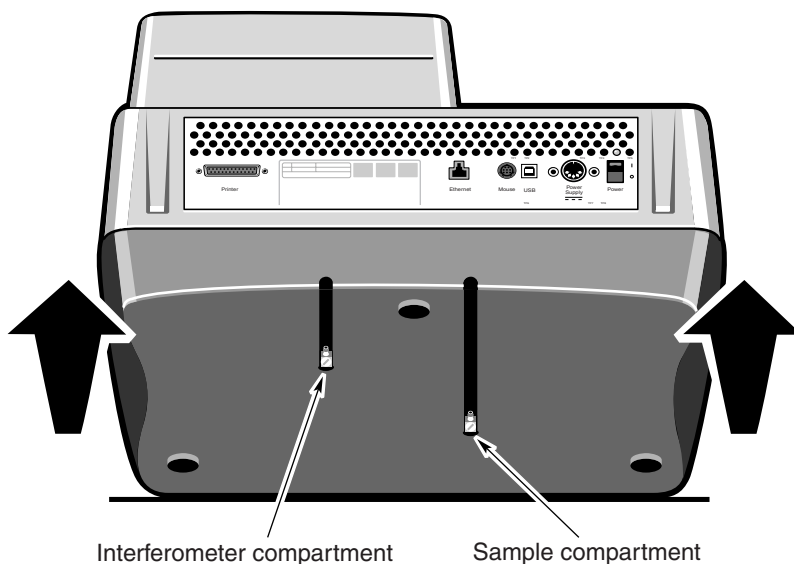
Press the power switch on the back of the spectrometer to the \circ position.



- ▲ Caution** To avoid personal injury or damage to your spectrometer, be very careful when lifting or lowering the instrument. Do not set the spectrometer on its front, back or side. You can tilt the spectrometer upward at an angle, but do not let it fall or drop, avoid jarring motions as much as possible, and always have a person providing steady support when the instrument is lifted. ▲

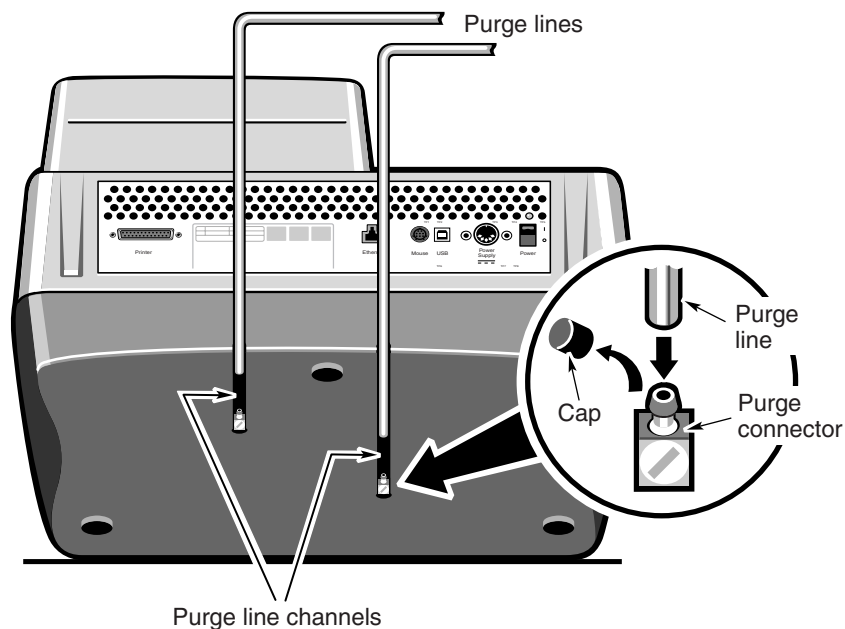
2. **Have one person carefully lift the back of the spectrometer so that the underside of the baseplate is clearly visible.**

The front of the spectrometer should remain resting on the work surface. The spectrometer has two purge gas fittings, one for the sample compartment and one for the interferometer. If you want to add protection for optical components, it is more important to purge the interferometer. If you want to improve the appearance of your data, try purging both the interferometer and the sample compartment.



- 3. Remove the cap from the purge connector and slide the end of the purge gas line onto the connector.**

There are channels in the underside of the spectrometer baseplate for the purge gas lines. Once a line is connected, press it into the channel so that it stays in place.



Keep the cap in a safe place. To maintain the desiccated condition inside the spectrometer, you will need to replace the cap when you disconnect the purge line before storing the spectrometer.

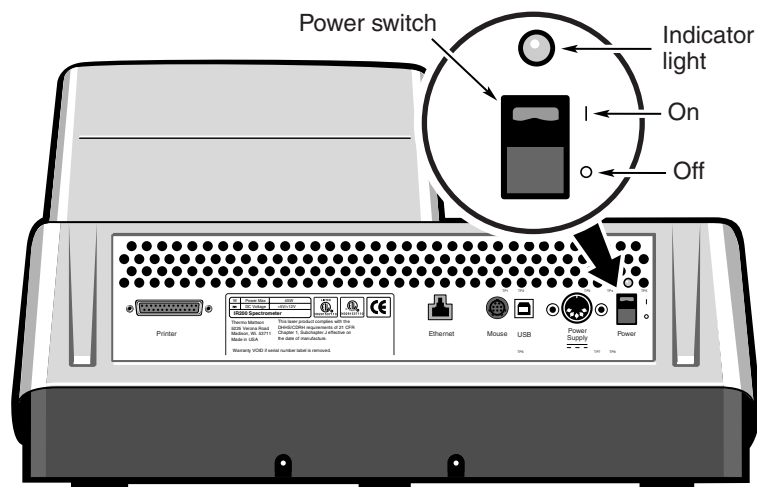
- 4. Carefully lower the spectrometer so that it rests flat on the work surface, reconnect the power cable and turn on the power.**

Make sure the purge gas source is set to maintain the flow rate between 10 and 35 scfh.

Using the Transport Kit

After you have set up the spectrometer as explained in the preceding chapter, turn on the spectrometer power by pressing the power switch on the rear panel.

The light above the power switch indicates that the spectrometer power is on.



Encompass starts automatically when you turn on the power. See “Starting Encompass on a Nicolet IR00” in the “Getting Started” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide* for more information. That manual also explains how to use the software, including collecting and analyzing spectra.

To verify that the spectrometer is operating properly, read the next section.

For an overview of using the provided accessories to collect spectra, read “Using the accessories.”

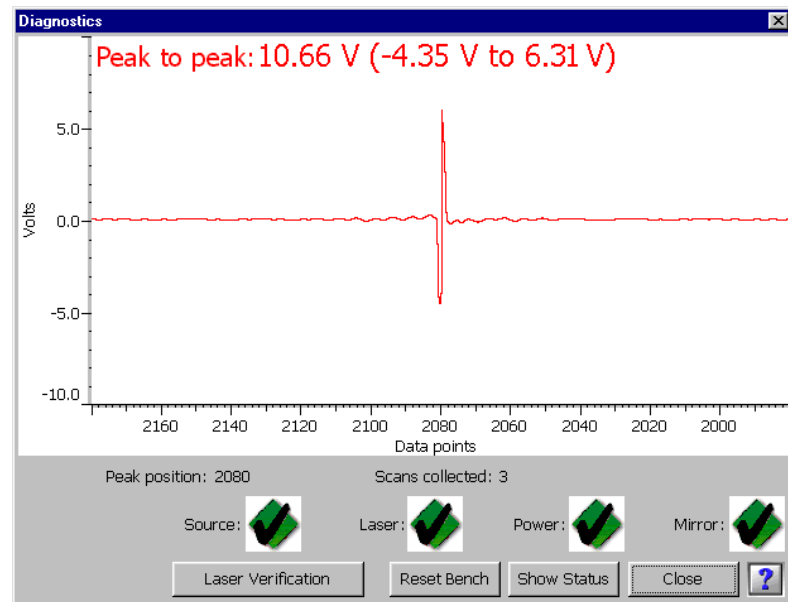
For information about using the ATR Correction macro to correct your ATR spectra for the shifting of infrared absorption bands and the effects of variation in depth of penetration, read “Performing ATR correction.”

To learn how to shut down the system when you are finished using it, read “Shutting down the system.”

Verifying the installation

Once you have installed the spectrometer, you need to verify that it is operating properly by checking the intensity of the detector signal in the live display of Encompass. First make sure no accessories or samples are installed in the spectrometer. (The spectrometer is shipped from the factory with the Transport Kit Golden Gate installed. See “Removing the Transport Kit Golden Gate” for removal instructions.) Then click the Collect button in the Encompass software and choose Diagnostics from the menu. The Diagnostics window appears:

After you open the live display, there will be a short delay before the interferogram appears.



Check the values in parentheses near the top of the window. The absolute value of the larger of these numbers should be at least 6 volts. If it is not, see “Troubleshooting table” in the “Troubleshooting Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer* for instructions.

The Source, Laser, Power and Mirror items should show a check mark. This indicates that those hardware components are working properly. If an X appears instead, see “Troubleshooting table” in the “Troubleshooting Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer* for instructions.

Collecting your first spectrum

If you are using the system for the first time and want to collect your first spectrum, read the “Collecting Spectra” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide*. ▲

Using the accessories

Follow the instructions in the next sections to collect spectra using the provided accessories. For complete information about using the features of Encompass and the spectrometer, see the indicated sections of the *Nicolet IR100 and Nicolet IR200 User’s Guide*.

Before you begin...

1. Make sure the spectrometer is on a flat surface and in an environment that meets the temperature and other requirements described in “Operating conditions” in the “Before You Use the System” chapter.
2. Connect the power source as explained in “Connecting the power source” in the “Setting Up the Spectrometer” chapter.
3. Turn on the power as explained at the beginning of this chapter.
4. Check the signal intensity without an accessory installed, as explained in “Verifying the installation” in the “Setting Up the Spectrometer” chapter.

Transport Kit Golden Gate

The Transport Kit comes with a special version of the Transport Kit Golden Gate ATR accessory that has been designed to fit your spectrometer. This section explains how to install the accessory, use it with the TRANSPORT.MAC macro to analyze samples, and clean it. For more information about using the accessory, see the provided *MKII Golden Gate Single Reflection ATR System User Manual*, which fully describes the standard version of the accessory. The information in that manual applies to your accessory, with the exceptions explained in this section.

Your version of the accessory includes these features:

- Diamond crystal 45° top plate (unheated).
- KRS-5 focusing lenses.
- Reactive-sample anvil. You can order other anvil types.
- Removable top plate. This lets you install samples in a safe environment such as under an exhaust hood. It also lets you clean or decontaminate the top plate apart from the spectrometer.

To ensure a good seal with the reactive-sample anvil, the maximum thickness allowed for a rigid, noncompressible sample is 0.50 mm (0.02 in). Also, the sample diameter must be no greater than 9.5 mm (0.375 in) if you use this anvil.

The next sections explain how to install and use the accessory.

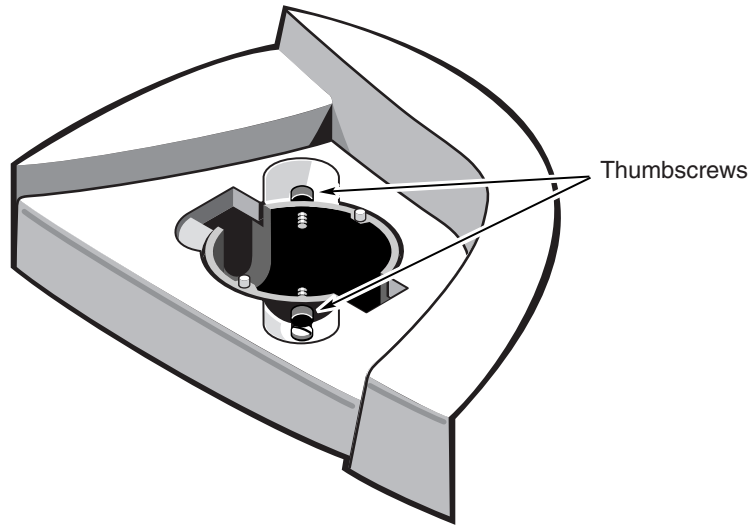
Installing the Transport Kit Golden Gate

Follow these steps to install the Transport Kit Golden Gate accessory:

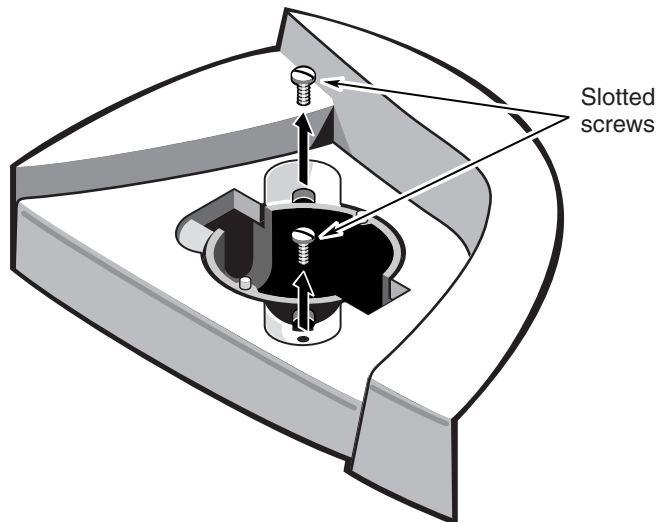
1. Remove the Transmission accessory if it is installed.

See the *Foundation Series User's Manual* if you need help.

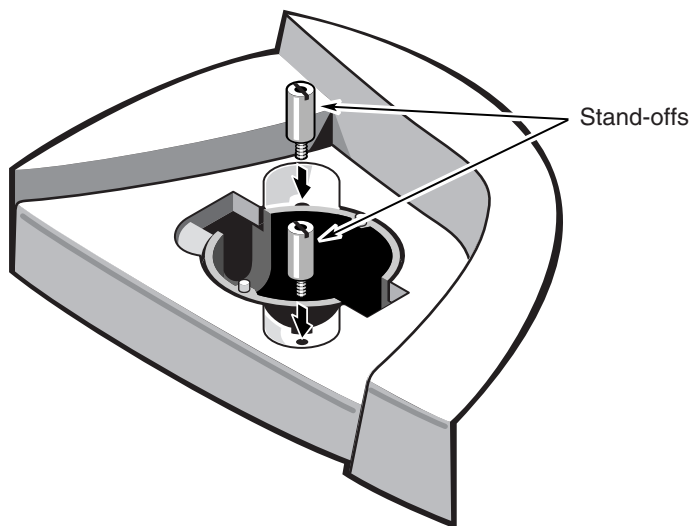
2. Use your fingers to screw the two thumbscrews in the Foundation well all the way in.



3. Use a flat-blade screwdriver to remove the two slotted screws from the spectrometer.



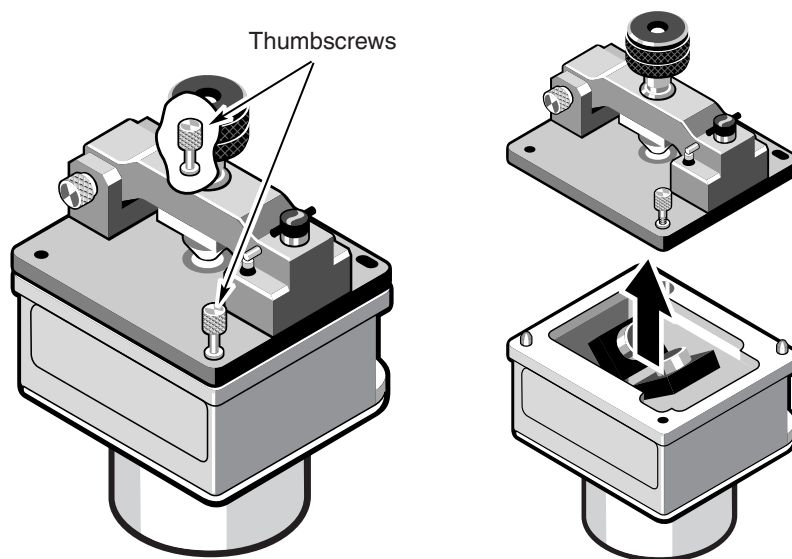
4. Use your fingers or a flat-blade screwdriver to screw the two stand-offs into the screw holes.



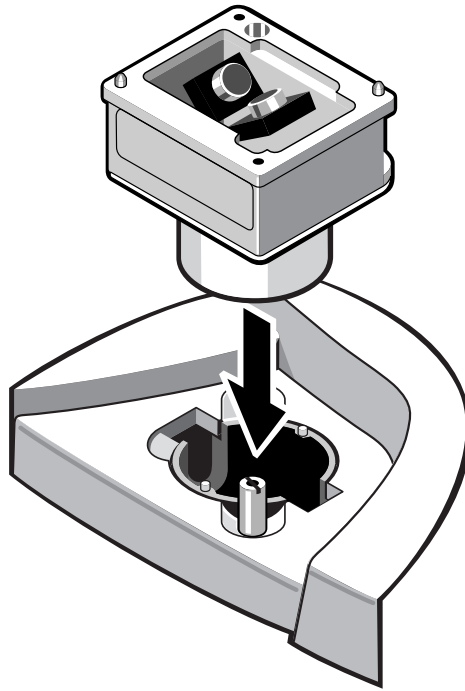
- Important** In the next step be careful not to touch the focusing lenses or any other part of the exposed accessory optics. ▲
- ▲ **Caution** The focusing lenses are made of KRS-5, a toxic material. If you accidentally touch a lens, wash your hands before eating. ▲

5. Remove the top plate from the Transport Kit Golden Gate accessory.

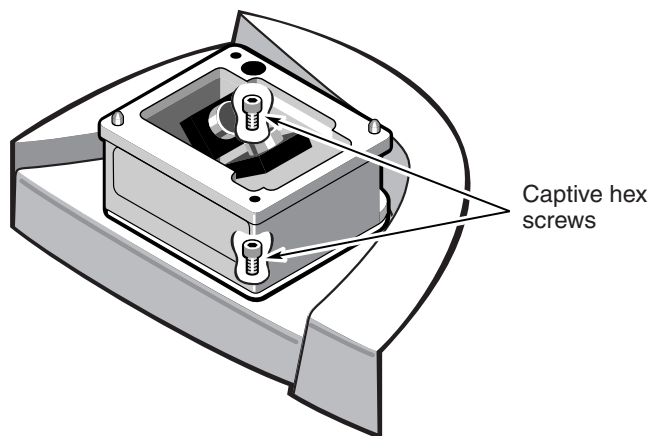
First use your fingers to loosen the two thumbscrews and then lift off the top plate.



6. Place the accessory, without the top plate, into the spectrometer.



7. Using the provided hex wrench, tighten the two captive hex screws to attach the accessory to the stand-offs.



8. Replace the top plate and secure it with the thumbscrews you loosened earlier.

The accessory is now ready to use, as explained in the next section.

See “Removing the Transport Kit Golden Gate” for information on removing the accessory.

Using the Transport Kit Golden Gate to analyze samples

When used with the Transport Kit Golden Gate accessory to perform a sample analysis, the TRANSPORT.MAC macro performs the following sequence of operations. You are prompted at appropriate times to perform operations or enter needed information.

1. Collects a background spectrum.
2. Collects a sample spectrum.
3. Searches the libraries on the flash memory card.

4. Finds peaks in the sample spectrum, if desired.
5. Saves the sample spectrum, if desired.
6. Saves the report containing the search results (and any list of found peaks), if desired.
7. Exits the macro. You can then visually compare the results of your analysis.

Follow the steps below to use the TRANSPORT.MAC macro with the Transport Kit Golden Gate to perform a sample analysis. Step 2 explains how to run the macro. If the accessory is not installed, first install it as explained in the preceding section.

▲ Warning

To avoid personal injury, use solvents or bleach solution only with adequate ventilation. Avoid spilling combustible solvents, and keep them away from sparks, heat and open flames. Avoid contact with eyes, skin and clothing; wear appropriate protective goggles, aprons, gloves, etc. as needed. Do not allow solvents, bleach solution or any other liquid to run into any openings in the spectrometer cover. *See the Material Safety Data Sheet for the solvent or other material you are using for detailed safety information.* Material Safety Data Sheets are normally available from the supplier of the material. ▲

1. Make sure the crystal is clean.

You can use a clean cotton swab moistened with an appropriate solvent to wipe the crystal. Allow the solvent to evaporate completely before collecting data.

Important

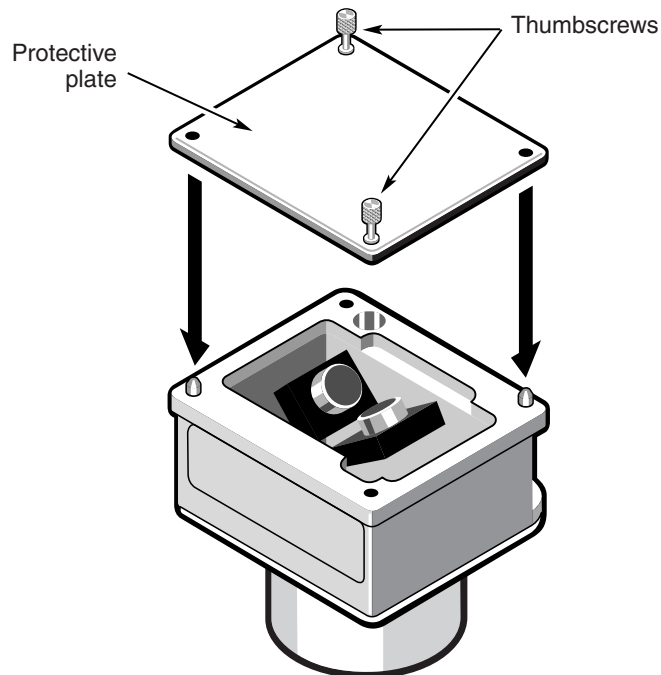
If you remove the top plate, be careful not to touch the focusing lenses or any other part of the exposed accessory optics. ▲

▲ Caution

The focusing lenses are made of KRS-5, a toxic material. If you accidentally touch a lens, wash your hands. ▲

You can remove the top plate to clean or decontaminate the crystal and the rest of the top plate apart from the spectrometer. (See step 5 of the installation procedure in the preceding section for instructions for removing the top plate.) The appropriate solution for cleaning or decontamination depends on the sample material and your organization's approved procedures. As an example, you can use a nominal 10% chlorine bleach solution. Wipe the top plate with a soft cloth moistened with the bleach solution, or immerse the entire top plate assembly in the bleach solution. Then rinse the solution off with clean water and wipe the assembly dry. Be sure to dry the underside of the top plate, especially in the vicinity of the crystal. When you are finished, replace the clean, dry top plate on the accessory.

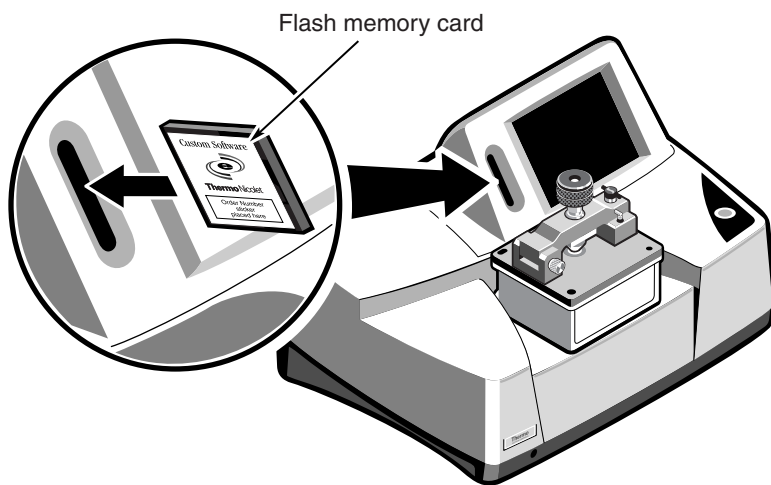
If you remove the top plate, we recommend protecting the exposed accessory optics by placing the provided protective plate on the two pins as shown below. Tighten the two captive thumbscrews to hold the plate in place.




Remove the protective plate before reinstalling the top plate.

2. Start the TRANSPORT.MAC macro.

First insert the flash memory card that contains it into the slot on the front of the spectrometer, as shown below. See the illustration of the contents of the smaller travel case in the “Setting Up the Spectrometer” chapter for the location of the plastic case that contains the card. **For information about using flash memory cards, including static-electricity precautions, see “Using flash memory cards” in the “Software Management” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide*.**



Next use the Run Macro command available through the File button in Encompass to locate and run the macro. See the “Running a Macro” chapter of the *Encompass Macros User’s Guide* for detailed instructions. To see the available macro files, you will need to click the  button in the Open dialog box until “My Computer” appears and then double-click the folder named “Storage Card.” Then select the TRANSPORT.MAC macro and choose Open.

Follow the instructions that appear on the screen, as further explained in the next steps.

3. When you are prompted to clean the sampling area, make sure it is clean and then choose OK.

The background must be collected with the cleaned top plate installed, with no sample applied to the crystal. See step 1 for information about cleaning the crystal.

When you choose OK, background collection begins.

Tip You can speed up your analyses by purchasing an extra top plate for collecting backgrounds. One person can collect a background with the background plate while another person cleans the sample plate and installs the next sample. ▲

4. When you are prompted to install the sample, install it and then choose OK to collect the sample spectrum.

See the *MKII Golden Gate Single Reflection ATR System User Manual* for detailed instructions for raising the clamp bridge, installing the sample and clamping down the bridge. The technique used depends on the sample type (liquid, powder, fiber, etc.).

Use just enough sample material to cover the crystal completely.

Use proper evidence handling and personal protection as needed.

If necessary, you can remove the top plate to install the sample in a safe environment such as under an exhaust hood and then reinstall the top plate on the accessory. Follow the precautions given in step 1. If you remove the top plate, we recommend protecting the exposed accessory optics by using the provided protective plate as described in step 1.

Continue to respond appropriately to the prompts that appear.

- 5. After you exit the macro, remove your sample and clean the crystal with an appropriate solvent.**

Follow the safety precautions given in the Warning that appears before step 1.

Removing the Transport Kit Golden Gate

Follow the steps below to remove the Transport Kit Golden Gate accessory.

Important When you remove the top plate, be careful not to touch the focusing lenses or any other part of the exposed accessory optics. ▲

▲ Caution The focusing lenses are made of KRS-5, a toxic material. If you accidentally touch a lens, wash your hands before eating. ▲

- 1. Remove the top plate from the accessory.**

First loosen the two thumbscrews and then lift off the top plate. See step 5 in “Installing the Transport Kit Golden Gate” for an illustration showing the thumbscrews.

- 2. Loosen the two captive hex screws that attach the accessory to the stand-offs.**

See step 7 in “Installing the Transport Kit Golden Gate” for an illustration showing the screws.

- 3. Lift the accessory out of the spectrometer.**

- 4. Replace the top plate and secure it with the thumbscrews you loosened earlier.**

5. Unscrew the two stand-offs from the spectrometer.

See step 4 in “Installing the Transport Kit Golden Gate” for an illustration showing the stand-offs.

6. Screw the two slotted screws into the spectrometer.

Skip this step if you have removed the accessory as part of verifying the installation and plan to reinstall it.

See step 3 in “Installing the Transport Kit Golden Gate” for an illustration showing the screws.

Transmission

Follow the general steps below to collect a spectrum using the Transmission accessory. See the *Foundation Series User's Manual* for detailed information about installing and using the accessory.

1. Install the Transmission accessory in the spectrometer.

If the Transport Kit Golden Gate accessory is installed, remove it as explained in “Removing the Transport Kit Golden Gate.”

2. Remove any sample from the accessory so that the beam path is clear.

3. Use the Collect Options command available through the Setup button to set the data collection options.

See “Setting the data collection options” in the “Software Management” chapter of the *Nicolet IR100 and Nicolet IR200 User's Guide* for details.

4. Use the Background command available through the Collect button to collect a background spectrum.

See “Collecting a background” in the “Collecting Spectra” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide* for more information.

5. Install the sample.

Use proper evidence handling and personal protection as needed. You can remove the accessory to install the sample in a protected environment if necessary.

6. Use the Sample command available through the Collect button to collect a sample spectrum.

See “Collecting a sample spectrum” in the “Collecting Spectra” chapter of the *Nicolet IR100 and Nicolet IR200 User’s Guide* for more information.

Performing ATR correction

You can use the ATR Correction operation in a macro to correct attenuated total reflection (ATR) spectra for the shifting of infrared absorption bands and the effects of variation in depth of penetration. We recommend using this operation only if wavelength accuracy is a major concern. The operation may take several minutes.

Note The ATR Correction operation is available only for the Transport Kit and is not described in the *Encompass Macros User's Guide*. ▲

To use the operation, add it to a new or existing macro and then run the macro. The operation will be performed on the selected spectrum (this can be a spectrum opened or collected by the macro or a spectrum that was selected before you started the macro.) See the *Encompass Macros User's Guide* for complete information about creating, editing and running macros.

Shutting down the system

When you are finished using the Transport Kit, follow these steps to shut down and store the system:

- 1. Turn off the spectrometer power by pressing the power switch on the back of the spectrometer.**
- 2. Unplug the cable from the power source.**

The power source may be an AC wall outlet, a rechargeable battery or the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle.

Important

If you do not unplug the cable from a rechargeable battery or the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle, current will continue to flow and the power source will be drained of charge. ▲

- 3. Clean and store any accessories you used.**
- 4. As appropriate, disconnect the mouse, printer and other system components you connected when you set up the system.**

If you ran the spectrometer in its travel case, you don't need to disconnect the mouse or the power supply.

- 5. If you removed a cap from a purge connector when you connected a purge line, replace the cap.**

Important

This step is important for maintaining the desiccated condition inside the spectrometer to protect the optical components. ▲

6. Check the humidity indicator and replace or dry the desiccant if necessary.

See “Checking the desiccant” in the “Setting Up the Spectrometer” chapter for more information.

7. Place the spectrometer inside the provided plastic bag.

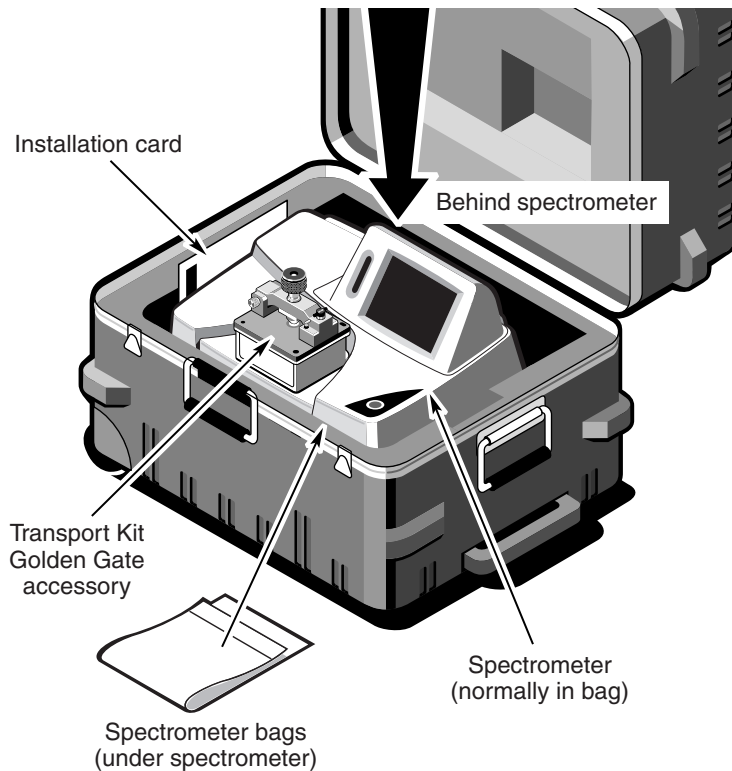
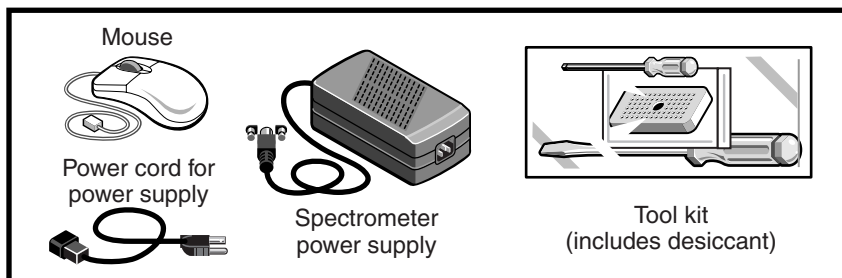
Use packing tape, or a similar tape, to seal the bag.

8. Place all the components in the travel cases, and then close the covers of the cases and secure the latches.

The following illustrations show where to place the components.

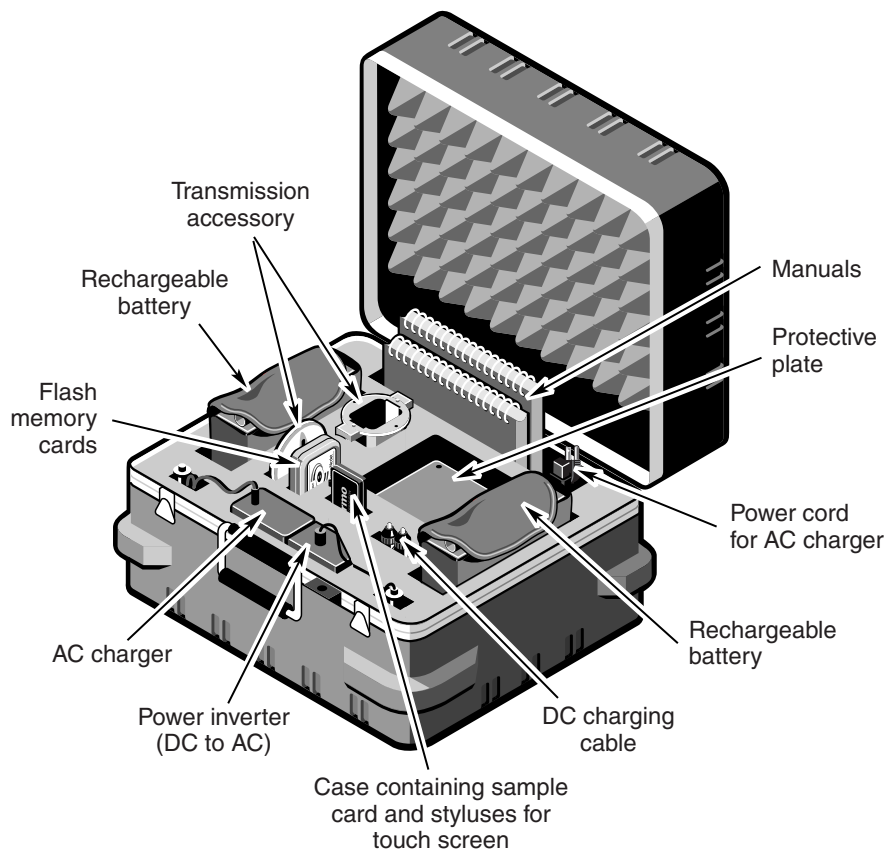
If you used a rechargeable battery to power the system, we recommend recharging it as soon as possible to keep the system ready for operation.

If you purchased the system for use outside the U.S.A., it may also include special power cords required for the electrical outlets in your country.



Larger travel case

The compartment that holds the protective plate can also be used to store the Transport Kit Golden Gate accessory.



Smaller travel case

Maintaining and Servicing the System

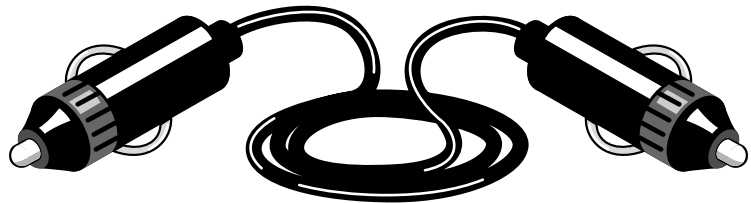
Most of the information you need to maintain and service your Transport Kit is contained in the manual titled *Servicing Your Spectrometer*. When you use that manual, follow the instructions given for the Nicolet IR100, with a few exceptions. These are explained in the next sections.

Recharging the batteries

To extend the life of a rechargeable battery, recharge it within a few hours when it has become depleted from use. It typically takes about 4 hours to fully charge a drained battery.

There are two ways to recharge a rechargeable battery provided with the spectrometer:

- To use an indoor AC wall outlet, connect the battery to the provided charger and connect the charger to the wall outlet, as explained in the documentation that came with the batteries and charger. Be sure to read and follow all the safety precautions. Use the charger indoors only.
- To use the cigarette lighter outlet or 12-volt DC auxiliary outlet of a motor vehicle, start the vehicle's engine and then connect the battery to the outlet using the provided DC charging cable (shown below).



Important To prevent overcharging the battery and shortening its life, do not allow the charging cable to remain connected for longer than recommended by the instructions that came with the charger. ▲

You can drive the vehicle while the battery is being charged.
When you are finished charging the battery, disconnect the cable.

▲ Warning If you recharge the battery using a running motor vehicle, make sure engine exhaust gases do not accumulate. ▲

Cleaning the spectrometer

Your spectrometer may sometimes require cleaning to remove contaminants from its exterior. The cleaning procedure varies depending on the environmental conditions and types of samples you have analyzed.

Before you clean the spectrometer, turn off its power, disconnect the power cable from the power source, and then disconnect the power cable and all other cables from the back of the spectrometer. (For more information, see steps 1 and 2 of “Removing the main cover” in the “Servicing Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer*. Pay close attention to all instructions and precautions.)

For general cleaning to remove nonhazardous contamination from the outside of the spectrometer, you can wipe it with a soft, damp (not wet) cloth and a mild detergent. Do not use harsh abrasives or detergents.

Important To prevent damage to the exterior of your spectrometer, do not allow acetone, acetonitrile, tetrahydrofuran, or other harsh detergents or chemicals to come into contact with the main cover. ▲

Important Do not allow cleaning products or other liquids to run into any openings in the spectrometer cover, including around the display or sample compartment. Liquids must not come into contact with any part of the interior of your spectrometer. Do not attempt to clean any internal component or touch any of the optical surfaces such as the mirrors, beamsplitter, and the windows. If you wish, you can remove dust with a gentle stream of purge gas. (Acceptable purge gases are dried air or nitrogen. For more information, see “Selecting a purge gas” in the “Before You Use the System” chapter.) Do not use cloth, paper, or any kind of solution or canned cleaning air to remove dust. Commercial cleaning air can damage optical surfaces and interfere with spectral data. ▲

To clean the touch screen, wipe it with a soft cloth slightly dampened with ordinary glass or surface cleaner, or with chlorine bleach if disinfection is required. Do not spray or pour cleaner on the screen; damage could occur. If it is necessary to remove foreign material with an organic solvent, you can wipe the screen with a cloth slightly dampened with acetone, methylene chloride, methyl ethyl ketone, isopropanol, hexane or mineral spirits.

▲ Warning

To prevent personal injury, follow good laboratory practices for safely handling solvents and other cleaning materials. ▲

To clean the spectrometer of hazardous contamination, follow your organization's procedures for decontaminating electronic equipment, being careful to heed the precautions given earlier in this section.

Replacing the laser

Your spectrometer includes a HeNe laser. The laser provides the reference signal for triggering data collections and measuring the stroke of the moving mirror. If you ever need to replace the laser, follow the steps below. You will need a flat-blade screwdriver and about 10 minutes to complete this procedure.

Important

Make sure you note the part number of the laser in your spectrometer, and use that part number to order the same type of replacement laser from Thermo Electron. ▲

▲ Caution

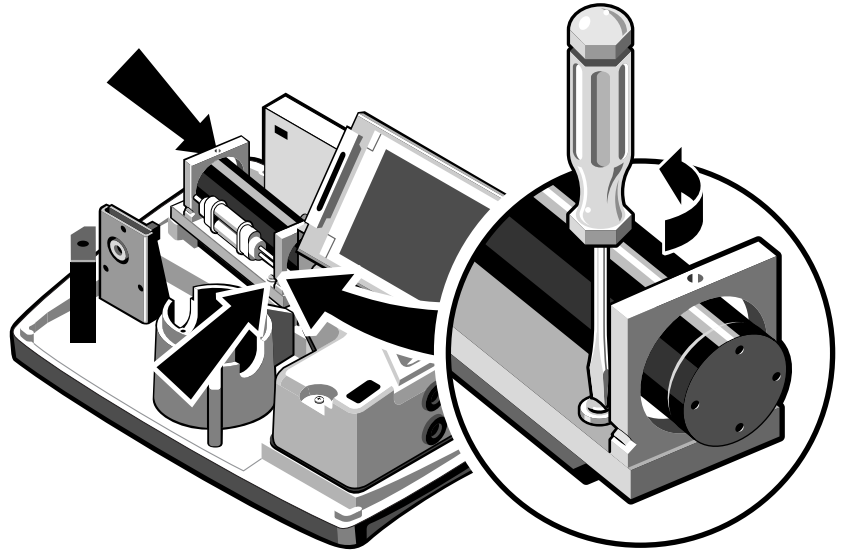
Never stare into the bright red laser beam or a reflection of the laser beam. ▲

- 1. Turn off the spectrometer power, disconnect the power cable and all other cables from the back of the spectrometer, and then remove the main cover.**

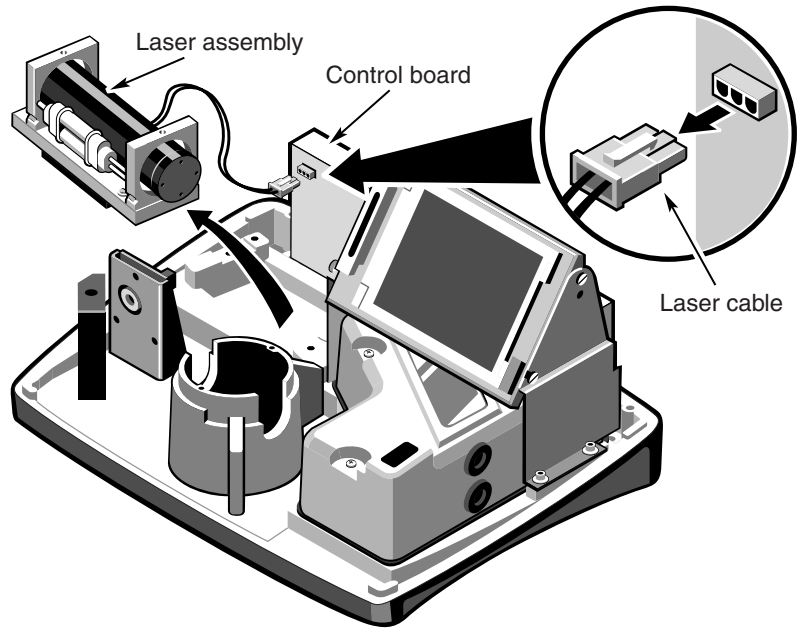
For more information, see “Removing the main cover” in the “Servicing Your Spectrometer” chapter of *Servicing Your Spectrometer*.

2. Use the flat-blade screwdriver to loosen the screws on the corners of the laser assembly.

The screws on the laser assembly cannot be completely removed.



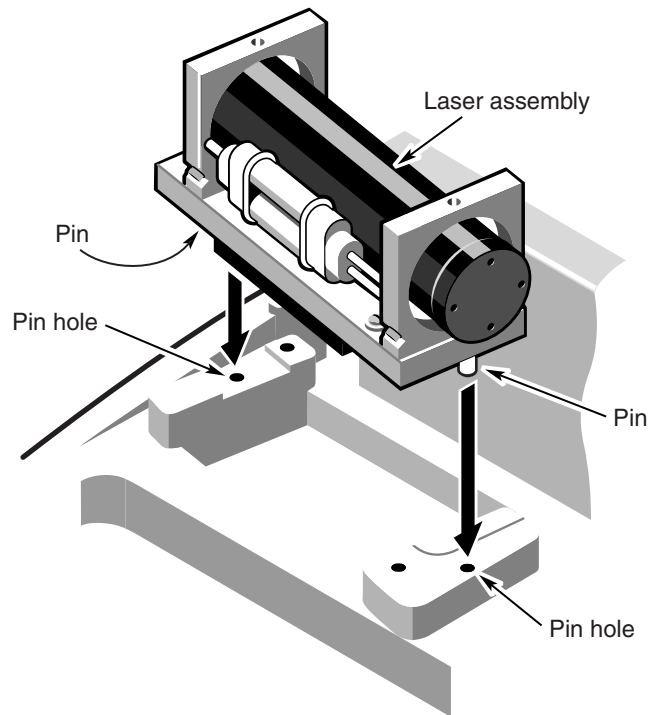
- 3. Lift the laser assembly out of the spectrometer and disconnect the laser cable from the control board.**



- 4. Connect the laser cable of the new laser assembly to the control board.**

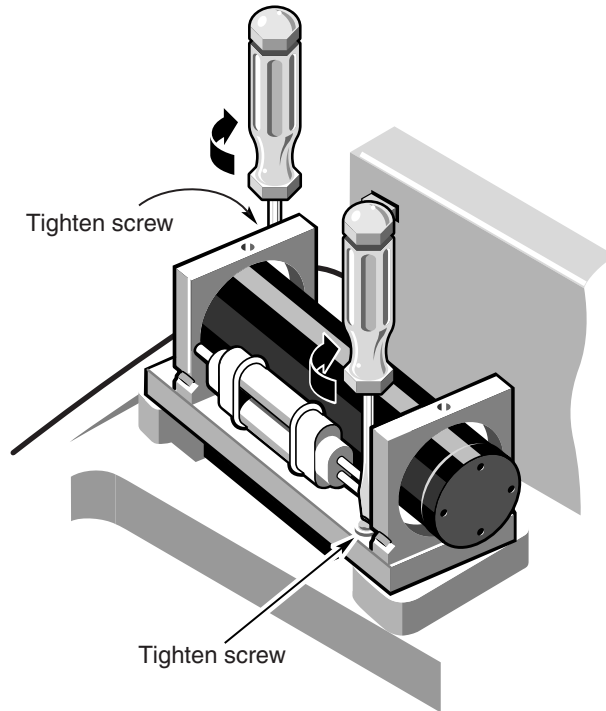
5. Place the new laser assembly into the spectrometer.

Make sure the pins on the underside of the laser assembly align with the holes in the baseplate. Also, make sure there are no cables or wires under the laser assembly when you place it. The assembly is seated properly when it does not rock or wobble.



6. Use the flat-blade screwdriver to tighten the screws in the corners of the laser assembly.

The screws are part of the laser assembly and cannot be removed.



7. Reinstall the main cover of the spectrometer.

Cleaning or replacing the interferometer window

The interferometer window in your spectrometer is made of KRS-5, a material whose low affinity for water vapor helps protect it in high-humidity environments. If you need to replace the window, follow the instructions given for KBr windows in “Replacing the interferometer window” in the “Servicing Your Spectrometer” chapter of *Servicing Your Spectrometer*. Be sure to order the correct part number; see the replacement parts list that came with the Transport Kit.

▲ Caution

KRS-5 is a toxic material. Wear clean gloves or finger cots when handling the interferometer window. If you accidentally touch the window with your hands, wash them. ▲

If the window ever becomes wet or dirty, follow the instructions below to dry or clean it. The window replacement procedure in *Servicing Your Spectrometer* explains how to remove the window from the interferometer cover and reinstall it. This will allow you to dry or clean both sides of the window. There is no need to remove the window from the holder ring.

Important

To avoid scratching the window surface, apply only light pressure when drying or cleaning it. ▲

If the window becomes wet (due to condensation or for any other reason), wipe it gently with a dry cotton ball or lotion-free facial tissue.

If the window becomes dirty, wipe it gently with a cotton ball or lotion-free facial tissue moistened with water and then wipe it gently with a dry cotton ball or lotion-free facial tissue. If the window is still dirty, try gently rubbing it with a clean cotton ball moistened with alcohol solution. Then gently rub the window with a new cotton ball moistened with water. Finally, dry the window by wiping it gently with a dry cotton ball or lotion-free facial tissue. If this does not clean the window, it needs to be replaced.



Troubleshooting

If you experience a problem with your Transport Kit, first use the following troubleshooting table to determine the cause of the problem and find the solution. If the needed information is not in the table, read the “Troubleshooting Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer*. Follow the instructions given for the Nicolet IR100.

If you are unable to solve a problem after following the provided instructions, contact Thermo Electron at one of the numbers below. Outside the U.S.A. call your local sales or service representative.

- Telephone (U.S.A.): 800-642-6538 or 608-276-6373
- Fax: 608-273-6883
- World Wide Web: <http://www.thermo.com/nicolet>
(Choose ABOUT US and then click the desired location under “Contact Us” at the left side of the page.)
- E-mail: careplan.techsupport@thermo.com ▲

Problem	Possible Cause	Solution
<p>The green indicator light above the power switch on the back of the spectrometer does not illuminate when the switch is on.</p>	<p>The power cables are not connected properly.</p> <p>The rechargeable battery or vehicle battery is discharged.</p> <p>The power inverter is malfunctioning.</p> <p>The external power supply is malfunctioning.</p>	<p>If you are using the power inverter, make sure it is connected to the external power supply and to a 12-volt DC power source. (Note: The power inverter must be connected to the external power supply before you connect the inverter to the power source. If necessary, disconnect the inverter from the power source and then reconnect the cables in the correct order.)</p> <p>If you are not using the power inverter, make sure the external power supply is connected to an AC wall outlet.</p> <p>Make sure the external power supply is connected to the spectrometer.</p> <p>Charge the battery.</p> <p>If the green indicator light on the power inverter does not illuminate when the inverter is connected to a charged battery, contact Thermo Electron for information about replacing the inverter.</p> <p>See “The power indicator or the power supply indicator (if you have a Nicolet IR100 or Nicolet IR200) is dark” item in the troubleshooting table in the “Troubleshooting Your Spectrometer” chapter of the manual titled <i>Servicing Your Spectrometer</i> for more information.</p>

For more troubleshooting information, see the “Troubleshooting Your Spectrometer” chapter of the manual titled *Servicing Your Spectrometer*. Follow the instructions given for the Nicolet IR100.

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