Spectrum RX I
Advanced Operations

Release History

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User Assistance
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Warnings and Safety Information

Summary

The Spectrum RXI has been designed to comply with a wide variety of international standards governing the safety of laboratory equipment. In routine use, the Spectrum RXI poses virtually no risk to you. If you take some simple, common-sense precautions, you can make sure that you maintain the continued safe operation of the instrument:

DO make sure that the Spectrum RXI is properly connected to the electrical supply; in particular make sure that the ground (earth) is securely connected.

DO disconnect the electrical power cable before opening the main cover of the Spectrum RXI.

DO keep the Spectrum RXI dry. Avoid spilling liquid into the instrument, especially into the top of the display-screen housing, which contains a high-voltage supply. Clean all external spills immediately. If anything that is spilled enters the main body of the Spectrum RXI, switch off the power and call a Perkin-Elmer Service Engineer.

DO NOT stare into the laser beam. The Spectrum RXI contains a low power, visible (red) laser; momentary exposure to the beam is not dangerous, but deliberate, direct viewing of the beam along its axis could damage your eye.

DO NOT use a flammable gas to purge the Spectrum RXI. The Spectrum RXI contains a hot source, and a fire or explosion will result. Only use clean, dry, oil-free nitrogen or air to purge the instrument.

DO take care if you need to open the main cover of the instrument. The screen is a separate unit and must be removed before opening the cover.

DO read the more detailed information on safety in *Getting Started*.

Electrical Safety

The Spectrum RXI must only be connected to equipment meeting the requirements of IEC 61010-1 (Safety requirements for electrical equipment for measurement, control and laboratory use – general requirements) or IEC 60950 (Safety of information technology equipment).

When this label is attached to the instrument it means 'Caution: risk of danger'. Refer to the manual to find out the nature of the potential hazard and any actions which have to be taken.

This manual contains the more advanced features of the Spectrum RXI and the features that you will require less frequently – such as the instrument diagnostics and maintenance procedures.

Using this Manual

This manual has seven chapters:

- **User Preferences**: setting the beeper volume, clock, screen colors, user name, keypad lock, and setup.
- **Communicating with other Devices**: how to install peripherals and configure the Spectrum RXI to communicate with them.
- **Instrument Diagnostics**: diagnostic tests.
- **Maintenance**: maintenance procedures that you can do yourself.
- **Typed Commands**: each set of keypresses you use to execute a command has a typed equivalent; this chapter describes these.
- **Using the Disk Drive**: more advanced features of the disk drive. Copying files is described in *Copying and Storing Data* in *Routine Operations*.
- **Index**

Conventions Used

All the documentation supplied with your Spectrum RXI use the following conventions to indicate various methods of entering commands:

- Keypad keys are referred to as *hard keys* and are represented by gray boxes. For example, scan.
- The top row of the keypad keys are called the soft keys. The function of the soft keys changes as you access different commands. Instead of permanent labels, soft keys have labels that appear on the screen. Soft keys are represented by white boxes: setup.
- Soft keys that execute their command immediately, without the entry having to be confirmed, are called *action keys*. Action keys are represented by black boxes: EXECUTE.
- Text that you type, or that appears on the screen is printed in **this type**: The cursor moves to the **from** field. Type **1020**.
- Typed commands for use in method/Obey files are printed in **this type**: **noise Y 4000 3750**

  In a representation of the format for such a command, only the key word is **bold**:

  noise x w1 w2

User Preferences 1

Changing the Beeper Volume

Each time that you press a key on the keypad, you hear a beep; this tells you that the keypress was effective. The Beeper option enables you to change the volume of the beep, or switch it off. The beeper volume is specified by an integer scale from 0 (off) to 255 (loud).

NOTE: *You cannot change the volume of the beep that tells you that you have pressed an invalid key; it is always at full volume.*

1 At Ready For Next Command, press
setup OTHERS OTHERS misc beeper .
The command line and soft keys in Figure 1-1 appear.

Figure 1-1 The Beeper Option Command Line and Soft Keys

2 Set the volume by either:

* Typing an integer.

or

* Pressing a soft key to set the volume at **off** , **soft** , **medium** , or **loud**.

3 Press EXECUTE EXIT .
Ready For Next Command returns.

Setting the Clock

Using the Clock option, you can set the date and the system clock.

NOTE: *The typed command* **clock** *sends the current date and time, as set by the Clock option, to the printer. Use it to date the output of method files.*

1 At Ready For Next Command press **setup** (OTHERS) (OTHERS) (misc) (clock).
The command line and soft keys in Figure 1-2 appear.

Figure 1-2 The Clock Option Command Line and Soft Keys

2 Set the date and time; press **enter** to move the cursor to the next field, or press the appropriate soft key, then type the setting that you want.

3 Press (EXECUTE).
Ready For Next Command returns.

NOTE: *If you have just changed the desiccant, you can press* **shift** (EXECUTE) *to set the date of the last desiccant change to the current date. Refer to* Resetting the Date of the Last Desiccant Change *in Chapter 4.*

Choosing a Color Scheme

There are four fixed color schemes for the Spectrum RXI: **factory**, **preset1**, **preset2**, and **preset3**. In addition, there are four color schemes that you can customize: **user1**, **user2**, **user3** and **user4**. These four **user** color schemes are initially the same as the four preset color schemes.

Choosing a Preset Color Scheme

1 Press *setup* *view* *OTHERS* *colors* .
The screen in Figure 1-3 appears.

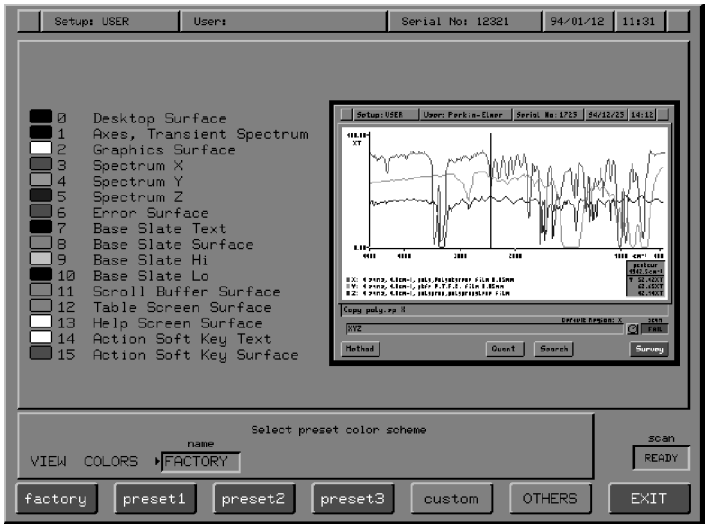


Figure 1-3 Choosing a Color Scheme

2 Choose one of the color schemes (press *OTHERS* to display the soft keys for the user color schemes).
The color scheme is displayed in the picture of the screen and in the screen itself.

3 When you are satisfied with the color scheme, press *EXIT* twice.
Ready for Next Command returns.

Customizing the User Color Schemes

NOTE: *You can only customize the user setups; you cannot customize the factory and preset color schemes.*

Changing the colors

1 Press **setup** **view** **OTHERS** **colors** **OTHERS** .

2 Press **custom** .
The command line and soft keys in Figure 1-4 appear. If they do not, you are using the factory setup or a preset color scheme. You can change to the user setup by pressing **restore** **setup** **user** *and choosing one of the user color schemes.*

Figure 1-4 The Command Line and Soft Keys for Selecting a color#

3 In the **color#** field, type the number of the color that you want to modify, or use ↑ and ↓ to select a part of the screen.
Figure 1-5 shows the parts of the screen, and their numbers.

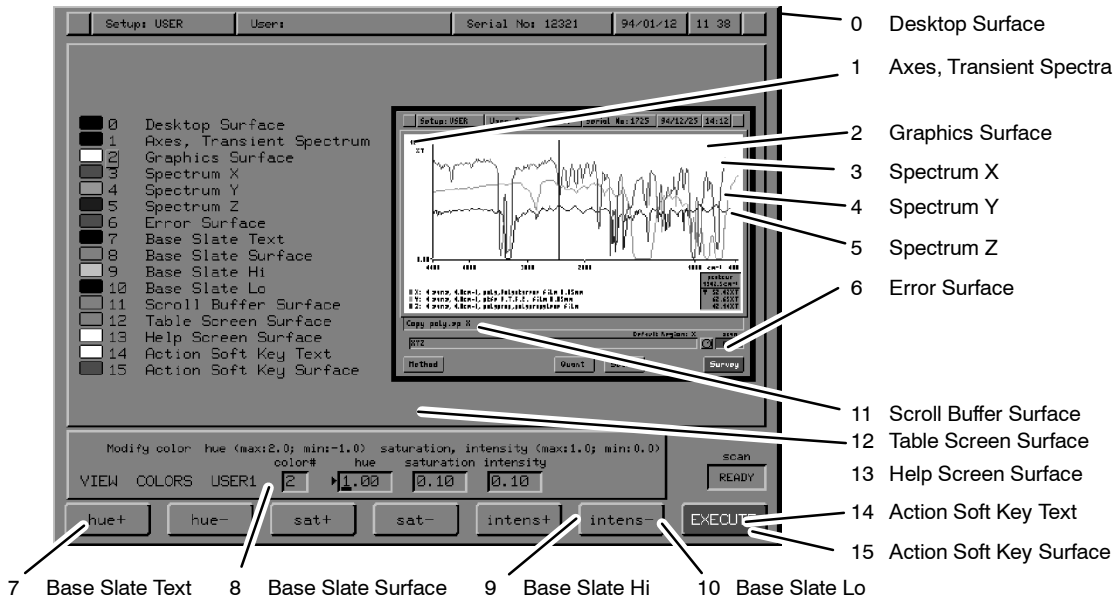


Figure 1-5 Parts of the Screen

4 Press **enter**.
The soft keys for hue, saturation and intensity appear. These three properties of a color are described below.

hue *– A color's hue is expressed as a number between 2 and -1.00. The spectrum of hues is a continuous scale – each primary color has a hue, but each color in between also corresponds to a hue.*

saturation *– This describes the amount of hue in a color. As you reduce a color's saturation, more white is mixed with the hue and the color becomes paler. A pure primary color has a saturation of 1; grey has no hue, and so has a saturation of 0.*

intensity *– A color's intensity describes its brightness. As you reduce a color's intensity, more black is mixed with it and it becomes darker. A pure color, and also white, has a brightness of 1; black has a brightness of 0.*

5 Use the soft keys to change the hue, saturation and intensity of the color.
If you are changing from black to another color, change the intensity first, then the saturation, and then the hue. The color of the sample screen, and, if appropriate, the screen, is updated as you proceed. If you want to undo your changes, press **cancel**.

6 When you are satisfied with the color, press EXECUTE.
The user color scheme is overwritten with the new one: your changes cannot now be undone. The number of the next color appears in the **color#** *field.*

7 When you have created your color scheme, press EXIT three times.
Ready for Next Command returns.

Black and white

A color is black if it has an intensity of 0%. If you change the hue or saturation of black, its color does not change.

A color is white if it has a saturation of 0%. If you change the hue of white, its color does not change.

What to do when you cannot read the soft keys

It is possible to set up a color scheme with black on black, for example, black text on black soft keys, which is impossible to use. If you find the Spectrum RXI in this situation:

1 Switch off the Spectrum RXI.

2 Switch it on again.

3 Type **view colors factory**.
The factory colors are restored.

Changing the User-name

If you enter a user-name, it:

- is saved with each spectrum that is collected;
- appears in the Status information for the spectrum;
- appears in the captions of plots.

Changing the user-name

1 At Ready For Next Command, press **setup** (**user**) .
The command line in Figure 1-6 appears.

Figure 1-6 The Command Line for Specifying the User

2 Type a name of up to 20 characters, or edit the name that is already there.
You can delete a name by pressing **clear** .

3 Press **enter** .
Ready For Next Command returns.

Changing the Instrument Name

The instrument name appears in the title bar of the Spectrum RXI screen. You can change it using the **INST** command.

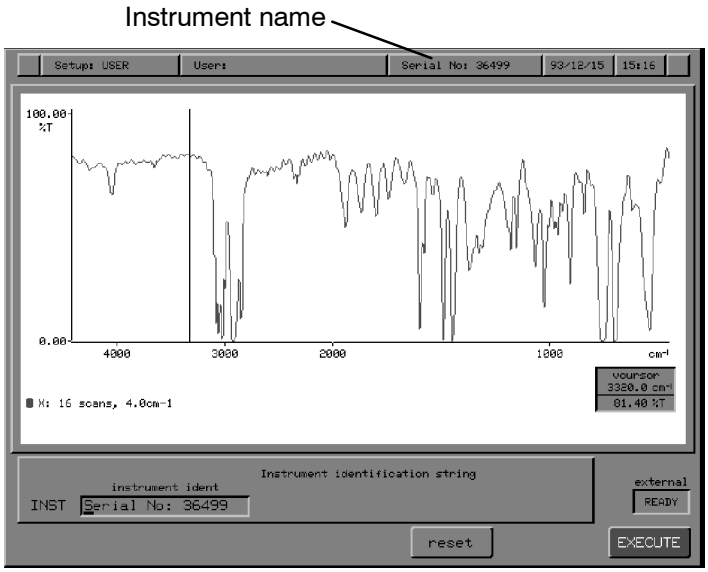


Figure 1-7 The Instrument Name and Command Line

Changing the user-name

1 At Ready For Next Command, press **setup** (OTHERS) (OTHERS) (misc) (inst) .
The command line in Figure 1-7 appears.

2 Type a name, or edit the name that is already there.
You can delete a name by pressing **clear** *, or press* (reset) *to reset the field with the serial number.*

3 Press (EXECUTE) (EXIT) .
Ready For Next Command returns.

Lock Options

The following Lock Options are available:

Lock Method This option is recommended if you are setting up methods that must be followed exactly by other users. When methods are locked, only stored methods can be used; the soft keys are labelled with the names of the methods that are stored in the method regions. All the keypad keys are disabled, except for **restore**. See *Locking the Keypad for Methods* in *Routine Operations*.

Lock Setup When you lock the setup, **setup** is disabled so that no one can change the operating parameters. All other keys work in the usual way.

Lock Routine The routine soft keys enable you to collect a spectrum and plot it, using default parameters. The following action keys are displayed:

scan Present except when no valid background spectrum exists in ratio mode.

plot Present unless no plotter is configured with the Device options of Setup.

print Present unless no printer is configured with the Device options of Setup.

BACKG Present in ratio mode, unless a sample shuttle in automatic mode is installed.

These action keys execute using the current settings in the Scan, Plot, and Print options of Setup. All the keypad keys are disabled, except for **restore**.

Accessing the Lock Options

Setting up the lock

1 At Ready For Next Command press
setup (OTHERS) (OTHERS) (misc) (locks) .
The command line and soft keys in Figure 1-8 appear.

Figure 1-8 The Lock Options Command Line and Soft Keys

2 Choose the option that you want to lock, referring to page 1-9.

3 Press (EXECUTE) (EXIT) .
Ready For Next Command returns, with the keyboard locked as you specified.

Removing the lock

4 To remove the lock, press *restore* (keypad) .
Ready For Next Command returns.

Restoring a Setup

Also see the section *Instrument Configuration Files* on page 1-14.

Setup options

The three setup options are:

factory

Restores the factory-set options. Note that:

- Any changes that you make to the Setup are not saved when you switch off the Spectrum RXI. The next time that you switch it on, your previous (user) Setup is restored.
- The parameters in the Device Options are not restored to factory settings. The printer, plotter, and other peripheral devices continue to work.
- The ordinate mode becomes %T.
- The graphics display returns to its default scale and range.
- The default region becomes Backg.

user

If you have been using the factory options, your customized Setup options are restored. Any changes that you make to the Setup are saved in battery-backed memory.

reset

The Setup options return to their factory-default values (except for the configurations in the Device Options): you cannot restore the current user options later.

Restoring the setup

1 Press ***restore*** ***setup*** .
The command line and soft keys of Restore Setup appear.

Figure 1-9 The Restore Setup Command Line and Soft Keys

2 Press factory or user .

or

Press reset EXECUTE .
Ready for Next Command returns.

Display of setup information in title bar

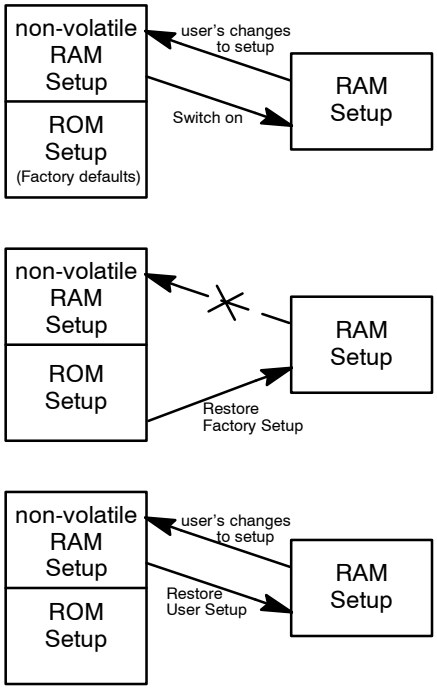
The current setup is displayed in the title bar. The three different types of setup shown are:

- User; the user setup is in use
- Factory; the factory setup is in use
- Temporary; the factory setup is in use, and it has been modified. These modifications will be lost when the Spectrum RXI is switched off.

Storage of setups in the memory regions

The Spectrum RXI stores parameter settings for Setup in three different memory regions, which are illustrated in Figure 1-10:

- The factory default settings are in Read-Only Memory (ROM). This memory is permanent (it is not lost when the Spectrum RXI is switched off), and its contents cannot be changed.
- The current settings are in Random Access Memory (RAM). The contents of RAM can be modified, but they are lost when the Spectrum RXI is switched off.
- Changes that you make to Setup are copied from RAM into non-volatile (battery-backed) RAM. Non-volatile RAM is not lost when the Spectrum RXI is switched off.



Each time you switch on the Spectrum RXI, the Setup is read from non-volatile RAM into RAM. When you make changes to the Setup, they are copied from RAM into non-volatile RAM.

When you restore the factory settings, those settings are copied from ROM into RAM. Now, changes cannot be copied into non-volatile RAM, so your own Setup options are protected; they cannot be overwritten.

When you restore the *User* settings (or when you next switch on the Spectrum RXI), the settings are again read from non-volatile RAM into RAM, and changes can be saved again.

Figure 1-10 Storage of Setups in the Memory Regions

Instrument Configuration Files

NOTE: *Instrument Configuration Files are only available if your Spectrum RXI has a floppy disk drive (***FD:***).*

Instrument Configuration Files enable you to save all of the settings of your Spectrum RXI, including the methods stored in the method regions, to a file. This enables you to have different configurations for different users or for different experiments – you can consider Instrument Configuration Files to be a form of login.

Creating an Instrument Configuration

1 Create a user setup with the parameters and methods you require.

2 At Ready For Next Command, press ***shift*** ***setup***.
The Setup Login command line and softkeys are displayed.

3 Press ***save***.
save *is displayed in the* **option** *field. The cursor moves to the* **name** *field, and the Instrument Configuration Files screen is displayed.*

The Instrument Configuration Files screen displays the login files already saved in the displayed directory.

4 If you want to choose a different directory from the one displayed, press ***newpath*** and use the arrow keys to choose a new path.

5 Type a name for the Instrument Configuration File (up to 8 characters) and press ***enter***.
The filename is displayed in the **name** *field and the cursor moves to the* **password** *field.*

6 Type a password and press ***enter***.
The instrument configuration is saved to the named file.

NOTE: *You can use a blank password.*
If you do not use a blank password, make sure you remember the password, or you will not be able to retrieve the stored instrument configuration files.

Restoring an Instrument Configuration

1 At Ready For Next Command, press **shift** **setup**.
The Setup Login command line and softkeys are displayed.

2 Press **retrieve**.
retrieve *is displayed in the* **option** *field. The cursor moves to the* **name** *field, and the Instrument Configuration Files screen is displayed.*

3 If you want to choose a different directory from the one displayed, press **newpath** and use the arrow keys to choose a new path.

4 Use the arrow keys to select the instrument configuration file that you require and press **enter**.
The filename is displayed in the **name** *field and the cursor moves to the* **password** *field.*

5 Type the password and press **enter**.
The instrument configuration is retrieved. All of the settings, including the methods in the method regions, are restored.

NOTE: *You cannot restore an Instrument Configuration File as part of a method. Unlike* **restore**, *the configuration file will overwrite device information.*

Communicating with Other Devices **2**

Installing Peripheral Devices

Connecting the Cables

Connect each device to the Spectrum RXI as shown in Figure 2-1, using the cables and connectors indicated in the Figure and in Table 2-1. The five connectors for peripheral devices are located on the right-hand side of the Spectrum RXI.

	Model/Type	Part Number of Cable (UK numbers in brackets)	Connector on Spectrum RXI
Printers	9-pin dot matrix	N017 0001 (0497 8094)	parallel port
	HP LaserJet IV	N017 0001 (0497 8094)	parallel port
	HP LaserJet IV	0941 0023	serial
	HP Desk Jet 500C	N017 0001 (0497 8094)	parallel port
	HP Desk Jet 550C	N017 0001 (0497 8094)	parallel port
	HP Desk Jet 510	N017 0001 (0497 8094)	parallel port
Plotters	HP 7440	L225 5137	serial
	HP 7550	L225 5137	serial
Others	Auxiliary keyboard	Supplied with keyboard (ps/2 type connector)	IBM keybd
	PC	0941 0022	remote PC
	I/O port	custom	user I/O

Table 2-1 Peripheral Devices for the Spectrum RXI

NOTE: *Cable 0941 0022 connects the* **REMOTE PC** *connector on the Spectrum RXI to the 9-pin RS232C connector on the rear of your PC. If your PC has a 25-pin RS232C connector, you can use the adapter 0941 0024 to convert from a 9-pin connector to a 25-pin connector.*

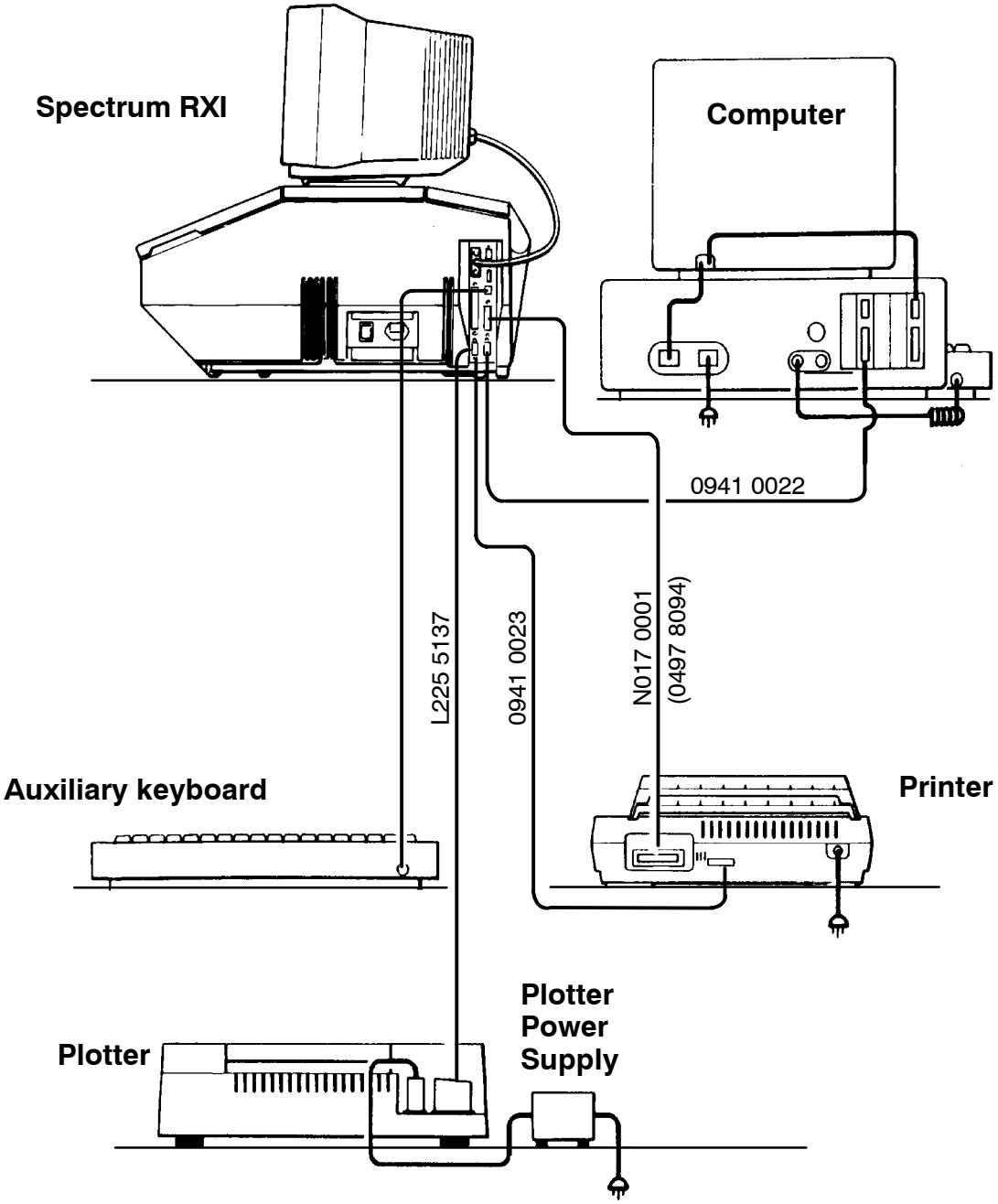


Figure 2-1 Connecting Peripheral Devices to the Spectrum RXI

Settings on the printer or plotter

Make sure that the hardware (DIP switch) or software settings on your printer or plotter are set correctly.

For serial communications to a printer or plotter, the required settings are:

9600 baud
No parity
8 data bits
1 stop bit
Xon/Xoff, no

How to change the settings is described in the manual for your printer or plotter. For an HP-7440 plotter, for example, the settings are made with DIP switches on the back of the plotter, which must be set as follows:

Switches	Number	Meaning
1 through 4	1 – ON 2 – OFF 3 – ON 4 – OFF	baud rate 9600
5	5 – OFF	Paper size U.S.
6 and 7	6 – ON 7 – ON	No parity

Table 2-2 Plotter Switches on the Plotter

If you are using a LaserJet printer, read the section on page protection in the printer's manual. Page protection must usually be set to the size of the paper you are using. A LaserJet printer usually has a minimum of 2 MB of RAM, but 4 MB or more is recommended.

Configuring the Spectrum RXI for Peripheral Devices

Before you can use devices connected to the Spectrum RXI, you must configure the Spectrum RXI for those devices. You need to set the Device options when:

- you first install the Spectrum RXI and connect its peripheral devices;
- you add another device to the system later;
- you need to change a communications parameter for a device (such as the format in which data is sent to a computer).

If you are configuring one of the standard devices listed in Table 2-3, press the soft key that names the device (for example, HP7440). This sets all the communications parameters automatically.

If you are using devices other than those in Table 2-3, soft keys are available for setting each communications parameter individually.

NOTE: *You do not need to configure an auxiliary keyboard connected to the* IBM KEYBD *port.*

Type of Device	Standard Models
Plotter	HP7440, HP7470, HP7550, EPSON, WX7471, HPLJET, HPDJET, HPDJETC
Printer	EPSON, HPLJET, HPDJET, HPDJETC HP7440
Remote Device	Spectrum, IRDM, GRAMS, terminal, IBM-PC, PE-LIMS, PE-7000, PE-1700
Input Device	auxiliary keyboard, bar code reader
Accessory	none

Table 2-3 Standard Devices

NOTE: *Some of the devices in Table 2-3 can be configured as both plotters and printers.*

When you set the Device options, the Spectrum RXI remembers the settings until you change them. Even if you use **restore** to restore the factory default setup, the factory Device options are not restored; this prevents your printer, for example, from being unintentionally disabled.

Configuring a Device

1 At Ready For Next Command, press **setup** **OTHERS** **devices** .
The command line and soft keys in Figure 2-2 appear.

Figure 2-2 The Device Options Command Line and Soft Keys

2 Press the soft key that corresponds to the device you are configuring:
plotter *is the device that receives output from the* **plot** *key.*

printer *is the device that receives output from the* **print** *key.*

remote *is the device that receives output* **to RS232** *from* **copy** .

accy *is for controlling serial accessories via methods.*

Soft keys appear for specifying a port (Figure 2-3). The exact keys depend on whether you chose **plotter** , **printer** , **remote** *or* **accy** .

Figure 2-3 Soft Keys for Specifying a Port for a Plotter

3 Press the soft key for the required port, or press **none** if you are removing a printer or plotter.
The soft keys for specifying the model of the device appear (Figure 2-4).

Figure 2-4 Soft Keys for Specifying the Model

4 • If your device is one of the standard devices in Table 2-3, press the key labelled with its name.
The device is now configured, and the Device options screen returns.

• If your device is not one of the standard devices in Table 2-3, press **custom**.
Soft keys appear for setting the communications parameters for your device. Table 2-4 lists the settings required for each port.

NOTE: *You need only set the parameters that are marked with a ✓.*

5 Refer to the manual supplied with the device to determine the correct communications parameters, and set them using the soft keys.

6 Press **EXIT** twice.
Ready For Next Command returns.

Parameter	RS232	Serial	Centronics	Settings
Format	✓	✓	✓	Plotting: HPGL, Printing: Epson, PCL, PCL5, HPGL and other (text only) Remote devices: JCAMP, binary
Baud Rate	✓	✓		1200, 2400, 4800, 9600
Parity	✓	✓		even, odd, mark, space, strip, off
Number of Data Bits	✓			5, 6, 7, 8
Number of Stop Bits	✓	✓		1; 1.5; 2
Time Out	✓	✓	✓	Type the number of seconds that the Spectrum RXI waits for the device to signal that it is ready.
Input Terminator	✓	✓		Type a character and a reply string.
Delete Character	✓			Type a character and a reply string.
Cancel Line	✓			Type a character and a reply string.
Output Termination	✓	✓	✓	Type the string that terminates output.
Discard control	✓			yes, no
Echo Input	✓			yes, no
Respond to Xon/Xoff	✓			yes, no
HPGLIN			✓	Type the command that starts HPGL mode
HPGLOUT			✓	Type the command that re-starts PCL mode
RTS/CTS	✓	✓		yes, no

Table 2-4 The parameters that you need to set for each type of port

Plotting to Desk Jet Printers

When plotting spectra at high resolution, the Spectrum RXI communicates with most plotters and many of the more sophisticated printers using a standard computer graphics language called HPGL. However, HP Desk Jet printers do not support HPGL and are limited instead to a much simpler printer control language called PCL3.

This less sophisticated operation of Desk Jets has some minor consequences. Much of the burden of graphical interpretation is transferred to the Spectrum RXI with the result that while plotting, some aspects of the user interaction may slow down noticeably. This is usual and need not be of concern. Also, the printer cannot move the paper backwards, so the entire print image must be formed up before printing. Overlaid plots on the same sheet of paper that are produced from more than one press of the print key can only be created by re-feeding the paper between plots. For non-critical applications such as multiple window plots this gives acceptable results; leave the plot advance on, make sure that the left edge paper guide is set properly, and then, between plots, replace the plotted sheet on the top of the input tray, turning the paper end over end so that the printed side faces down. For true overlaid plots, however, the change in alignment of the paper, which is inevitable when re-feeding the paper, may be unacceptable.

With plot advance switched off, printing resumes where it finished, namely about 12.5 mm ($^1/_2$ inch) beyond the previous output. This feature enables you to place text, for example, a peak table, either above or below a plot in portrait mode (**rotate on**), or it can also be used for multiple plots. Remember that when advance is on, a fresh sheet of paper is loaded before the plot and is ejected after the plot; with advance off, paper is loaded if necessary but is not ejected unless the bottom of the sheet is reached.

Draft mode

A color plot usually takes approximately 3 minutes to complete for a full page. When printing graphics, the draft mode available on the printer itself degrades the print quality but has very little effect on the print time. Consequently, the draft mode setting of **plot quality** switches the printer to monochrome operation, giving an identical output in about one third the time. Note that for monochrome Desk Jets (no C suffix) draft mode has no effect.

Color table

Color selection for plotting is by pen number:

1	2	3	4	5	6	7	8
Black	Red	Green	Blue	Yellow	Magenta	Cyan	Black

We recommend that you do not use yellow, because of its low visibility. The black used in color graphics is composite black (yellow + magenta + cyan) rather than from the black cartridge and is not as intense as the true black.

You can switch off the logo by setting its color to **0**, otherwise, you cannot control its color.

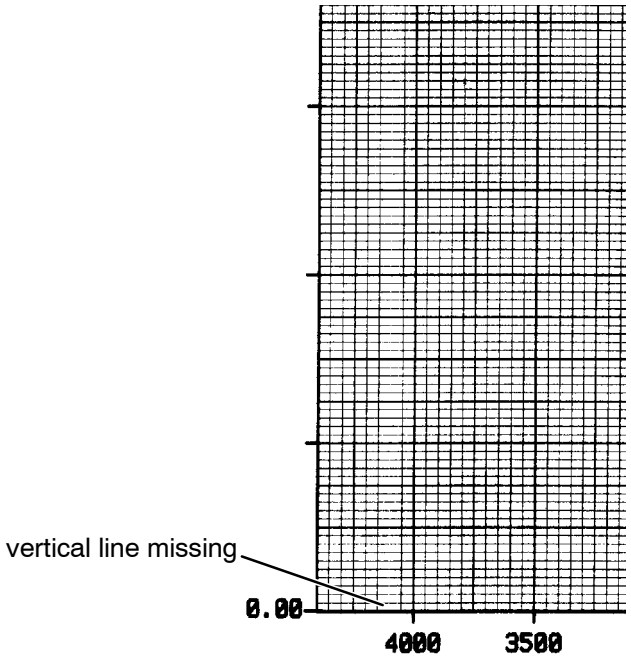
Printer setup

If your Desk Jet has color (C suffix), select **PLOTTER CENTRON HPDJETC** under Setup Devices; otherwise select **PLOTTER CENTRON HPDJET**. We recommend you connect the DeskJet to the Centronics output (PARALLEL PORT) because this is more efficient than RS232.

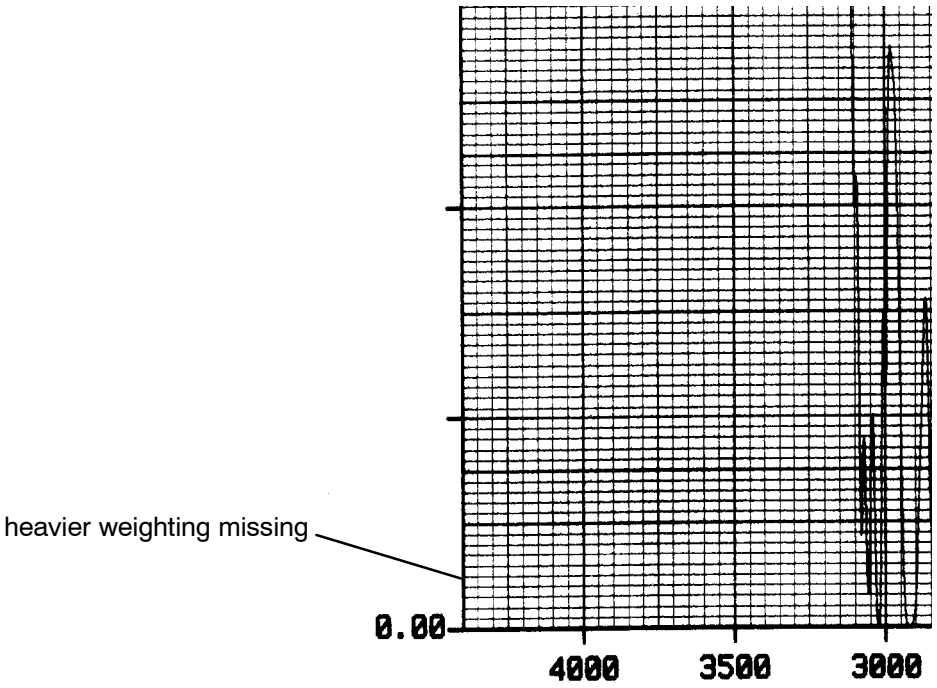
Troubleshooting for Desk Jet printers

This section describes some problems that you may have.

- If the color cartridge for one color is almost empty, you may see occasional missing or faint grid lines across the page. Either replace the cartridge or choose a color that does not use the failing cartridge. Plotting grid lines empties a cartridge quickly; we recommend that you use the **dotted** line style for **grid**.



- If you use the ECONOMODE or draft mode feature of the printer, certain pixels across the page are omitted. This removes the heavier weighting of some of the grid lines on the page.



Plotting to PCL5 Printers

Printers that use the PCL5 printer language have two modes of operation:

- PCL printer language mode (for printing text, defining page sizes, and so on);
- HPGL graphics mode (for pen plotter output).

To plot from a Spectrum RXI to a PCL5 printer, you need to switch the printer between PCL mode and HPGL mode. If you are using an HP LaserJet, this is configured automatically when you use the command **PLOTTER CENTRON HPLJET** under Setup Devices; if you are using a different PCL5 printer, however, you may need to use **PLOTTER CENTRON CUSTOM** to configure the printer parameters individually.

PLOTTER CENTRON CUSTOM HPGLIN and **PLOTTER CENTRON CUSTOM HPGLOUT** enable you to tell the Spectrum RXI the commands that the printer uses to start HPGL mode and to return to PCL mode, respectively. Consult the documentation provided with your printer to determine the required commands.

External Scan Control

Two lines at the USER I/O port, at pins 1 and 11, can be used to control the scan externally. No Perkin-Elmer devices use these pins, but for some applications (for example, experiments in biochemical kinetics) you may want to connect devices to them. Both lines have TTL-compatible signals and are active low. Figure 2-5 shows their location.

Pin 1 (output) The external start-of-scan; this is low when the Spectrum RXI is collecting data. Monitoring this line tells you the exact time that data collection begins.

Pin 11 (input) The external scan-disable; this stops the scan when it goes low. If you connect a switch to this line, you can start the scan from a remote location and stop it instantly if a problem arises.

NOTE: *You can change the function of pin 1, using the typed command* **signal***, which is described on page 5-50. This command enables you to set pin 1 permanently high, permanently low, or to monitor scanning. In the description of pin 1 above, and in the example on the next page, pin 1 is set to monitor scanning, which is the factory default setting.*

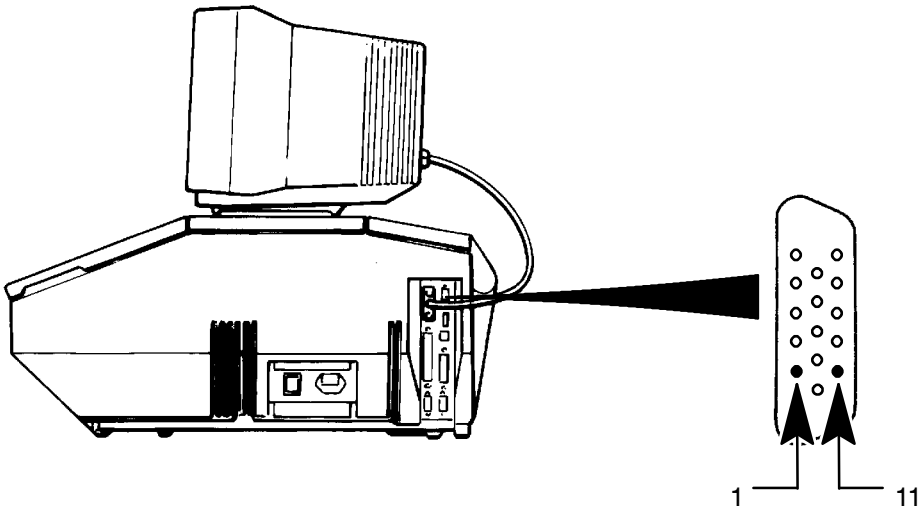


Figure 2-5 Location of the External Scan Control Lines

Using External Scan Control - an Example

This is an example of a typical use of the external scan control lines, enabling a sample to be inserted at the instant that the Spectrum RXI begins collecting data. The steps below describe the actions taken, and correspond with the labelled points in Figure 2-6.

1 With the pin 11 input held low (scan disabled), execute the Scan command at the Spectrum RXI (point A in Figure 2-6).
Nothing happens: the output pin (1) stays high.

2 Prepare all the equipment.

3 Start the scan, by opening the switch connected to pin 11 (point B).
The scan mirror begins moving.

4 At the moment when pin 1 goes low (data collection starts), insert the sample (point C).
The output pin (1) stays low during data collection, goes high while the mirror reverses, and goes low when data collection begins in the reverse direction.

5 If you need to stop the scan, disable it using the switch at pin 11 (point D).
The output pin goes high as the input pin goes low. The scan is paused until pin 11 enables it again (point E) and data collection continues.

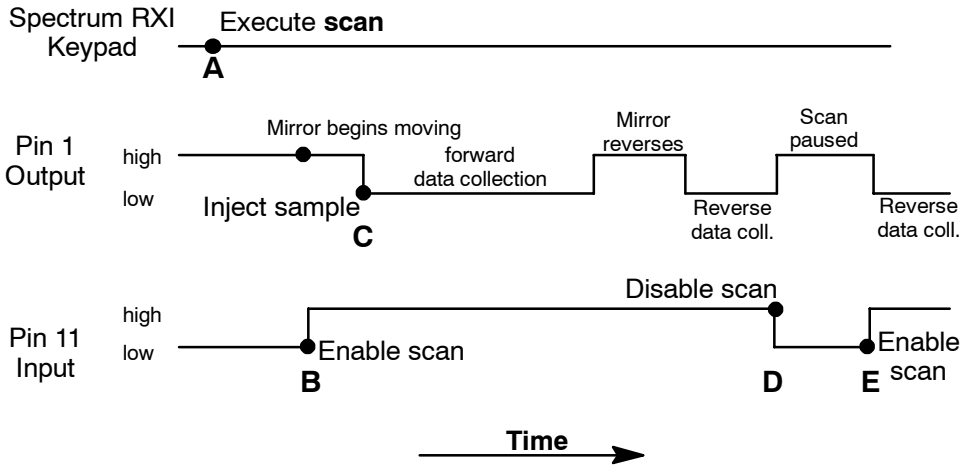


Figure 2-6 An Experiment Using the External Scan Control Lines

Schematic of the External Scan Control Lines

The schematic in Figure 2-7 is provided to help you use the external scan control lines.

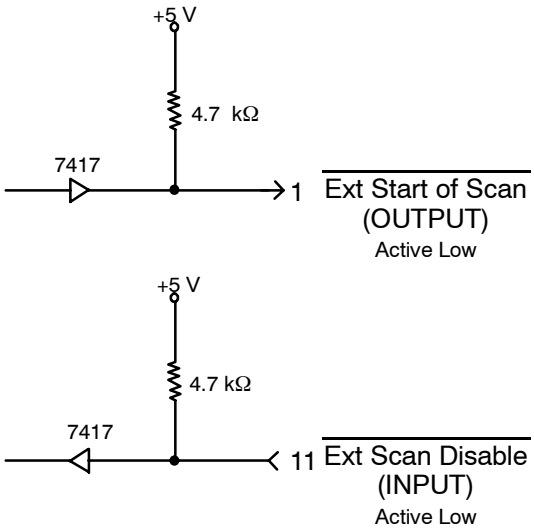


Figure 2-7 Schematic of the External Scan Control Lines

File Header Information

A spectral data file contains not only the data, but also information about when and how the data were collected, what data processing has been performed, and how the system is to draw the spectrum. All this additional information is stored in the file header, which is in ASCII.

The two formats for this data are IRDM (IR Data Manager) and SPECTRUM. The selection is made through the Disk options as described in *Setting the Floppy Disk Options* on page 6-23.

This section describes the Spectrum RXI IRDM file header. It then explains how the Spectrum RXI handles files with headers that deviate in various ways from its requirements. For details of the Spectrum RXI Spectrum file header, contact Perkin-Elmer.

IRDM Header Format Requirements

When you bring a spectral data file to the Spectrum RXI with a command such as **COPY RS232 X**, its header must have the format that is recognized by the Spectrum RXI. This format is:

- The header consists of a primary header, a secondary header, and a graphics header;
- Except for the first line of the primary header, all lines are of variable-length ASCII. (The first line contains six fields, each of which must be 12 spaces long.)
- Each line ends with a carriage return followed by a line feed;
- Items of information must be given in the order listed in the next section, in Table 2-5;
- If the information for a line does not exist, the line is blank except for the required carriage return and line feed;
- Lines used to specify a length (in bytes) may contain **-1** instead.
- If information is not present, its line is left blank.

Content of the IRDM Header

Figure 2-8 on page 2-17 shows a file header for a spectral data file. Notice the following:

- The primary header begins with a line that has six fields. (The second field is empty.)
- The secondary header begins with the line **#HDR**. The graphics header begins with **#GR**.
- If information is not present, its line is left blank.

```
PE IR                  SPECTRUM    BINARY           502 00.00.01
-1
filename
93/07/01
11:45:38.00
93/07/01
11:45:38.00


0.00000000000000e+00
1




502,00.00.01
DTGS
MIR
KBr
356123
3.00000000000000e-01
4.00000000000000e+00

STRONG
SINGLE
REAL


DOUBLE SIDED
0
BIDIRECTIONAL
2

#HDR
-1
-1
#GR
CM-1
EGY
2.38418579101563e-05
0.0
4.40000000000000e+03
-2.00000000000000e+00
1976
8
 86.00
 -1.07
#DATA
```

Figure 2-8 Header of a Spectral Data File

Primary Header

Record Number	Explanation or Comment	Values Used by the Spectrum RXI
1	Each of the six fields of Record 1 is 12 bytes, left justified, padded with spaces if the information does not fill the field.	
	Technique used to collect the spectrum.	PE IR
	Subtechnique. Not used; filled with spaces.	12 spaces
	File type.	SPECTRUM or IGRAM
	Data type.	BINARY
	Instrument type that generated the data.	502
	Revision level of the software.	A number in the format X.XX; for example, 4.02
2	Length of the rest of the primary header in bytes.	Up to 4 digits, or -1.
3	Filename. Needs no extension, but the Spectrum RXI reads an extension if one is present.	
4	Collection date and time: Records 4 and 5 are the date and time at which data collection began.	Date: yy/mm/dd
5		Time: hh:mm:ss.ss5
6	Date and time of the last modification: Records 6 and 7 change each time the file is modified.	Date: YY/MM/DD
7		Time: hh:mm:ss.ss
8	Analyst's name.	The setting of the User Option of Setup when the file was created.
9	Comment.	A comment attached to the data by the **Comment** or **Copy** commands.

Table 2-5 ASCII File Header for Spectral Data Files

Record Number	Explanation or Comment	Values Used by the Spectrum RXI
10	Final X.	Abscissa value of the final data point.
11	Number of accumulations.	Total number of sample scans.
12	Used in other software to show that arithmetic operations have been performed. Ignored when reading a file into the Spectrum RXI.	Blank.
13	Diff factor, if any.	
14	Order of Flat, if any.	0, 1, 2, 3, and 4 indicate step, linear, parabolic, cubic, and quartic Flat.
15	Smoothing width, if any, in abscissa units.	
16	Abex factor, if any.	
17	Deriv order and width, if any.	
18	Deconv width and smooth width, if any.	
19	Miscellaneous operations.	CALC, CONV, EXP, LN, KK, MIR, NOT SPECTRUM RX. Also SYN for *Synthetic*.
Records 20 to 37 are FT-IR parameters:		
20	Model number of the instrument used, software revision number.	502, XX.XX.XX
21	Detector	LITA, DTGS, EXT DTGS, MCT or PAS
22	Source	MIR
23	Beamsplitter	KBr or CsI
24	Serial number	Instrument serial number
25	OPD velocity	0.3

Table 2-5 (continued)ASCII File Header for Spectral Data Files

Record Number	Explanation or Comment	Values Used by the Spectrum RXI
26	Gain.	0, 1, 2, 4, or 8 if the detector is EXT DTGS or MCT 0 to 128 if the detector is PAS
27	Resolution.	
28	Apodization.	NONE, WEAK, or STRONG. Accepts, but does not store, NORMAL, TRAPEZOIDAL 25, TRAPEZOIDAL 50, or TRAPEZOIDAL 75.
29	Data type.	SINGLE or RATIO.
30	Spectrum type.	REAL. Accepts, but does not store, IMAGINARY, MAGNITUDE, or PHASE.
31	Phase correction (not supported by Spectrum RX).	Blank.
32	Accessory.	The keywords SHUTTLE and EXTERNAL indicate a sample shuttle or an external bench. Others are ignored.
33	Kind of igram.	DOUBLE SIDED. Accepts, but does not store, LEFT or RIGHT SINGLE SIDED. If the interferogram is single sided, the keyword is followed by a comma and the number of points in the ramp.
34	Scans ratioed against.	Total number of background scans.
35	Scan direction.	BIDIRECTIONAL. Accepts, but does not store, FORWARD or REVERSE.
36	Sampling frequency (zero crossings).	2

Table 2-5 (continued)ASCII File Header for Spectral Data Files

Record Number	Explanation or Comment	Values Used by the Spectrum RXI
37	Zero path.	0 in interferogram files; otherwise, blank.
1	Marks the beginning of the secondary header.	#HDR
2	Length, in bytes, of the rest of the secondary header, beginning at the first byte of record 3. (or -1)	
3	Number of bytes, beginning with the first byte after the carriage return and line feed that ends record 3. (or -1)	
optional sub-headers	Not used at present.	
1	Marks the beginning of the graphics header.	#GR
2	X units: the abscissa label. The **~M** tells the software to put a Greek μ on the screen.	CM-1 or ~M
3	Y units: the ordinate label.	A, %T, EGY, or KM.
4	Y scaling. Represents the scaling of the data in order to accurately draw the graph.	In absorbance, 1/8388608. In %T, 1/41943.04.
5	Y offset.	0.0
6	First X.	Abscissa of the first data point.
7	Delta X.	Interval between data points. It is negative for wavenumber data, positive for interferograms.
8	Number of data points in the file.	

Table 2-5 (continued)ASCII File Header for Spectral Data Files

Record Number	Explanation or Comment	Values Used by the Spectrum RXI
9	Compression technique: a code that specifies the format of the data in the file. For example, the Spectrum RXI stores data as 4-byte integers; the code for this is 8.	8
10	Maximum Y.	Largest ordinate value in the file.
11	Minimum Y.	Smallest ordinate value in the file.

Table 2-5 (continued)ASCII File Header for Spectral Data Files

Rejection of Files Copied to the Spectrum RXI

The Spectrum RXI tries to accept any valid FT-IR spectrum it receives from another instrument or from a computer. It rejects a spectrum only in the following situations:

- the data type is not BINARY;
- the file type is not SPECTRUM or IGRAM;
- a parameter is found that is not valid for an FT-IR spectrum;
- an interferogram has abscissa units **cm-1**, or a spectrum has **~M**;
- first X is not an integer multiple of delta X;
- delta X is positive for a spectrum or negative for an interferogram;
- the compression technique is not 8.

Two categories of file are not accepted:

Files that originated on a Spectrum RXI and have been processed by other software (for example, by the Perkin-Elmer IR Data Manager): The Spectrum RXI accepts the file, but discards the data processing information in the header.

Files that are not Spectrum RXI files, but are valid FT-IR files from another instrument: The Spectrum RXI accepts the file, but treats the header information as follows:

- A **NOT SPECTRUM RX** flag is set, which appears in the status information for the file.
- Only the resolution, apodization, data type, and spectrum type are kept in the primary header. If the apodization and spectrum type are not settings supported by the Spectrum RXI, they are set to **NONE** and **REAL**, respectively, when you save the file.
- The data processing information in the header is discarded.
- If the X units in the graphics header are not supported by the Spectrum RXI, they are set to **CM-1** for spectra or **~M** for interferograms.
- If the Y units are not supported, they are set to **%T**.
- If the Y offset is not **0.0**, it is ignored.

Instrument Diagnostics 3

Diagnostics

The diagnostic tests in the Spectrum RXI enable you to ensure that the Spectrum RXI is functioning properly, and to determine the cause of a failure.

The diagnostic tests in the Spectrum RXI are in two groups:

Start-up diagnostics

These run each time you switch on the power. They make sure that the Spectrum RXI is operating properly before you begin to use it.

On-demand diagnostics

These are accessed by pressing **setup** **OTHERS** **OTHERS** **test** ; use these to determine the cause of a Spectrum RXI failure, or as a more extensive test that the Spectrum RXI is functioning properly.

Start-up Diagnostics

The start-up diagnostics are extensive enough to intercept most problems. However, they do not include tests that take a long time to run, or those that require user interaction; these are available in the on-demand diagnostics (page 3-6).

How the Spectrum RXI Reports the Results of Start-up Tests

To be useful, diagnostics must give you an indication of what failure occurred and how to correct it. The start-up diagnostic tests are arranged so that the Spectrum RXI begins with minimal hardware functioning, gradually turning on and testing more and more functions. Milestones along the way tell you that certain subsystems are functioning.

Even if there is a failure, the diagnostics continue running as long as possible, to give you the most complete picture possible of the problem. The Spectrum RXI reports and explains errors as described below.

Beeper signals The first tests are performed before the screen is tested and functioning, so the results of these tests are saved for display when the screen switches on. Meanwhile, the beeper sounds as the first two tests are completed. If you do not hear two beeps, there has been a failure. If you hear a long beep, there has been a failure.

Screen display Each test is recorded on the screen as follows:

- When the test begins, its name appears, so you know which test is being performed.
- If the test completes successfully, **PASSED** appears after the test name.
- If the test fails, **FAILED** appears, and messages may be displayed which further define the error.

Printed results The results of all the tests are stored in memory as well as displayed on the screen. If any errors have occurred, a *print* soft key appears, so you can obtain a hard copy of the error messages. If the screen has failed, so that there is no display, you can still obtain the results by pressing the *print* hard key.

Switching on the Spectrum RXI

1 Switch on the power.
The switch is on the right-hand side of the Spectrum RXI.

2 Make sure that five of the six LEDs on the right-hand side of the Spectrum RXI are illuminated. If any of the marked lights in Figure 3-1 on page 3-4 do not come on, correct the problem before continuing.
The first two tests are performed before the screen is switched on. The results are indicated by beeps. The results of all subsequent tests are reported on the screen.

WARNING

The third light is illuminated when the laser is on. The laser is always on when the Spectrum RXI is switched on. If you open the main cover of the Spectrum RXI, an interlock switches the power off. However, we recommend that you always switch off the power and wait 60 seconds before opening the main cover.

3 Wait for the start-up tests to finish.
If all the tests were successful, Ready for Next Command returns. If one or more tests failed, the test results appear.

4 If any of the tests failed, press (print) to print the test results, or (proceed) to go to Ready for Next Command.
If the screen failed, press [print].

5 If necessary, perform appropriate on-demand diagnostics, to locate the exact cause of a failure, and contact the nearest Perkin-Elmer Service Department.

The Start-up Tests

LEDs Make sure that the five marked LEDs on the right-hand side of the Spectrum RXI are illuminated before you continue. If they are not illuminated, you will not be able to diagnose problems correctly later. Figure 3-1 shows the LEDs and what they indicate.

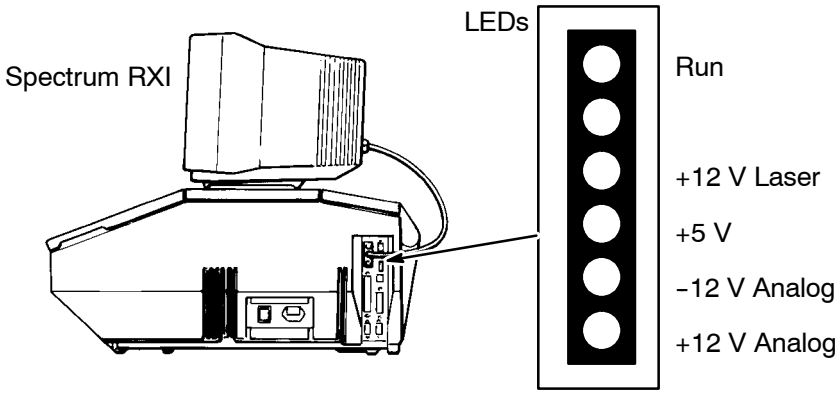


Figure 3-1 The LEDs on the Spectrum RXI

Screen Power-up screen table (short beep for pass, long beep for fail)
Video RAM (short beep for pass, long beep for fail)
The screen switches on.

Dynamic RAM (stack) If this fails, a message appears on the screen. The start-up tests are suspended for ten seconds to give you time to read the message.
Errors so far are displayed (the ones reported by beeps before the screen switched on).

EPROM checksum The EPROM checksum is calculated and compared with the checksum stored in the EPROM.

DRAM (whole) The Dynamic RAM is tested by writing a series of different test patterns to each location and verifying that the same is read back. If messages appear, there is a long beep, and the start-up tests are suspended for 20 seconds to give you time to read the messages. At the end of the 20 seconds, the start-up sequence continues. However, if the Dynamic RAM failed then your Spectrum RXI will crash.

CPU This is tested and the results appear on the screen.

Programmable timers	Each timer, in turn, is set to count down from a preset value at a certain rate. The time taken for the counter to time-out is monitored and compared with the expected value.
Non-volatile RAM and battery	*System Record*. If this fails once, it is tested again. If it then passes, you can conclude that the battery has run down. If it fails again, the NVRAM has failed. After a failure, Setup Options return to the factory defaults, so you may need to reset them.
Periodic interrupt timer	Tested by modifying the interrupt vector to a routine that increments a semaphore. The period between increments is calculated and compared against tolerances.
DMA	The DMA modules are tested by making them transfer 4 KB of EPROM contents into known good, spare RAM. The new contents of NVRAM are then tested against the source in EPROM.
Power	The output of the comparator connected to the analog electronics supply is tested. This indicates the state of the 12 V analog supply. If the analog supply is faulty, the other supplies cannot be tested because the tests require the operation of the analog supply. The 0 V level is then sampled and tested against tolerances. The +12 V non-VDU rail is then sampled and compared with tolerances.
Clock	The current time is saved into RAM. The time is then set to 23:59 31/dec/1999. The execution pauses for a couple of seconds to let the clock advance and then the time is read to verify that the new time and date are correct. The original, correct time is restored.
RS232	Each module is switched to internal loopback mode and a test string (0x00 through 0xff) transmitted at the most commonly used RS232 configuration (9600 baud, 8 bits, 1 stop, no parity). The received data is tested for errors.
Floppy disk drive	This test is performed if the Spectrum RXI has a floppy disk drive.
Integral Non-linearity	Tests the analog-to-digital converter. An internally-generated ramp is digitized, and a best-fit line through the data is calculated. The actual data are then compared with the best-fit line and the maximum deviation found. The maximum deviation is compared with an allowed limit.
Scan Diagnostics	This tests the source, laser, opto-interrupter, servo motor, bearing, and data integrity. If the scan fails any test, you can still use the Spectrum RXI for other functions. You may want to run the on-demand scan diagnostic.
Shuttle	Only tested if the Spectrum RXI has a sample shuttle.

On-demand Diagnostics

If the Spectrum RXI is not functioning correctly, the on-demand diagnostics, accessed with setup OTHERS OTHERS test, enable you to identify the problem.

Printing Diagnostic Messages

Before you run the diagnostic tests, set up the Spectrum RXI so that error messages are printed automatically. This gives you a record of the error messages generated by the diagnostics.

1 Press setup OTHERS print.
The Print Options screen appears.

2 Press auto error printer.
The Print Options screen returns.

3 Press EXIT.
Ready For Next Command returns.

Running the Diagnostic Tests

To select and run on-demand diagnostic tests:

1 At Ready for Next Command, press setup OTHERS OTHERS test.
The categories of tests, together with a brief definition of each category, appear (Figure 3-2).

Figure 3-2 The Initial Test Screen

2 Make sure that the Spectrum RXI meets all the conditions listed on the screen under **BEFORE PROCEEDING**.

3 Press the soft key that represents the test category you want, and then, if necessary, press the soft key corresponding to the test you want to perform.

4 If you want the test to be performed more than once, type the number of times in the **repeat** field. If you want the test to run until you press STOP, type a very large number.

6. Press EXECUTE.
The tests start. When the tests are complete, the Test screen (Figure 3-2) returns.

Interpreting the Test Results

Some of the I/O tests are interactive; that is, they require input while they are running. Other tests proceed without any intervention after you press EXECUTE. They generate a display of results similar to Figure 3-3.

Figure 3-3 Typical Results of a Set of Diagnostics

Format of the results

The display of results contains the following information:

- the title of the test or group of tests being performed.
- the number of repetitions of the test performed so far. This number appears in the top right-hand corner of the screen, labelled **DONE**.
- a list of the tests to be performed, if a group (for example, scan) is running. A pointer indicates the test that is currently running.
- a list, at the bottom of the display area, of the error messages generated so far. Beside each one is the number of times it has been generated.
- When the tests are complete, the list of error messages remains displayed. If there were no errors, the display in Figure 3-2 returns.

Dealing with errors

If the Spectrum RXI fails any diagnostic tests, switch it off, then on again, and try the tests again. Make sure that the Spectrum RXI is warmed up.

If any of the error messages end with the words **TEST ADJUST**, refer to *Adjust*, on page 3-13.

If you still receive error messages, contact your Perkin-Elmer Service Department.

The Automatic Tests

The *auto* key runs all of the scan tests, and all of the computer tests except for the screen test. This test is omitted because you must be watching the screen when you do the screen test.

The Scan Tests

The *scan* key displays the Test Scan screen (Figure 3-4). It lists the seven tests that are part of the scan test, and has the action keys *history* and *EXECUTE*. The date of the last desiccant change is reported.

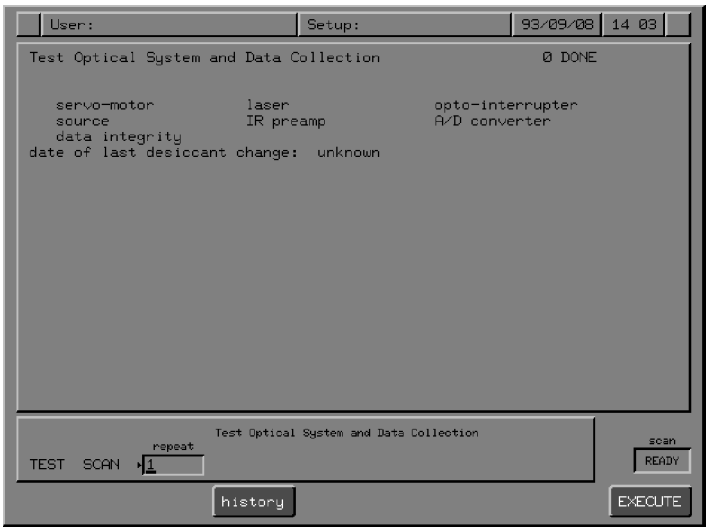


Figure 3-4 The Test Scan Screen

history displays a list of the errors that occurred in the previous scan.

EXECUTE starts running the scan tests.

Testing the Computer

The *computr* key displays the Test Computer screen. It lists the computer tests, and has a soft key for each (if the soft key for the test you want is not displayed, press *OTHERS*).

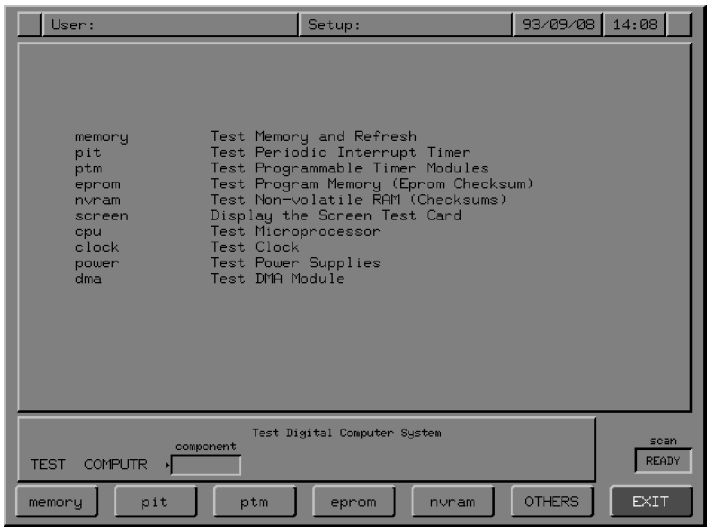


Figure 3-5 Screen for Selecting Computer Tests

Testing Input and Output

The I/O key displays the Test I/O screen (Figure 3-6). It lists the input and output tests, and has a soft key for each.

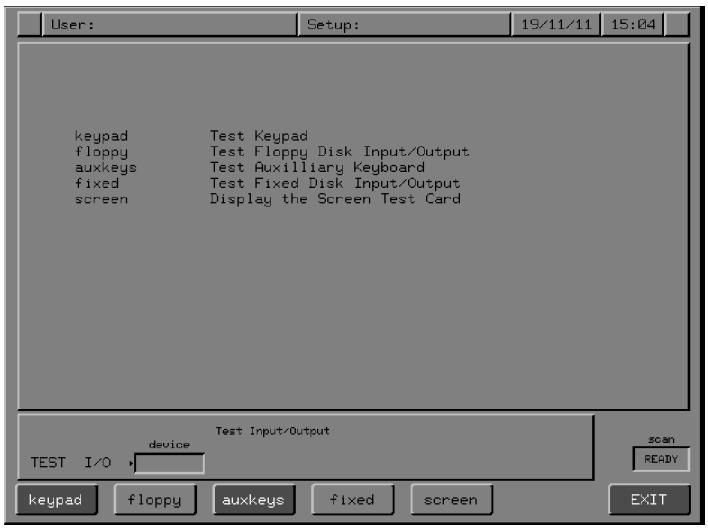


Figure 3-6 The Test I/O Screen

keypad Enables you to test the keypad of the Spectrum RXI. When you press a key, its representation on the screen lights until you release the key. If a key is faulty nothing happens, or the screen stays lit after you release the key. To exit, press **restore**.

floppy Verifies that the Spectrum RXI can read from and write to a floppy disk. If **Format** is on, the Spectrum RXI formats the disk first. If you switch formatting off, you must use a formatted disk for the test. If the disk is not blank, make sure that its contents are not valuable, because the test erases them.

auxkeys Enables you to test the auxiliary keyboard. When you press a key, its representation on the screen lights until you release the key. If a key is faulty nothing happens, or the screen stays lit after you release the key. To exit, press **restore**.

fixed Makes sure that the Spectrum RXI can read and write to and from its hard disk.

screen Displays the screen test-card.

Analog

The (analog) key displays the Test Analog screen. It lists the available tests, and has a soft key for each.

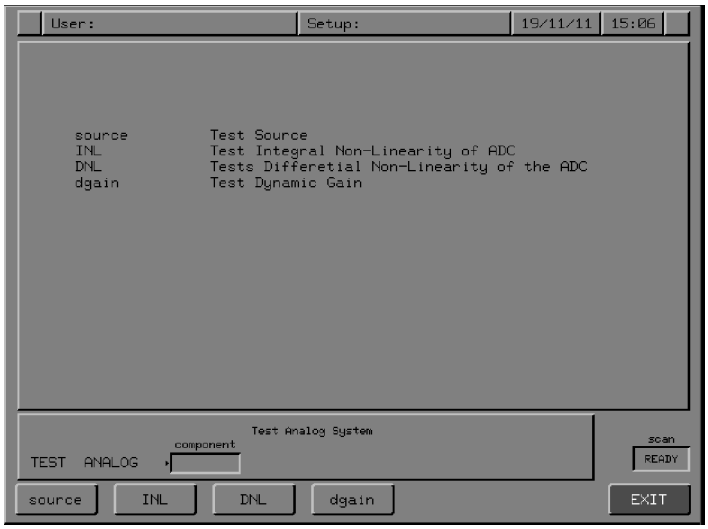


Figure 3-7 The Test Analog Screen

(source) Tests the source to find out whether the correct current is passing through it. If it is, this indicates that the source is functioning.

(INL) Tests the *Integral Non-Linearity* of the analog-to-digital converter. An internally-generated ramp is digitized, and a best-fit line through the data is calculated. The actual data are then compared with the best fit line and the maximum deviation found. The maximum deviation is compared with an allowed limit. This is the same as the Integral Non-Linearity test that is included in the start-up tests, but in addition, the test result is displayed in the scroll buffer.

(DNL) Tests the *Differential Non-Linearity* of the analog-to-digital converter. This test takes approximately 1 minute. If it is much quicker, something may be faulty. The test result is displayed in the scroll buffer.

(dgain) Tests the *Dynamic Gain* of the analog-to-digital converter.

Adjust

The *adjust* key displays the screen for making adjustments. It lists the available adjustment procedures, and has a soft key for each.

Figure 3-8 Command Line and Soft Keys for Making Adjustments

You only need to use these tests if a diagnostic error message ending in **TEST ADJUST** is reported. The Test Adjust error messages tell you what it is that you need to adjust.

NOTE: *Some of these adjustments involve removing the purge cover and must therefore be performed by a Perkin-Elmer Service Engineer. However, you can use the adjustment procedure to find the current value.*

laser Displays an energy bar, enabling you to maximize the laser signal. Press *auto* for the Spectrum RXI to adjust the laser signal automatically, or adjust it yourself, using *more* and *less*, so that the gain is 16 V ± 1 V. When the energy is maximized, press *EXECUTE*.

NOTE: *Before you do this, maximize the energy by adjusting the interferometer.*

endstop The endstop is located under the purge cover, so you cannot adjust it yourself. Use this command to find out the present offset of the endstop; if the number in the **offset** field is not between -100 and +100, contact your Perkin-Elmer Service Department.

zpath The opto-interrupter, which adjusts the zero path, is located under the purge cover, so you cannot adjust it yourself. Use this command to find out the current zero path. If it has drifted out of range, you can calibrate the Spectrum RXI by pressing *zpath* *EXECUTE*.

energy An energy bar is displayed, enabling you to maximize the energy. You can also display the energy bar by pressing *monitor* *energy*.

gain If you have an accessory installed (the Diffuse Reflectance Accessory, for example) *and* if you have a DTGS detector, you will obtain a better signal-to-noise ratio with an increased gain. Contact your Perkin-Elmer Service Department.

match Displays an energy bar. Press **auto** for the Spectrum RXI to minimize the energy bar automatically, or minimize it yourself using **more** and **less**. Press **faster** and **slower** to change the rate of change.

Adjusting the Interferometer

Do the following after the infrared source has warmed up completely (approximately two hours after the Spectrum RXI was switched on).

1 At Ready For Next Command, press **monitor**.
The Monitor command line and soft keys appear.

2 Press **energy**.
The display shown in Figure 3-9 appears. It has the following features:

- A bar graph. The greater the energy throughput, the longer the bar.
- A pointer at the right end of the bar. This indicates the greatest length the bar has reached.
- A number above the bar. The number is in arbitrary units, related to the amount of energy reaching the detector.

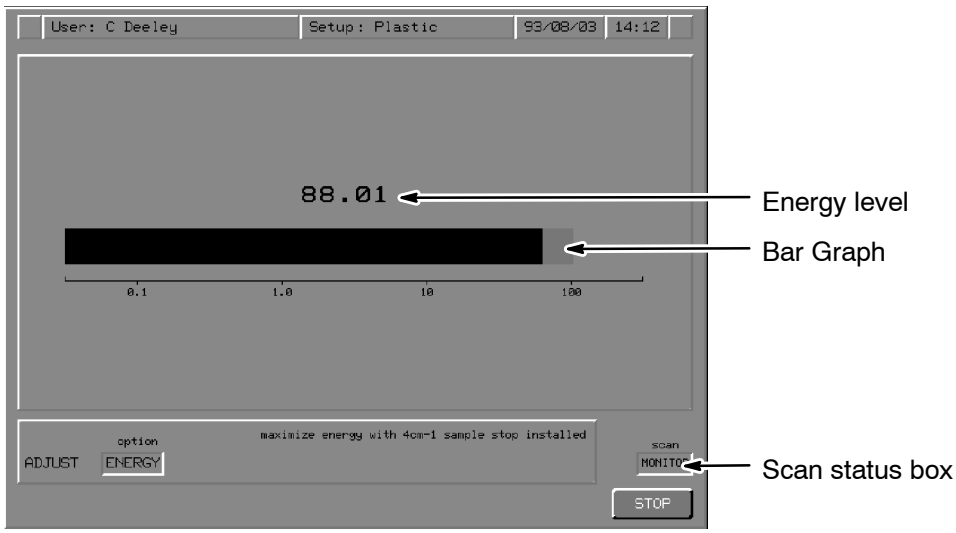


Figure 3-9 Monitoring the Energy Throughput

In the following steps you adjust the interferometer so that the energy is maximized.

3 Remove the two round inserts from the left-hand side of the top of the main cover (Figure 3-10). To do this, push down the edge of the insert that is near the back of the Spectrum RXI.
The front of the insert lifts up.

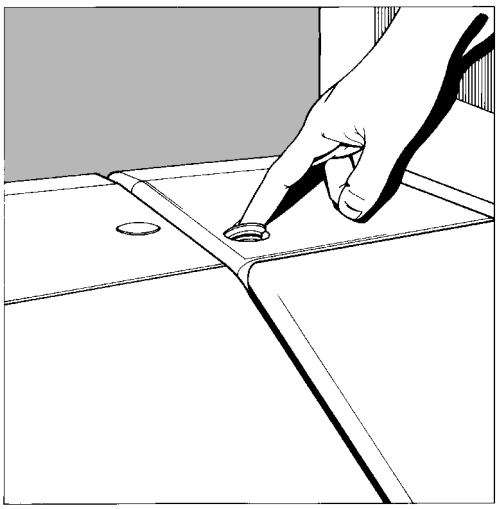


Figure 3-10 Removing the Inserts

4 Lift away the insert.
A hole is visible below each hole.

5 Insert the smaller hexagonal wrench ($^{3}/_{32}$ inch) into the left-hand adjustment screw for the interferometer, as follows:

a Insert the wrench through the hole on the left.

b Tilt the wrench toward the left front corner of the instrument at an angle of 6°.

c Push the wrench in as far as it goes.

d Gently rotate the wrench until it drops into the head of the adjustment screw.

NOTE: *Scan errors may be caused when the wrench is first engaged. If the scan status box changes to red with the word* **ERROR**, *wait until the scan has recovered before proceeding. This may take several seconds, and the scan status box will return to* **MONITOR** *when the instrument is ready to continue.*

6 Adjust the screw until the energy bar on the screen is at the maximum obtainable.

NOTE: *The adjustment is sensitive. The energy should reach the maximum within one quarter turn of the key.*

7 Insert the hexagonal wrench in the hole on the right, also at 6°. The wrench goes down farther into this opening than into the other.

8 Adjust this screw also, to give maximum energy.

9 Repeat steps 5 through 8 until you are sure that the energy throughput is maximized.

NOTE: *Typically, the maximum energy will be between 90 and 120 units. It should take about three repeats of steps 5 through 8 to achieve an alignment to within 1 unit of the maximum observed value.*

10 Refit the inserts in the holes by pressing down and twisting them into position.

11 Press STOP.
Ready For Next Command returns.

Maintenance 4

Moving the Spectrum RXI

WARNING

Before moving the Spectrum RXI:

- *switch off the power supply to the Spectrum RXI, wait 60 seconds, and disconnect the power cable.*
- *disconnect and remove the screen.*

Lifting the Spectrum RXI

The Spectrum RXI can be lifted from underneath, at its ends, as shown below. It weighs 54 kg (118 lb), and you will need two people to lift it.

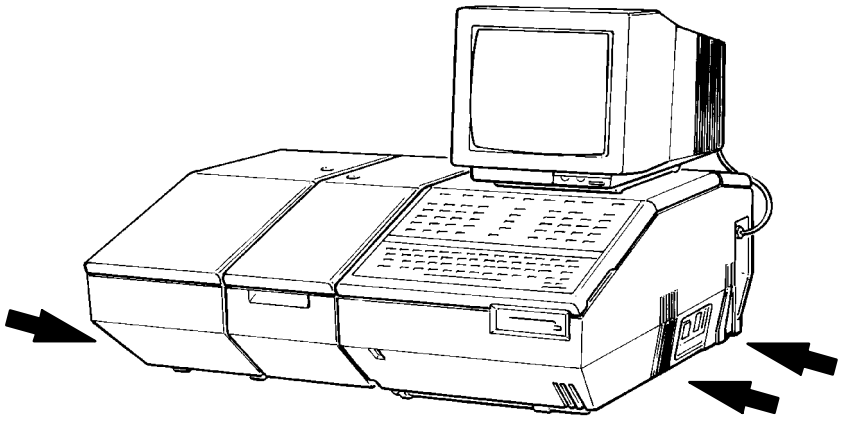


Figure 4-1 Lifting the Spectrum RXI

Condensation

Be aware that condensation caused by moving the Spectrum RXI from a cooler environment to a warmer one can damage the windows of the sample compartment. To prevent this damage from occurring, make sure that the windows are protected by placing fresh bags of desiccant in the sample compartment.

Opening the Cover of the Spectrum RXI

To perform most maintenance tasks, you have to open the cover of the Spectrum RXI and prop it open. When you do this, a safety interlock automatically switches off the power.

WARNING

Switch off the power supply to the Spectrum RXI, wait 60 seconds, and disconnect the power cable before you open the cover of the Spectrum RXI. This makes sure that you are safe from electrical shock and laser radiation.

1 Switch off the power supply to the Spectrum RXI.

2 Wait for 60 seconds.

WARNING

Take care when lifting the main cover of the Spectrum RXI. The screen is a separate unit and must be removed before opening the cover of the Spectrum RXI.

3 Remove the screen.

4 Disconnect the power cable.

5 Use the larger of the two Allen wrenches supplied ($^{5}/_{32}$ inch) to unlock the main cover of the Spectrum RXI by turning the screw on the lower front cover counterclockwise until it is loose.

6 Lift the main cover from the front.

7 Support the cover with the prop, inserting the free end into the notched receptacle, as shown in Figure 4-2.

CAUTION

Place the cover prop in the receptacle provided for it. Do not rest it on any other part of the Spectrum RXI.

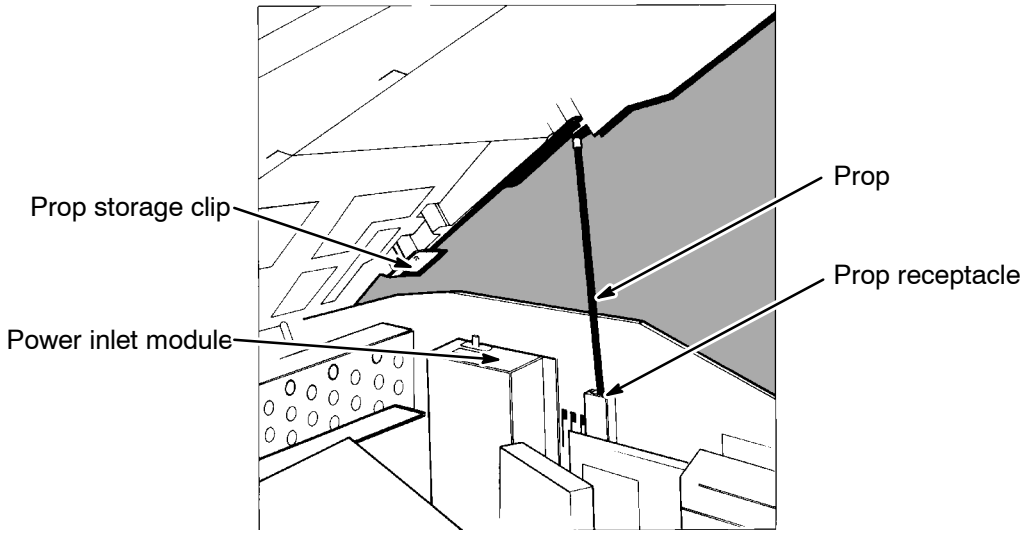


Figure 4-2 Propping Open the Main Cover

8 Do whatever work you need to perform inside the Spectrum RXI .

CAUTION

Do not remove the clear plastic purge cover inside the Spectrum RXI. If you remove the cover you might cause serious damage to the optics. The purge cover must only be removed by a Perkin-Elmer Service Engineer.

9 When you are ready to close the cover, remove the prop from its receptacle, and slide it behind the storage clip, then close the main cover.

10 Lock the cover by turning the cover screw clockwise until it becomes difficult to turn.

Maintenance Warnings

The Spectrum RXI enables you to set maintenance warning times to remind you to:

- change the desiccant;
- service the instrument;

You log the date the maintenance was performed and then set the interval for the next warning, for example, six months. Then, after the six month interval, the Spectrum RXI will warn you that one of the maintenance options is due. A warning message begins appearing every time you switch the Spectrum RXI on and every time the screen goes into Sleep mode:

Maintenance reminder – see SETUP ... MISC MAINTAIN

Resetting a Maintenance Warning

Each time you perform one of the maintenance procedures, you must reset the maintenance warning.

1 At Ready For Next Command, press **setup** (OTHERS) (OTHERS) (misc) (maintain).
The Maintenance Page is displayed, similar to Figure 4-3.

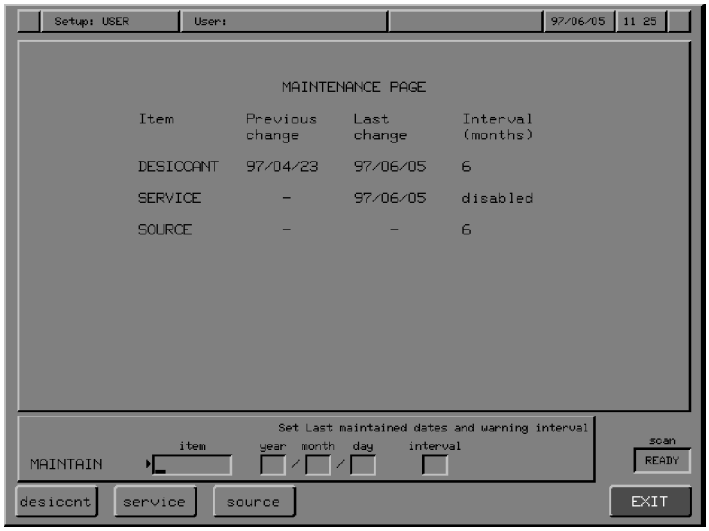


Figure 4-3 Typical Maintenance Page

2 Press the softkey for the maintenance operation that has been performed, for example, ***desiccnt*** .
The command line and softkeys shown in Figure 4-4 are displayed.
The current date and interval is displayed in the boxes.

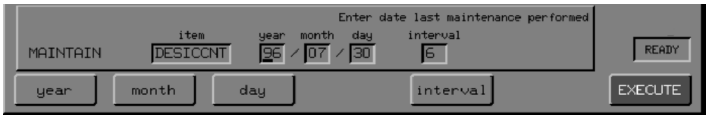


Figure 4-4 Desiccant Maintenance Warning Command Line

3 If necessary, correct the date by pressing ***year*** , ***month*** or ***day*** and typing the required value.

4 You may also change the interval for your next maintenance warning by pressing ***interval*** and typing the required value.

5 When the correct date and interval are displayed, press ***EXECUTE*** .
The Spectrum RXI records the date that is in the command line as the date of the last change, as shown in Figure 4-5 .

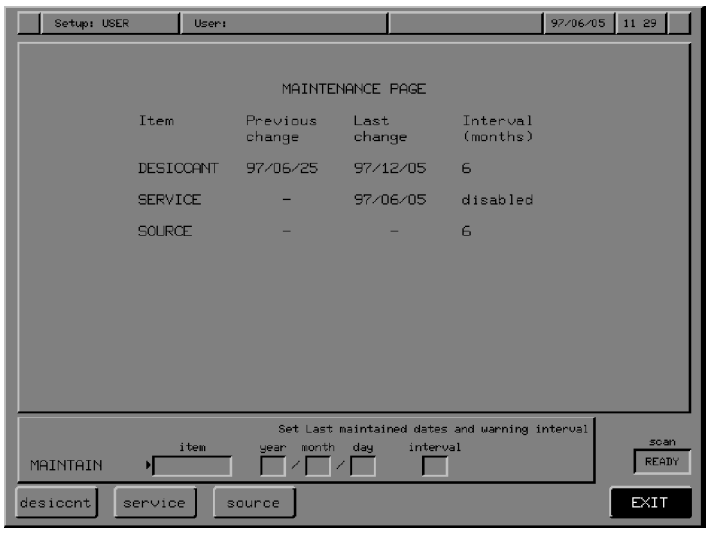


Figure 4-5 Updated Maintenance Page

6 Press ***EXIT*** ***EXIT***.
Ready For Next Command returns.

Disabling a Maintenance Warning

The Spectrum RXI enables you to disable a maintenance warning.

NOTE: *We recommend that you do not disable the desiccant warning because this is a necessary operation that must be performed regularly.*

1 At Ready For Next Command, press **setup** (OTHERS) (OTHERS) (misc) (maintain).
The Maintenance Page is displayed.

2 Press the softkey for the maintenance operation that you want to disable, for example, (service).

3 Press (interval).

4 Type **0**.
The service maintenance warning interval changes to **0** *as shown in Figure 4-6.*

Figure 4-6 Service Maintenance Warning Command Line

5 Press (EXECUTE).
The service maintenance warning is disabled, as shown in Figure 4-7.

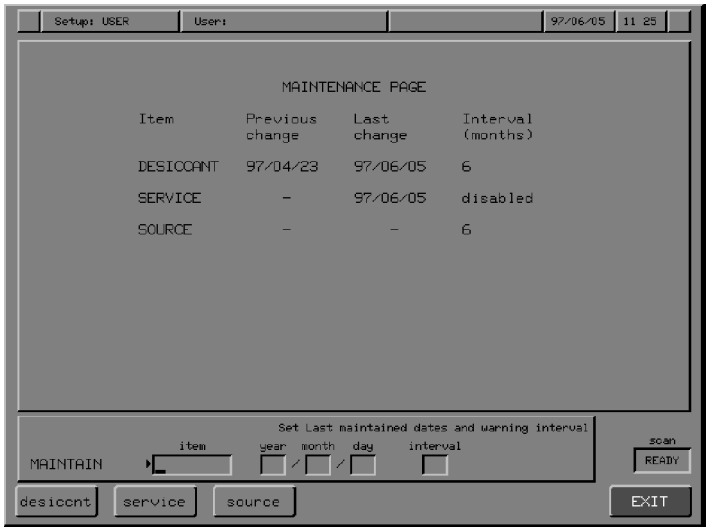


Figure 4-7 Disabled Service Maintenance Warning

6 Press EXIT EXIT.
Ready For Next Command returns.

Changing the Desiccant

The optical system of the Spectrum RXI is purged at the factory, then sealed under a clear plastic purge cover. This protects the KBr both in the beamsplitter and in the sample compartment windows from being damaged by humidity. Four replaceable packages of desiccant maintain the purge.

CAUTION

Make sure you change the desiccant every six months because old, used desiccant releases moisture and can cause catastrophic failure of the beamsplitter.

At the set interval after the previous desiccant change, a warning message begins appearing every time you switch the Spectrum RXI on and every time the screen goes into Sleep mode:

Time to change desiccant: see MAINTENANCE chapter of manual

When this message appears:

- Change the desiccant, following *Replacing the Desiccant* on page 4-9.
- Do *not* try to dry the disposable cloth bags of desiccant for reuse. The temperatures needed to dry them will destroy the enclosing bag.
- If you have re-usable, perforated metal, desiccant packs, re-activate them by following the instructions given on page 4-11.

Care in Humid Climates

In humid climates, you need to take extra care of the optics. In particular:

- Change the desiccant before you switch on the Spectrum RXI if it has been switched off for one month or longer (or less time if the desiccant was old when the Spectrum RXI was switched off);
- Leave the Spectrum RXI switched on;
- Change the desiccant every three months;
- Use only desiccant recommended by Perkin-Elmer;
- Make sure the desiccant has been stored properly.

Replacing the Desiccant

1 Order two desiccant kits (N017 1159). Each contains two packages of desiccant.

2 Inspect the plastic bags in which the spare desiccant packages are packed. If the plastic bag is not properly sealed, discard the desiccant pack.

WARNING

Switch off the power supply to the Spectrum RXI, wait 60 seconds, and disconnect the power cable before you open the cover of the Spectrum RXI. This makes sure that you are safe from electrical shock and laser radiation.

CAUTION

During the following procedure, the purged optical system is exposed to the atmosphere. To minimize the loss of purge, have the new desiccant ready before you begin, and complete the procedure as quickly as possible.

Do not start the procedure if the temperature of the Spectrum RXI has not equilibrated with the ambient temperature of the laboratory.

Do not start the procedure if the the relative humidity is >75%(if your Spectrum RXI has a KBr beamsplitter), or >45% (if your Spectrum RXI has a CsI beamsplitter). You can determine the relative humidity using the humidity detector on the purge cover (Figure 4-8)

3 Unlock the main cover of the Spectrum RXI (see *Opening the Cover of the Spectrum RXI* on page 4-1).

4 Lift the cover and prop it open.
The safety interlock switches off the Spectrum RXI, if you did not disconnect the power cable.

The desiccant box is located behind the sample compartment (Figure 4-8).

5 Loosen the screws on the desiccant box, and lift the box from the Spectrum RXI.

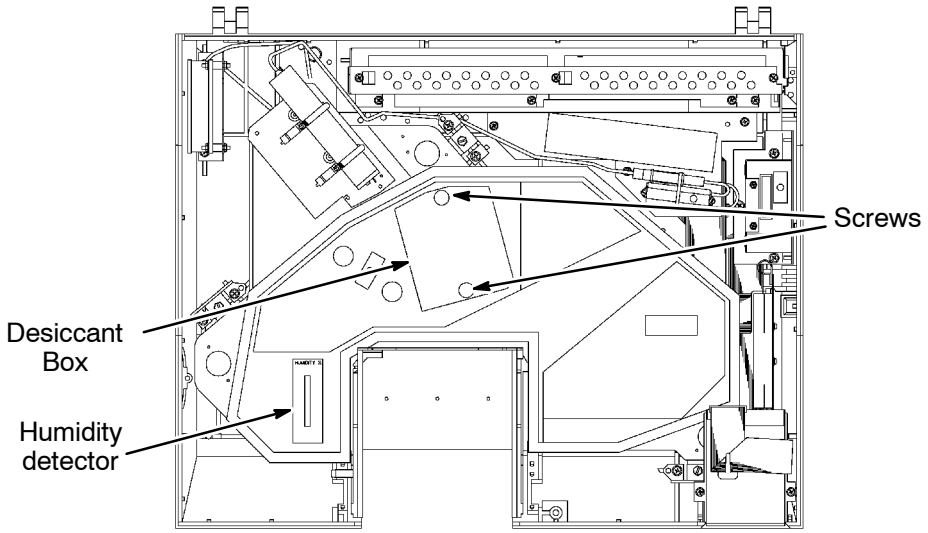


Figure 4-8 Location of the Desiccant Box

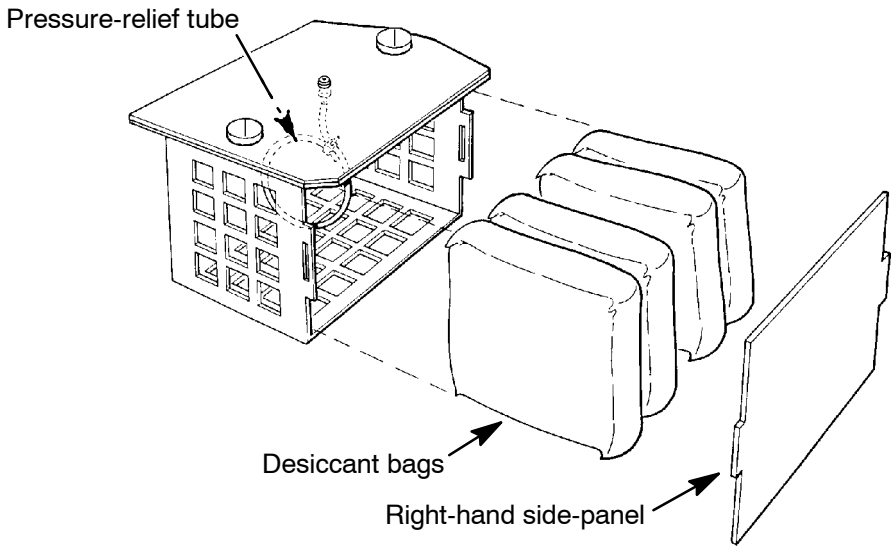


Figure 4-9 Replacing the Desiccant

Five surfaces of the desiccant box are formed from a single sheet of metal. The sixth surface (the right-hand side-panel) is a separate piece (Figure 4-9).

6 To open the box, snap out the right-hand side-panel.

7 Remove the old desiccant bags and discard them. Be careful not to damage the pressure-relief tube that lies between the middle two bags (Figure 4-9).

NOTE: *Do* not *attempt to dry the bags of desiccant for re-use. The temperatures needed to dry them will destroy the enclosing bag.*

8 Carefully insert two new bags of desiccant between the pressure-relief tube and the rear panel of the box.

9 Reposition the pressure-relief tube so it is flat against the desiccant package.

10 Insert the other two bags of desiccant in front of the tube.

11 Snap the right-hand side-panel back onto the box.

12 Lower the box into the instrument.

13 Tighten the screws.

14 Close the main cover and lock it by turning the screw clockwise until it becomes difficult to turn.

Reactivating and Replacing the Desiccant Packs

Re-usable desiccant packs, which are in perforated metal covers, are also available for the Spectrum RXI. They can be re-activated by baking them in an oven at 250 °C for approximately 8 hours. They should be cooled in a dry atmosphere. The part number is 0499 4725, and 2 packs are required for each instrument.

Purging the Optical System of the Spectrum RXI

In most situations, you do not need to purge the optical system, because the desiccant maintains the purge. However, you may want to purge the optical system briefly after you change the desiccant, to remove water vapor and carbon dioxide that entered while the system was open. You can purge the optical system with either dry air or nitrogen. Both remove water vapor; but nitrogen is preferable because it also removes atmospheric carbon dioxide.

A typical cylinder of dry nitrogen (or dry air) stores 220 ft^3 at 2200 lb/in^2 (6.26 m^3 at 14000 kPa). Make sure that the gas is free of oil, water, or dirt particles larger than 25 μm (0.001 inch).

WARNING

Do not use a flammable gas to purge the Spectrum RXI. The Spectrum RXI contains a hot source, and a fire or explosion will result. Only use clean, dry, oil-free nitrogen or air to purge the instrument.

WARNING

Never connect the purge tubing directly to a gas cylinder or other high pressure supply; always use a pressure regulator and set the pressure to a maximum of 1 pound per square inch (6.9×10^3 Pa) before you start the flow.

Purging the optical system

1 Raise the cover of the Spectrum RXI, following the instructions on page 4-1.

WARNING

A safety interlock switches off the power when you raise the cover. Nevertheless, to avoid all danger of electrical shock, as well as exposing your eyes to laser radiation, switch off the Spectrum RXI, wait for 60 seconds, and disconnect the power cord before opening the instrument cover.

2 Use Figure 4-10 to help you locate the following components:

- the clear plastic purge cover;
- the inlet for purge gas on the front of this cover, to the left of the sample compartment;
- the outlet, which is also on the front, near the right-hand side.

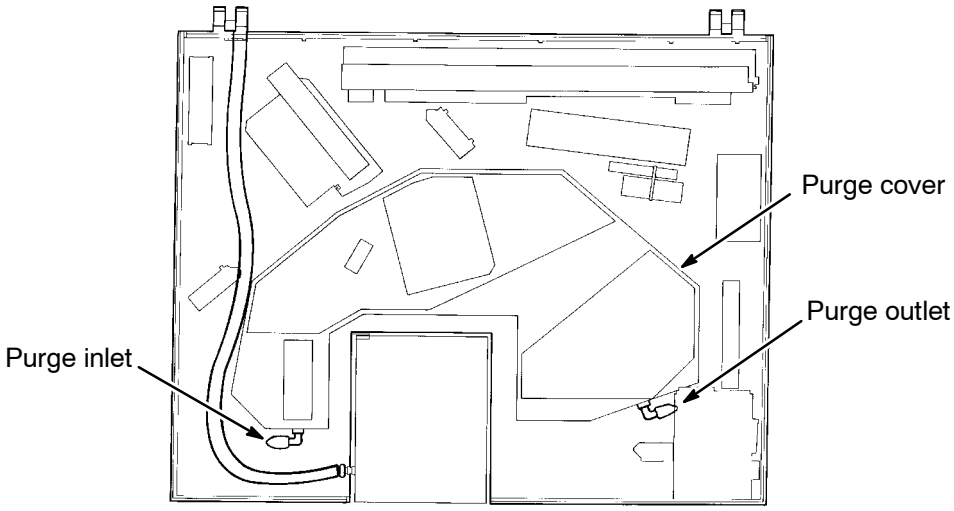


Figure 4-10 Purging the Spectrum RXI

3 Remove the plastic caps from the inlet and the outlet.

4 Connect tubing (not supplied with the instrument) to the inlet.

5 Arrange the tubing alongside the sample compartment purge tubing, which is shown in Figure 4-10. An exit is provided for it at the rear of the instrument, next to the exit for the sample compartment tubing.

6 Connect the free end of the inlet tubing to the gas supply.

7 Make sure that the gas supply regulator is set to a pressure of no more than 1 pound per square inch (6.9×10^3 Pa).

WARNING

Make sure that the purge outlet is open before you turn on the gas supply to the inlet. Otherwise, pressure could build up under the sealed purge cover.

8 Make sure that the purge outlet is open and turn on the gas, using a flow rate of 1 cubic foot per minute (28 l/min). No special outlet tubing is necessary. *The optical system will be purged in about 10 minutes.*

Changing the External Fuse

Very occasionally, a fuse may fail with age and need to be changed. If fuses fail repeatedly, there is an electrical fault: disconnect the Spectrum RXI from the power supply and contact your PerkinElmer Service Department.

You received a supply of spare external fuses with your Spectrum RXI. If you need more, order 20 mm 3.15A, 250V Slo-Blo fuses (0C973085) from PerkinElmer. You must only replace the fuse with one of this type and rating.

WARNING

Switch off the power to the Spectrum RXI, wait for 60 s, and disconnect the power cable before you start this procedure. This protects you from electrical shock.

1 Switch off the power to the Spectrum RXI.

2 Wait for 60 seconds.

3 Disconnect the power cable.
The external fuse holder is located below the power cable connector, on the right-hand side of the Spectrum RXI (Figure 4-11).

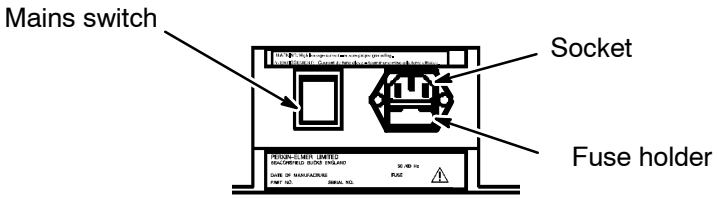


Figure 4-11 The External Fuse Holder

4 Pull the fuse holder out.
The fuse is in a clip on the back of the fuse holder.

5 Remove the old fuse and discard it.

6 Push the new fuse into the clip.

7 Refit the fuse holder.
The new fuse is now installed.

8 Reconnect the power cable.

NOTE: *You can store a spare fuse in the front of the fuse holder.*

Electrical Connections

Fitting the Plug

The power cable for the electrical supply plugs into the right-hand side of the Spectrum RXI. It has a molded socket at one end. If it is necessary to fit a plug on the power cable, use the wire color code below:

Plug Pin	Wire Color (100/110/120V)	Wire Color (220/230/240V)
Ground (Earth)	Green or Green/Yellow	Green/Yellow
Line	Black	Brown
Neutral	White	Blue

WARNING

To ensure safe and satisfactory operation of the instrument, it is essential that the green or green/yellow ground (earth) wire of the power cord is connected to a ground that complies with the regulations of the local electricity supply authority (or equivalent body); ground circuit continuity is essential for safe operation of the equipment.

Connecting the Spectrum RXI to the Electrical Supply

The Spectrum RXI can operate on an electricity supply at 50 or 60 Hz, and in either of the ranges 100 to 120 V or 220 to 240 V, without any adjustment.

Fit the molded socket of the power cable onto the plug at the right-hand side of the Spectrum RXI. The location of the electrical supply inlet is illustrated on the next page.

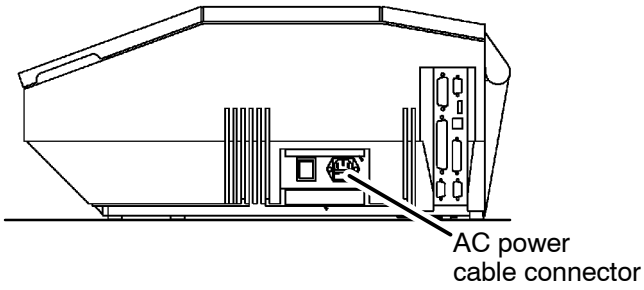


Figure 4-12 The Location of the Electrical Supply Inlet

Connecting the Spectrum RXI to the PC

For information about connecting the Spectrum RXI to the PC, see *Communicating with Other Devices*.

Other Connectors

The electrical connections for peripheral devices are shown below.

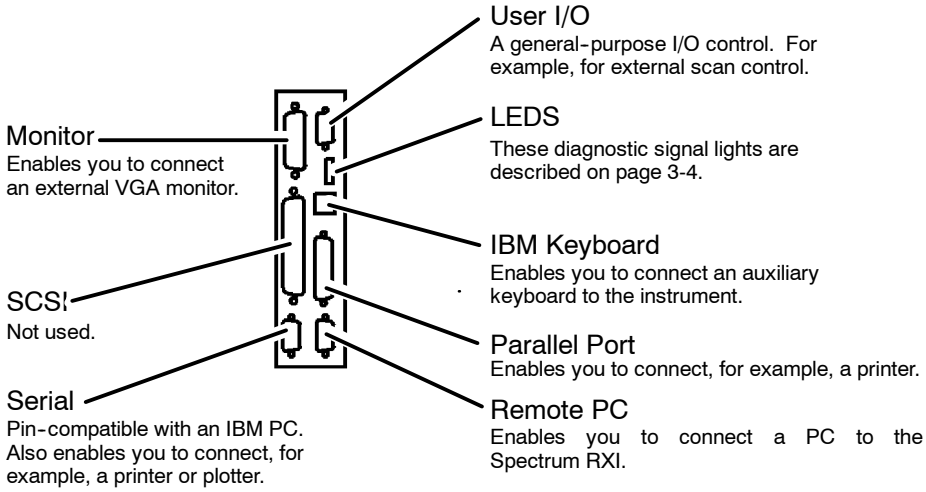


Figure 4-13 Electrical Connections for Peripheral Devices

Connections

MONITOR

Pin	Signal	Voltage	Current
1	RED	+2.4V	5mA
2	GREEN	+2.4V	5mA
3	BLUE	+2.4V	5mA
4	Not Used		
5,6	$0V_L$		
7,8	$0V_L$		
9	Not Used		
10	$0V_L$		
11	$\overline{\text{COLOUR}}$	Input, +5V	
12	Not Used		
13	HSYNC_BUF	+5V	24mA
14	VSYNC_BUF	+5V	24mA
15	Not Used		

User I/O, 15-way HD D-type

Pin	Signal	Voltage	Current
1	$\overline{\text{EXT\_SCAN\_START}}$	+5V	95mA
2	USR_O/P1	+5V	95mA
3	USR_O/P2	+5V	95mA
4	$0V_L$		
5	$0V_L$		
6	$0V_L$	$0V_L$	
7	$0V_L$		
8	$0V_L$		
9	$0V_L$		
10	$0V_L$		
11	$\overline{\text{EXT\_SCAN\_EN}}$	+5V	1mA
12	USR_I/P1	+5V	1mA
13	USR_I/P2	+5V	1mA
14	$0V_L$		
15	$0V_L$		

Serial: 9-way D-type, pins; Remote PC 9-way D-type, sockets

Pin	Signal	Voltage	Current
1	$\overline{\text{DCD}}$	±12V	±8mA
2	$\overline{\text{RXD}}$	±12V	±8mA
3	$\overline{\text{TXD}}$	±12V	±10mA
4	DTR	±12V	±10mA
5	$0V_L$	±12V	±8mA
6	DSR	±12V	±8mA
7	RTS	±12V	±10mA
8	CTS	±12V	±8mA
9	$\overline{\text{RI}}$	±12V	±8mA

Parallel port, 25-way D-type

Pin	Signal	Voltage	Current
1	$0V_{CHASSIS}$	0V	
2	$\overline{\text{SAMPLE\_LOADED}}$	5V	0.5mA
3	$\overline{\text{AUTO-SAMPLER\_HERE}}$	5V	0.5mA
4	$0V_L$	0V	
5	$-12V_P$	-12V	1A (3A, S/C)
6	$\overline{\text{SHUTTLE\_HERE}}$	5V	0.5mA
7	$+12V_P$	+12V	1A (3A, Short circuit)
8	$+5V_L$	+5V	5A
9	PAS_GAIN0	5V	95mA
10	SAMPLE-BSY/POS	5V	0.5mA
11	SAMPLE_POSITION	5V	95mA
12	PAS_GAIN1	5V	95mA
13	PAS_RET	0V	
14	PAS_SIG		INPUT
15	Not Used		
16	Not Used		
17	Not Used		
18	$0V_{AG}$	0V	
19	Not Used		
20	Not Used		
21	Not Used		
22	Not Used		
23	Not Used		
24	Not Used		
25	Not Used		

IBM

Pin	Signal	Voltage	Current
1	Data	5V	16mA
2	NU		
3	0VL		
4	+5VL	5V	Maximum available current <5A
5	Clock	5V	16mA
6	NU		

External Beam: PL 20 OF Main PCB: MAS-CON 0.1 inch

Pin	Signal	Voltage	Current
1	ExtBSig	≤±12V	(Input impedance: 10kΩ): Input signal: ≤1.2mA
2	ExtBReturn	0	
3	0VAG	0	
4	0VAG	0	
5	0VAG	0	
6	0VCH	0	
7	+VE12/15	+12V	Maximum available current <2A
8	-VE12/15	-12V	Maximum available current <2A
9	0VAG	0	
10	Not Connected	NU	
11	ExtBgain0	5	24mA
12	ExtBgain1	5	24mA
13	0VAG	0	
14	+5VL	+5V	Maximum available current <5A
15	0VL	0	

Cleaning the Spectrum RXI

Always switch off the power and remove the power cord before cleaning.

You can clean the outside of the Spectrum RXI using a damp cloth. Mild detergent may be used, if necessary. Always perform a patch test on an inconspicuous area of the instrument, before you clean the entire instrument.

Avoid spilling liquid into the instrument, especially into the top rear cover of the Spectrum RXI, which contains a high-voltage supply. Clean all external spills immediately. If anything that is spilled enters the main body of the Spectrum RXI, switch off the power and contact a PerkinElmer Service Engineer.

Do not touch or attempt to clean any optical surface in the instrument, because this will impair its performance and may easily damage the component.

Typed Commands 5

Typing Commands

For each set of keypresses you use to enter and execute a command, there is a typed equivalent. For example, instead of pressing scan Y 16, you can type **scan y 16**.

Whether you use the keypad or a typed command, the same command appears in the Previous Command Line; for example, whether you press scan Y 16 or type **scan y 16,** the Previous Command line reports **SCAN Y 16**.

After typing the command you press enter to execute the command.

You can type a command whenever the Spectrum RXI is at Ready For Next Command, by typing directly into the command line with one of the following:

- the keypad of the Spectrum RXI;
- an auxiliary keyboard plugged into the IBM KEYBD port;
- a terminal or PC plugged into the REMOTE PC port.

Conventions Used for Typed Commands

In this chapter, the following conventions are used to describe typed commands.

- **bold text** indicates text that you type as it is;
- [square brackets] indicate that an item is optional;
- *italics* indicate parameters; do not type the word itself, type the number or character string that you require;
- | indicates mutually exclusive choices;
- (parentheses) are used to group items together.

Example

Format **area** *region* [*start end*] [*point1 point2*]

Examples

area X
uses region X, and assigns default values to start, end, point1 and point2

area Z 3000 2950
uses region X, a start and end of 3000 cm^{-1} and 2950 cm^{-1}, and assigns default values to point1 and point2

area X 1800 1725 2000 1600
uses region X, a start and end of 1800 cm^{-1} and 1725 cm^{-1}, and a point1 and point2 of 3000 cm^{-1} and 2950 cm^{-1}

Notes

- The command is **area**, and the parameters are *region*, *start*, *end*, *point1* and *point2*.
- The square brackets indicate that *start*, *end*, *point1* and *point2* are optional parameters.
- Because the brackets group the parameters together in pairs, you must include both of the paired parameters, or neither of them, for example both *start* and *end*, or neither.
- You cannot default intermediate values in a command line. That is, if you leave out *start* and *end*, you cannot type values for *point1* and *point2,* because the first values typed are assigned to the first parameters (refer to the second example).

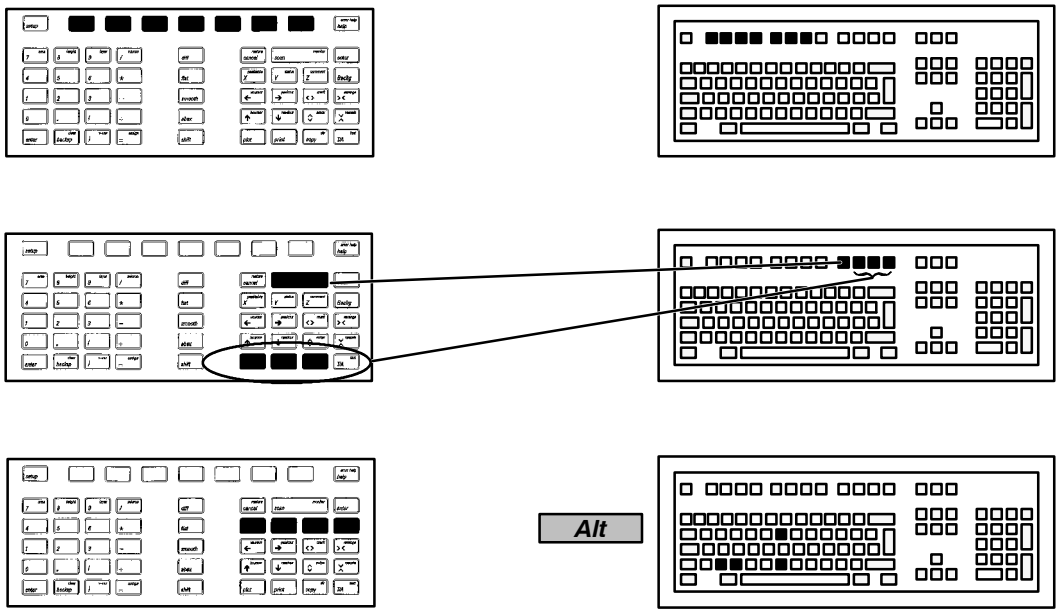
Typing With an Auxiliary Keyboard

You can plug an auxiliary keyboard into the **IBM KEYBD** connector on the Spectrum RXI. You can then enter commands from the auxiliary keyboard instead of from the Spectrum RXI keypad.

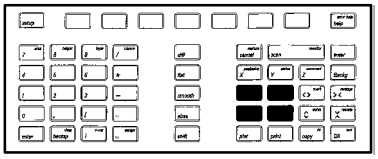
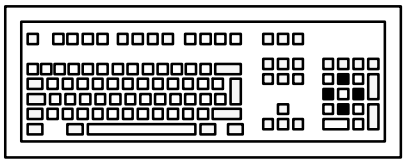
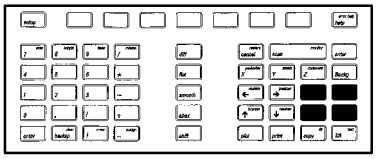
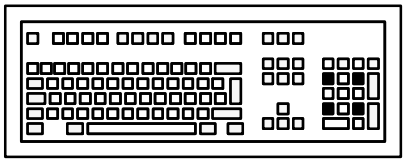
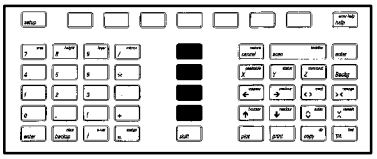
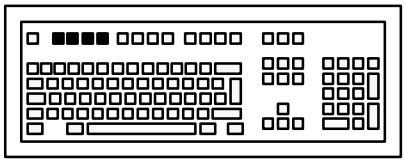
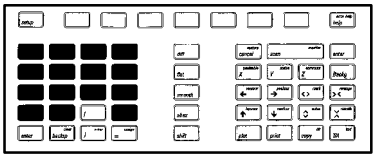
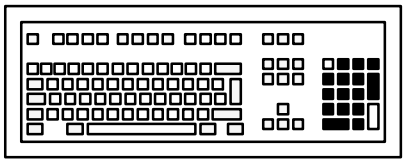
The commands on the keypad of the Spectrum RXI are assigned to keys on the auxiliary keyboard, and these are displayed below. Unless otherwise stated, the shifted function of a key on the Spectrum RXI keypad is obtained by pressing [Alt] followed by the key for the unshifted function.

NOTE: *The Spectrum RXI works with a keyboard that has an American layout. If your keyboard has a different layout (for example, British) you will find that some keys do not type the characters you expect.*

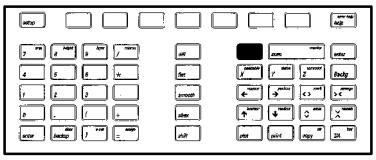
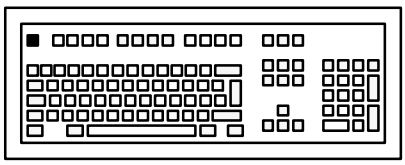
Spectrum RXI 500 Keypad **Auxiliary Keyboard**



NOTE: *For the shifted functions on* [X], [Y], [Z] *or* [Backg], *press* [Alt] [shift].

Spectrum RXI 500 Keypad		Auxiliary Keyboard
		num lock off 
		num lock off 
	*shift*	
		num lock on 

NOTE: *Match the keys by their labels, not by their positions.*

Alphabetical Listing

a

Changes the current ordinate display mode to absorbance

Key command none

Format **a**

Parameters none

Example **a**
xyz
plot
Ensures that the overlaid spectra are plotted in absorbance mode

Reference *Routine Operations*, *Viewing and Processing.*

ab

Converts a per cent transmittance into absorbance.

Key command none

Format **ab** *transmittance*

Parameters *transmittance*
a per cent transmittance

Example **ab 20.11**
Converts 20.11%T into absorbance

See also **tr** converts absorbance to transmittance
T/A converts an absorbance spectrum into transmittance, and vice versa

abex

Expands the absorbance of the spectrum in the specified region

Key command *abex*

Format **abex** [*region*] [*factor*]

Parameters

region
a spectrum region. If this parameter is omitted, the default spectrum region is used.

factor
the abex factor. This can be a numerical value, or the word **auto**. If you type **auto**, the Spectrum RXI selects the abex factor.

Examples

abex auto
performs absorbance expansion on the spectrum in the default region, using a factor selected by the Spectrum RXI.

abex X 1.3
performs absorbance expansion on the spectrum in region X using 1.3 as the factor.

Reference *Routine Operations*, *Viewing and Processing.*

addbackg

Adds background to a synthetic, single-beam spectrum

Key command none

Format **addbackg** *region temperature scale*

Parameters

region
a spectrum region

temperature
the temperature of the source in K

scale
the scaling factor

Example

addbackg X 1000 .9
adds a background to the synthetic single beam spectrum in region X. The supposed source has temperature 1000 K and the scaling is .9 K.

addband

Adds a synthetic band to a spectrum

Key command none

Format **addband** *region shape position height width*

Parameters

region
a spectrum region

shape
the shape of the band
Values: lorentz, gauss

position
the position of the band, measured in wavenumbers

height
the height of the band, measured in ordinate units

width
the width of the band, measured in wavenumbers

Examples

addband X gauss 2500 .65 100
adds to the synthetic spectrum in region X a gaussian-shaped band, position 2500, and height .65 at width 100.

addnoise

Generates pseudo-random white noise and adds it to the specified spectrum.

Key command none

Format **addnoise** *region amplitude seed*
or **addnois** *region amplitude seed*

Parameters

region
a spectrum region

amplitude
the rms amplitude of the noise

seed
the seed for the random number generator. If the seed is zero, successive addnoise commands generate unrelated noise; if the seed is a positive number, the noise generated for that number is always the same.

Examples **addnoise X 1.5 10**
adds noise to the synthetic spectrum in region X. The amplitude is 1.5 and the seed for the random number generator is 10.

area

Calculates the area under a spectrum.

Key command *area*

Format **area** *region* [*start end*] [*point1 point2*]

Parameters *start* and *end*
wavenumbers between which the area under the spectrum is calculated

point1 and *point2*
points on a baseline above which the area is calculated

Examples **area X**
calculates the area under the spectrum in X

area Z 3000 2950
calculates the area under the part of the spectrum in X that is between 3000 and 2950 cm^{-1}.

area X 1800 1725 2000 1600
calculates the area under the part of the spectrum in X that is between 3000 and 2950 cm^{-1} and above a baseline through 2000 and 1600 cm^{-1}.

Reference *Routine Operations*, *Viewing and Processing.*

autex

The displayed spectra expand to fill the entire screen vertically. Only the display changes; the data in memory do not. This is the important distinction between Autex and Abex; Abex multiplies the data by an expansion factor.

Key command *autex*

Format **autex**

Parameters none

Reference *Routine Operations*, *Collecting Spectra*

NOTE: *Autex works in two different ways, depending on the setting of the View Autex Option in Setup.*

backg

There is no typed command for the backg soft key. Use the scan typed command, for example, **scan backg 1**.

Key command *Backg*

Reference *Routine Operations*, *Collecting Spectra*

backup cleanup

Verifies that a backup has been completed successfully, and then deletes the original files.

Key command *setup* *OTHERS* *disk* *backup* *CLEANUP*

Format **backup cleanup** *backup original*

Parameters

backup
the backup disk

original
the disk that contains the original files

Reference *Routine Operations*, Chapter 5, *Copying and Storing Data*

backup copy

Copies a directory and the files it contains to a backup disk.

Key command setup OTHERS disk backup copy

Format **backup copy** *source destination files contents*

Parameters

source
the directory to be backed up

destination
the backup disk

files
specifies whether all the files or just the changed ones are to be backed up
values: **changed** or **all**

contents
specifies what to do with existing data on the backup disk
values: **erase**, **update** or **preserve**

Examples **backup copy FD:\ FD:\ all erase**
copies the entire contents of a floppy disk to another floppy disk (the backup disk), and erases the previous contents of the backup disk

Reference *Routine Operation*, Chapter 5, *Copying and Storing Data*

backup verify

Verifies that a backup has been completed successfully.

Key command setup OTHERS disk backup VERIFY

Format **backup verify** *backup original*

Parameters

backup
the backup disk

original
the disk that contains the original files

Examples **backup verify FD:\ FD:**
verifies that the files on the first floppy disk are exact copies of the files on the second floppy disk

Reference *Routine Operation*, Chapter 5, *Copying and Storing Data*

beeper

Sets the loudness of the keypad beeper.

Key command setup OTHERS OTHERS misc beeper

Format **beeper** *level*

Parameters *level*
the loudness of the keypad beeper
values: off, soft, medium, loud or an integer from 0 (off) to 255 (loud)

Reference *Advanced Operations*, Chapter 1, *User Preferences*

bmp

Changes the operation of the print key to store the current screen display as a Windows bitmap file on the floppy disk. The filename is taken from the a-variable a99; if a99 is empty, the name bmp0001.bmp is used. The filename is incremented and written to a99 after each successful write.

Format **bmp off|fixed|true**

Parameters

none
reports the current setting in the scroll buffer

off
resets print as defined by setup others print key

fixed
print causes the current screen display to be captured to the floppy disk using a fixed default color palette

true
print causes the current screen display to be captured to the floppy disk using the instrument color palette

Examples

```
a99=rfnc0001=
bmp fixed
print
bmp true
print
bmp off
```

Two files are written to the floppy disk drive: rfnc0001.bmp, which shows the screen as Ready For Next Command using the fixed colour palette; and rfnc0002.bmp, which shows the same screen with the instrument color palette.

NOTE: *The fixed palette was chosen to give the best results when reduced to grey scales for inclusion in a manual. You need a PC with 256 color display or better for bitmaps captured using the true option to appear correctly in Windows Paintbrush.*

bottom

Moves the displayed spectrum or horizontal cursor downward.

Key command [↓]

Format **bottom**

Parameters none

calc trans

Selects transmittance or absorbance for calculating process commands

Key command [setup] (OTHERS) (OTHERS) (calc) (trans)

Format **calc trans** *value*

Parameters *value*
specifies which process commands are calculated in transmittance:
0 or OFF – none; 1 – area; 2 – compare; 4 – deconv; 8 – deriv; 16 – diff;
32 – flat; 64 – height; 128 – peak, peakcur, peak location in height and mark;
255 or ON – all. If you want to switch **trans** to **on** for some process commands and not others, add the numbers together for the required commands.

Example **calc trans 3**
switches **trans** to **on** for area and compare

calcl trans off
switches trans to off for all the process commands

cancel

Stops the detached task that is specified, and keeps as little of it as possible.

Key command [cancel]

Format **cancel plot|print|scan|format**

Examples **cancel print**
Stops the printing that is running as a detached task.

clock

Sends the current date and time to the printer. If this command is in a method file, the date and time are printed on your results each time you use the method.

Key command *setup* (*clock*)

Format **clock**

Parameters none

Reference *Advanced Operations*, Chapter 1, *User Preferences*

comment

Attaches a comment to the spectrum in the specified spectrum region.

Key command *comment*

Format **comment** *region text*

Parameters *region*
a spectrum region

text
a string of characters

Example **comment X polys #1**
Attaches the comment **polys #1** to the spectrum in X

Reference *Routine Operations*, *Collecting Spectra*

compare

Compares a sample spectrum with the spectrum of a known compound and computes a correlation coefficient and a difference factor. It saves the correlation and the difference factor in V0 and V1.

Key command *compare*

Format **compare** *region1 region2* [*start end*] [*filter*]

Parameters

region1 and *region2*
spectrum regions, or files on disk

start and *end*
wavenumbers defining the region of the spectrum compare uses

filter
a filter to give more weight to certain differences. If you do not specify a filter, the default filter is used. The filter settings are given in Table 3-9 on page 3-68 *(Routine Operations)*.

Examples

compare X Y
compares the sample spectrum in X with the known spectrum in Y.

compare X FD:\ 3000 1500
compares the spectrum in X with the spectra on a floppy disk over the range from 3000 cm^{-1} to 1500 cm^{-1}.

compare X Y off
compares the spectrum in X with the spectrum in Y using the specified filters.

convolve

Takes a weighted running average of the data points in a spectrum, using an array of weighting factors stored in the V-variables.

Key command none

Format **convolve** *region v-var #weights center*

Parameters

region
a spectrum region

v-var
the V-variable that contains the weighting factor

#weights
the number of weights in the array

center
the center weight (counting the first weight as 1)

Example **convolve X 8 6 3**
convolves the spectrum in region X using 6 weights. These begin at V-variable 8 and with the center weight as weight 3.

See also **deconv**, page 5-18

copy

Copies a file from one location to another.

Key command ***copy***

Format **copy** *source destination*

Parameters

source
a spectrum region, a store region, a disk file, or a remote device (RS232).

destination
a spectrum region, a store region, a disk file, or a remote device (RS232).

Examples **copy X FD:\polymr2**
copies a file from spectrum region X to the file polymr2 on the floppy disk

NOTE: *If you are copying a method file, you must type the extension* **.oy***, because the default is a spectrum file.*

Reference *Routine Operations*, *Copying and Storing Data*

See also **method copy**, page 5-32; **dcopy**, page 5-18

dcopy

Direct copy of any file type from disk to disk. Works for any type of file. Performs no data integrity checking.

Format

dcopy *from to*
dcopy *from from1 from2 from3 dir*

Parameters

from, from1 ...
the full filename of the file to be copied. This must include the file extension and may include the full drive and directory path.

to
the full name of the copy

dir
the directory to which the file or files will be copied

deconv

Narrows the bandwidths of absorption bands, enabling you to distinguish overlapping bands, and, in many cases, resolve them.

Key command none

Format

deconv *region width smoothing*

Parameters

region
a spectrum region

width
the width of a typical band in cm^{-1}

smoothing
smoothing width

Example

deconv X 10 4.5
deconvolutes the spectrum in region X, using the width 10 and the smoothing width 4.5.

See also

convolve, page 5-16

degrees

Selects degrees or radians for trigonometric calculations.

Key command *setup* *OTHERS* *OTHERS* *calc* *degrees*

Format **degrees on|off**

deriv

Calculates a derivative of a spectrum.

Key command none

Format **deriv** *region order smoothing*

Parameters

region
a spectrum region

order
the order of the derivative

smoothing
smoothing width

Example **deriv Y 2 5.2**
calculates the second order derivative of the spectrum in region Y, and smooths it using a smoothing width of 5.2.

diff

Subtracts the component spectrum in spectrum region2 from the mixture spectrum in region1, and places the resulting difference spectrum in region3.

Key command *diff*

Format **diff** [*region1 region2 region3*] [*scaling factor*]

Parameters *region1,region2,region3*
spectrum regions

scaling factor
a scaling factor to give the spectrum in region 2 the same scale as the spectrum in region1. If you omit the factor, it is determined automatically.

Examples **diff X Z Y**
subtracts the component spectrum in spectrum region Z from the mixture spectrum in X and places the resulting difference spectrum in region Y, using an automatically determined scaling factor.

diff X Y Z 2.5
subtracts the component spectrum in spectrum region Y from the mixture spectrum in X and places the resulting difference spectrum in region Z. Uses a scaling factor of 2.5.

Reference *Routine Operations*, *Viewing and Processing*

dir change

Changes the working directory

Key command *dir* *change*

Format **dir change** *directory*

Parameters *directory*
the directory that will become the current working directory

Reference *Routine Operations*, Chapter 5, *Copying and Storing Data*

dir create

Creates a new directory.

Key command dir create

Format **dir create** *parent directory comment*

Parameters

parent
the directory which is the parent of the new directory

directory
the name of the new directory

comment
a comment that is attached to the directory

Examples **dir create FD:\general spectra**
creates a new directory called spectra in the FD:\general directory

Reference *Routine Operations*, Chapter 5, *Copying and Storing Data*

display

Sets the format for displaying numeric results. If the notation is fixed or floating decimal, *number* sets the number of decimal places. If the notation is auto, *number* sets the number of significant figures.

Keyboard keys none

Format **display auto**|**fixed**|**float** [*number*]

Parameters

auto
results are reported to the specified number of significant figures

fixed
results are reported to the specified number of decimal places (scientific notation is only used when the result overflows the number of decimal places specified)

float
results are reported using scientific notation

number
the number of significant figures (for auto), the number of decimal places (for fixed and floating)

Examples

display auto 6
sets the format for display results to 6 significant figures

display fixed 6
sets the format for displaying results to 6 decimal places

Reference *Routine Operation*, *Viewing and Processing*

flat

Corrects the baseline of a spectrum.

Key command *flat*

Format **flat** [*region*] (*slope* [*bow*] [*skew*] [*wave*])|**auto**

Parameters

region
a spectrum region

slope, bow, skew, wave,
baseline correction parameters, *(for a description, refer to* Routine Operations*).*

auto
corrects the baseline automatically, using the baseline correction parameters specified by *setup* *OTHERS* *OTHERS* *calc* *flat*

Examples

flat Y 3.2
corrects the baseline of the spectrum in Y, using the slope 3.2.

flat auto
corrects the baseline of the spectrum in the default region, using the baseline correction parameters specified in **setup flat**.

flat Y 2.5 1.4
corrects the baseline of the spectrum in Y, using the slope 2.5 and the bow 1.4.

Reference *Routine Operation*, *Viewing and Processing*

getn

Reports the instrument configuration to a remote computer via the remote port.

Format

getn *x*|*y*|*z*|*backg*|*store1*|*store2*|*store3*|*store4*|*store5*|*store6*
getn method
getn scanmisc
getn scan
getn shuttle
getn config

Synonym you can use **gn** in place of **getn**

Responses

The format of the replies sent to the remote port. Unless otherwise stated all responses are a single line in length.

getn *region*
ERROR: 100 REGION EMPTY
or
OK: region=*file header*

file header has a multiline response: the standard Spectrum RXI file header, as described in *Advanced Operations*, Chapter 2, *Communicating with Other Devices*.

getn method
method=*avail space,name1,size1,name2,size2, ... ,name7,size7*

avail space
the number of free bytes remaining in the method buffer

name#
the method name for that method number #. If that particular method does not have a specified name, then method# is sent as the name. If the method is empty, then there is a NULL name.

size
the number of bytes in method number #

getn scanmisc
ERROR: 101 INSTRUMENT BUSY
if the instrument is scanning
or
OK: scanmisc=*scans,fgdur,bgdbur,BACKG,fgcontinue, bgcontinue,defregion*

scans
default number of scans

fgdur
duration of sample scan in seconds

bgdur
duration of background scan in seconds

BACKG
background valid **yes|no**

fgcontinue
foreground scan continuation valid **yes|no**

bgcontinue
background scan continuation valid **yes|no**

defregion
default region **x|y|z|backg**

getn scan
OK: scan=*resol,apod,igramfrom,igramto,specfrom,specto,mode*

resol
resolution

apod
apodization **strong|weak|none**

igramfrom
left igram range

igramto
right igram range

specfrom
left spectrum range

specto
right spectrum range

mode
scan mode **igram|single|ratio**

getn shuttle
OK: shuttle=*mode,position*

mode
operating mode **manual|semi|auto**

position
sample holder is **in|out** of beam

getn config
OK: config=*revision,software config,memory size,resolution,detector,disk, shuttle* configured

revision
software revision string

config
bit mapped flag of software packages

memory size
size in kbytes

resolution
maximum resolution

detector
INTERNAL|EXTERNAL|PAS

disk
0|3 no or 1.44 Mb floppy drive present

shuttle
shuttle fitted **yes|no**

NOTE: **getn** *only functions if the Spectrum RXI is configured to accept typed commands from the remote port. Youu can set this, for example, with the command* **setup others devices remote others ibm-pc**.
getn *is included to help users who want to create their own PC applications to control the Spectrum RXI.*

hcursor

Displays the horizontal graphics cursor at the specified value.

Key command ***hcursor***

Format **hcursor** *ordinate*

Parameters *value*
the ordinate value where the horizontal cursor will be displayed.

Reference *Routine Operation*, Chapter 3, *Viewing and Processing Data*

height

Reports the height of a peak.

Key command *height*

Format **height** *region wavenumber* [*point1*] [*point2*]

Parameters

region
a spectrum region

wavenumber
the wavenumber position of the peak

point1, point2
points on a baseline above which the height is measured

Example

height Y 3000 2950
Reports the height, width, and position, of the peak nearest to 3000 cm^{-1} in the spectrum in Y. The height is measured above a baseline through 2950 cm^{-1}.

height Y 3000 2950 1500
Reports the height, width, and position, of the peak nearest to 3000 cm^{-1} in the spectrum in Y. The height is measured above a baseline through 2950 and 1500 cm^{-1}.

Reference *Routine Operation*, Chapter 3, *Viewing and Processing Data*

help location

Selects the default location for disk-based on-line help.

Key command *setup* *OTHERS* *OTHERS* *help* *location*

Format **help location** *directory*

Parameters

directory
drive and directory to be used for disk-based on-line help

Example

help location FD:\helptext
sets the default location for help text to the directory helptext on the floppy disk.

help location
resets the default location for help text to the ROM-based help.

interp

Changes the the data-point interval of a spectrum (interpolates).

Key Command none

Format **interp** *region start end interval*

Parameters

region
a spectrum region

start
the starting wavenumber

end
the ending wavenumber

interval
the data interval that you want the spectrum to have

Example **interp X 3700 3300 0.1**
changes the data-point interval of the spectrum in X to 0.1 cm^{-1} in the region 3700 to 3300 cm^{-1}.

NOTE: *start and end are tested to make sure that they lie between the start and end of the spectrum; interval is tested to make sure that it produces neither too large nor too small a spectrum.*
The sign of interval is ignored and is determined by the order of start and end. You can turn the spectrum around by specifying limits in the wrong order.
No test is made to see that start is a multiple of interval.

layer

Calculates the thickness or refractive index of a layer.

Key command *layer*

Format **layer** *index*|*thickness wavenumber1 wavenumber2 fringes* [*angle*]

Parameters

index
refractive index

thickness
the thickness of the layer

wavenumber1 and *wavenumber2*
the wavenumber range that the fringes cover in the spectrum

fringes
the number of fringes

angle
angle of incidence

Examples

layer 1.14 3500 1200 8
reports the thickness of a layer with refractive index 1.14 that shows eight fringes in a wavenumber range 3500 - 1200 cm^{-1} when the angle of incidence is zero degrees.

layer 18.99 3800 1500 9 15
reports the refractive index of a layer with thickness 18.99 that shows nine fringes in a wavenumber range 3800 - 1500 cm^{-1} when the angle of incidence is 15 degrees.

Reference *Routine Operations*, Chapter 3, *Viewing and Processing Data*

lock

Locks certain keys in place or locks out regions of the keypad after you have set up the Spectrum RXI as you want it. In this way, you can limit the access of users, so that they must use the Spectrum RXI as you have set it up.

Key command *setup* *misc* *locks*

Format **lock method|routine|setup**

Parameters

method
only named methods can be run

routine
only *scan*, *plot*, *print*, and *Backg* are available

setup
the setup cannot be changed.

See also **Restore**, page 5-42

logo

Enables or disables the Perkin-Elmer 50 year screen saver logo.

Format **logo on|off**

Parameters

on
the Perkin-Elmer 50 year logo is displayed as the screen saver.

off
press enter to continue is displayed on a small raised slate as the screen saver.

NOTE: *The Spectrum RXI alerts you that a change of desiccant is required if it was last changed more than 6 months ago. Under these circumstances, the desiccant change warning replaces the usual screen saver.*

mark

Key command none

Adds a temporary mark to a spectrum, for labelling. The marks are not stored with the spectrum and are removed when you press a region key.

Format **mark** *wavenumber*

Parameters *wavenumber*
the wavenumber of the spectrum that you want to be marked

Reference *Routine Operations*, Chapter 3, *Viewing and Processing Data*

mean

Key command none

Format **mean** *region* [*start end*]

Parameters *region*
a spectrum region

start and *end*
the wavenumber range that mean uses

Examples **mean Y**
reports the mean, minimum, and maximum ordinate values of the spectrum in region Y.

mean Z 1000 850
reports the mean, minimum, and maximum ordinate values of the spectrum in region Z over the range 1000 to 850 cm^{-1}.

method

Runs a method.

Key command *method*

Format **method** *filename*

Parameters *filename*
the filename of the method that you want to run

Examples **method usedoil**
starts the method usedoil

Reference *Routine Operations*, *Methods*

method copy

Copies a method.

Key command *setup* *method* *copy*

Format **method copy** *filename filename2*

Parameters *filename*
the name of the method file that you want to copy *from*

filename2
the name of the method file that you want to copy *to*

Examples **method copy method1 RS232**
copies method 1 from memory to a remote device

Reference *Routine Operations*, *Methods*

See also **copy**, page 5-17

method erase

Erases a method.

Key command setup method erase

Format **method erase** *filename*

Parameters *filename*
the filename of the method that you want to erase

Reference *Routine Operations*, *Methods*

method print

Prints a method.

Key command setup method

Format **method print** *filename*

Parameters *filename*
the filename of the method that you want to print

Examples **method print polys**
prints the method *polys*

Reference *Routine Operations*, *Methods*

method rename

Renames a method.

Key command setup method rename

Format **method rename** *filename newname*

Parameters *filename*
the name of the method file that you want to rename

newname
the name that you want to give to the method file

Examples **method rename polys oils**
renames the method *polys* with the name *oils*

Reference *Routine Operations*, *Methods*

micron

Converts between microns and wavenumbers.

Key command ***micron***

Format **micron** *number*

Parameters *number*
a positive number. If it is greater than 100, it is converted into microns. If it is smaller than 100, it is converted into wavenumbers.

Examples **micron 1623**
converts the number 1623 from wavenumbers to microns

micron 56
converts the number 56 from microns to wavenumbers

Reference *Routine Operations*, Chapter 3, *Viewing and Processing Data*

monitor

Monitors an instrument signal while the Spectrum RXI scans.

Key command ***monitor***

Format **monitor scan**|**backg**|**energy**|(**igram** *start end*|*center*)

Parameters **scan**
monitors scanning

backg
monitors the background

energy
monitors energy

igram
monitors energy, using a range (*start* and *end*) or the centerburst (*center*)

Examples **monitor scan**
starts monitoring scanning

monitor igram x y
starts monitoring the interferogram

Reference *Routine Operations*, *Collecting Spectra*

noise

Reports the peak-to-peak and rms noise, and the linear trend for a spectrum.

Key command none

Format **noise** *region* [*start end*]

Parameters

region
a spectrum region

start and *end*
the wavenumber range that noise uses

Examples

noise X
calculates the noise in the spectrum in X.

noise Z 2000 1500
calculates the noise in the spectrum in Z over the range 2000 to 1500 cm^{-1}.

peaktable or peak

Creates a peak table.

Key command ***peaktable***

Format **peaktable** *region* [*start end*] [print] or **peak** *region* [*start end*] [print]

Parameters

region
a spectrum region

start and *end*
wavenumbers between which you want to find the peaks

print
if you include this parameter, the peak table is printed

Examples

peak Y
produces a peak table for the spectrum in region Y.

peak Z 4400 2000
produces a peak table for the range 4400 to 2000 cm^{-1} of the spectrum in Z.

peak X 1500 800 print
produces a peak table for the range 1500 to 800 cm^{-1} and prints it.

Reference *Routine Operations* , *Viewing and Processing*

plot

Plots the graphics display.

Key command ***plot***

Format **plot** [*region1*][*region2*][*region3*] [*start*] [*end*] [*scale*]

Parameters

region1, region2, region3
the spectrum regions that you want to plot from

start, end
the start and end of the range within which you want the data to be plotted

scale
the scale in cm^{-1}/mm that you want to be used

Example

plot
plots the current graphics display

plot XBACKG 900 450 20
plots the spectra in spectrum regions X and Backg, within the range 900 to 450 cm^{-1}, using the scale 20 cm^{-1}/mm

Reference *Routine Operations*, *Printing and Plotting*

plotter

Configures the Spectrum RXI for a plotter.

Key command ***setup*** ***OTHERS*** ***devices*** ***plotter***

Format **plotter** *(port model)*|***none***

Parameters

port
the port to which the plotter is connected

model
the model of the plotter

NOTE: *If you specify* **custom***, you must set the plotter parameters individually. Refer to Plotter Settings on page 5-37.*

none
specifies that there is no plotter

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

plotter settings

Sets the communication parameters of your plotter individually, as directed in the manual supplied with the plotter. You need to do this if you have chosen **custom** as the model of your plotter.

Key command *setup* *OTHERS* *devices* *plotter*

Format **plotter** *port* **custom** *parameter setting*

Parameters

port
values: **serial, centron, rs232**

parameter
values: **format**, **baud**, **parity**, **databit**, **stopbit**, **timeout**, **interm**, **delete**, **cancel**, **outterm**, **discard**, **echo**, **xon**

setting
values: format: **HPGL**, **PCL**, **PCL5**, **epson**
baud: **300**, **600**, **1200**, **2400**, **4800**, **9600**
parity: **even**, **odd**, **mark**, **space**, **strip**, **off**
databit: **5**,**6**,**7**,**8**
stopbit: **1**, **1.5**, **2**
timeout: a number of seconds
interm: a 3-character input termination and a 10-character reply string
delete: a 3-character 'delete' string and a 10-character reply string
cancel: a 3-character 'cancel line' string and a 10-character reply string
outterm: a string that terminates output (up to 10 characters)
discard: **yes**, **no**
echo: **yes**, **no**
xon: respond to Xon/Xoff: **yes**, **no**

NOTE: *If you set* **format** *to* **PCL** *or* **PCL5***, you can specify* **100** *or* **300** *dpi (dots per inch) as the plotter resolution and* **color** *or* **mono** *(monochrome) output. If you set* **format** *to* **epson***, you can specify the graphics mode number.*

NOTE: *If your plotter is at the serial port, you only need to set* **format**, **baud**, **parity** **stopbit**, **timeout** *and* **outterm**.

Examples **plotter serial custom parity odd xon yes**
sets the parity of the plotter on the serial port to **odd** and switches on response to Xon/Xoff.

plotter centron custom format pcl5 300 color
sets the plotter format on the centronics port to **PCL5**, with a printer resolution of 300 dots per inch and color printing

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

See also **printer**, page 5-38
plotter, page 5-36

print

Sends output to the printer as specified by the current setting of *print key* (setup OTHERS print key) or saves the current sscreen display as a Windows bitmap on the floppy disk if **bmp** is selected.

Key command print

Format **print**

Reference *Routine Operations*, *Printing and Plotting*

See also **bmp**, page 5-13

printer

Configures the Spectrum RXI for a printer.

Key command setup OTHERS devices printer

Format **printer** (**none**)|(*port model*)

Parameters

none
specifies that there is no plotter

port
the port to which the plotter is connected

model
the model of the plotter

NOTE: *If you specify* **custom***, you must set the printer parameters individually. Refer to Printer Settings on page 5-39.*

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

printer settings

Sets the communication parameters of your printer individually, as directed in the manual of the printer. You need to do this if you have chosen **custom** as the model of your printer.

Key command *setup* *OTHERS* *devices* *printer*

Format **printer** *port* **custom** *parameter setting*

Parameters

port
values: **serial, centron, rs232**

parameter
values: **format**, **baud**, **parity**, **databit**, **stopbit**, **timeout**, **interm**, **delete**, **cancel**, **outterm**, **discard**, **echo**, **xon**

setting
values: format: **hpgl**, **pcl**, **pcl5**, **epson**, **other**
baud: **300**, **600**, **1200**, **2400**, **4800**, **9600**
parity: **even**, **odd**, **mark**, **space**, **strip**, **off**
databit: **5**,**6**,**7**,**8**
stopbit: **1**, **1.5**, **2**
timeout: a number of seconds
interm: a 3-character input termination and a 10-character reply string
delete: a 3-character 'delete' string and a 10-character reply string
cancel: a 3-character 'cancel line' string and a 10-character reply string
outterm: a string which terminates output (up to 10 characters)
discard: **yes**, **no**
echo: **yes**, **no**
xon: respond to Xon/Xoff: **yes**, **no**

NOTE: *If you set* **format** *to* **PCL** *or* **PCL5***, you can specify* **100** *or* **300** *dpi (dots per inch) as the plotter resolution and* **color** *or* **mono** *(monochrome) output. If you set* **format** *to* **epson***, you can specify the graphics mode number.*

NOTE: *If your printer is at the centronics port, you cannot set* **format** *to* **hpgl**.

NOTE: *If your printer is at the serial port, you only need to set* **format**, **baud**, **parity** **stopbit**, **timeout** *and* **outterm**. *If your printer is at the* CENTRON *port, you only need to specify* **format**, **timeout** *and* **outterm**.

Examples **printer serial custom parity odd**
sets the parity of the printer on the serial port to *odd*

printer rs232 custom discard no echo no
sets the printer discard to *no* and the printer echo to *no* for the printer on the rs232 port

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

See also **printer**, page 5-38
plotter, page 5-36

remote

Configures a remote device, such as a computer. The remote device must be connected to the RS232 port.

Key command *setup* *OTHERS* *devices* *remote*

Format **remote** *model* | ***none***

Parameters *model*
the model of the remote device
values: **SPECTRUM, IRDM, GRAMS, IBM-PC**, **PE-LIMS**, **PE-7000**, **PE-1700**, **terminl**, **custom**

NOTE: *If you specify* **custom***, you must set the remote parameters individually. Refer to Remote Settings on page 5-41.*

none
specifies that there is no remote device

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

remote settings

Sets the communication parameters of your remote device individually, as directed in the manual supplied with the remote device. You need to do this if you have chosen **custom** as the model of your remote device.

Key command *setup* *OTHERS* *devices* *remote* *custom*

Format **remote** *parameter setting*

Parameters

parameter
values: **format**, **baud**, **parity**, **databit**, **stopbit**, **timeout**, **interm**, **delete**, **cancel**, **outterm**, **discard**, **echo**, **xon**

setting
values: format: **JCAMP**, **IRDM, SPECTRUM**
baud: **300**, **600**, **1200**, **2400**, **4800**, **9600**
parity: **even**, **odd**, **mark**, **space**, **strip**, **off**
databit: **5**,**6**,**7**,**8**
stopbit: **1**, **1.5**, **2**
timeout: a number of seconds
interm: a 3-character input termination and a 10-character reply string
delete: a 3-character 'delete' string and a 10-character reply string
cancel: a 3-character 'cancel line' string and a 10-character reply string
outterm: a string that terminates output (up to 10 characters)
discard: **yes**, **no**
echo: **yes**, **no**
xon: respond to Xon/Xoff: **yes**, **no**

Examples

remote stopbit 1
sets the stopbit for the remote device to **1**

remote parity odd
sets the remote parity to **odd**

Reference *Advanced Operations*, Chapter 2, *Communicating with Other Devices*

See also
printer, page 5-38
plotter, page 5-36

restore

Restores a spectrum to a spectrum region, the keypad to its full functionality, or the setup to the factory setup or user setup.

Key command ***restore***

Format **restore** *region*| ***keypad*** | ***setup user*** | ***setup factory***

Parameters

region
a spectrum region

keypad
restores full functionality to the keypad when it has been locked

setup user, setup factory
restores the user setup or the factory setup

Examples

restore X
restores the spectrum that was previously in X

restore setup factory
restores the factory setup.

References

spectrum - *Routine Operations*, *Collecting Spectra*;
keypad - *Advanced Operations*, Chapter 1, *User Preferences*;
setup - *Advanced Operations*, Chapter 1, *User Preferences*.

retrieve

Retrieves a file from the current working directory and places it in a spectrum region. If you specify the filename the first time that you use the command, the filename is incremented by 1 each time that you subsequently use the command.

Key command none

Format **retrieve** [*region*] [*filename*]

Parameters

region
a spectrum region

filename
the first in a series of filenames, or the wildcard character *****

Examples

retrieve x spect1
retrieve y
retrieve z
copies, in this order, the spectra called spect1, spect2 and spect3 from the current working directory into spectrum regions X, Y and Z.

retrieve benzyl
sets up the retrieve command so that it will subsequently look for a file called benzyl. If you follow this command with **retrieve x**, the file benzyl1 will be copied into spectrum region X from the current working directory.

retrieve *.sp
sets up the retrieve command so that it will subsequently retrieve .sp files from the disk in the order in which they are stored on the disk.

retrieve *
sets up the retrieve command so that it will subsequently retrieve all files (both .sp and .ig) from the disk in the order in which they are stored on the disk.

See also **save**, page 5-44

NOTE: *If necessary, you can type the complete path of the file, for example,* **FD:\spectra\spec1**.

rev

Displays the current software revision in the scroll buffer. Copies the software revision string into a0 and decodes the revision string xx.yy.zz to put xx.yy into v0 and zz into v1.

Format **rev**

save

Saves spectra or interferograms to sequentially named files in the current working directory. The results of the save are recorded in the V-variable V0:

Value of V0	Meaning
0	the file was saved successfully
-1	the file was not saved because there was no more room on the disk
+1	the file was not saved for some other reason

Key command none

Format **save** [*region*] [*filename*]

Parameters *region*
a spectrum region

filename
the first filename in the series

Examples
save x spect1
save y
save z
copies, in this order, the spectra called spect1, spect2 and spect3 from the spectrum regions X, Y and Z into the current working directory.

save benzyl
sets up the save command so that it will subsequently save a spectrum to a file called benzyl.sp. If you follow this command with **save x**, the spectrum in spectrum region X will be copied into the file benzyl1 in the current working directory.

See also **retrieve**, page 5-43

NOTE: *If necessary, you can type the complete path of the file, for example,* **FD:\spectra\spec1**.

scan apod

Changes the apodization.

Key command setup scan apod

Format **scan apod** *type*

Parameters *type*
strong, **weak** or **none**

Example **scan apod strong**
changes the apodization to strong

Reference *Routine Operations*, *Collecting Spectra*

scan mode

Changes the scan mode.

Key command setup scan mode

Format **scan mode ratio | single | igram**

Parameters **ratio**
changes the scan mode to ratio

single
changes the scan mode to single beam

igram
changes the scan mode to igram

Example **scan mode single**
changes the scan mode to single beam

Reference *Routine Operations*, *Collecting Spectra*

scan range

Changes the scan range.

Key command setup scan range

Format **scan range** *from to*

Parameters *from* and *to*
the limits of the scan range. Allowed values between 7800 and 100 cm^{-1}

Example **scan range 4500 400**
sets the scan range from 4500 cm^{-1} to 400 cm^{-1}

Reference *Routine Operations*, *Collecting Spectra*

scan resol

Changes the resolution that spectra are collected at.

Key command setup scan resol

Format **scan resol** *resolution*

Parameters *resolution*
the scan resolution, in cm^{-1}

Example **scan resol 8**
changes the scan resolution to 8 cm^{-1}

Reference *Routine Operations*, *Collecting Spectra*

set backg

Enables or disables the automatic redisplay of the default region after the Spectrum RXI has collected a new background.

Format **set backg on|off**

Parameters **off**
automatically redisplays the default region, usually X, after collecting a background spectrum in ratio mode.

on
leave the graphics showing the new background at the end of a background scan.

NOTE: *This setting is not permanently stored and is lost when the Spectrum RXI is switched off.*

set barcode

Enables or disables automatic polling of the IBM-AT keyboard port. By default, the Spectrum RXI polls the external keyboard port by sending a request for the Basic Assurance Test (BAT); this is used to detect whether a keyboard is connected, and to initialize the keyboard LEDs and ignore any spurious characters generated by plugging it in.

The IBM-AT emulation offered by barcode readers may ignore BAT. This function enables the automatic polling to be disabled.

Format **set barcode on|off**

Parameters **on**
disable polling of the keyboard

off
re-enable logging of the keyboard; this is the default

NOTE: *This setting is not permanently stored and is lost when the Spectrum RXI is switched off.*

setup retrieve

Loads the complete instrument configuration, including methods, from disk. This function is the equivalent of a user login to the Spectrum RXI.

Format **setup retrieve** *name password*

Parameters

name
an eight-character configuration filename, in effect the user name

password
a password that is used to protect against unauthorized access to an instrument configuration

NOTE: *The instrument calibration, configuration and the instrument id are unaffected by* **setup retrieve**.

Reference *Advanced Operations*, Chapter 1, *User Preferences*

setup save

Saves the complete instrument configuration, including methods, to disk.

Format **setup save** *name password comment*

Parameters

name
an eight-character configuration/login name, used as a filename

password
an eight-character password used to protect the configuration against unauthorized access

comment
a descriptive comment used by **dirlist** to distinguish configurations

Reference *Advanced Operations*, Chapter 1, *User Preferences*

shift

Shifts the abscissa of a spectrum according to a polynomial whose coefficients you supply. The polynomial may be up to 6th order: only the zeroth order coefficient must be supplied, any others not supplied are set to zero.

Let x be the nominal abscissa coordinate for a point in the shifted spectrum. The ordinate for this point is calculated by interpolating the ordinate value of the original spectrum at the abscissa given by:

$x' = x + c_0 + c_1*x + c_2*x^2 + c_3*x^3 + c_4*x^4 + c_5*x^5 + c_6*x^6$

If x' lies outside the range of the original spectrum, x' is set to the appropriate abscissa limit of the spectrum.

Format **shift** *region c0 [c1 [c2 [c3 [c4 [c5 [c6]]]]]]*

Parameters

region
spectrum region **x|y|z|backg**

c#
numerical coefficient

Example **shift x 10.0**
shift the spectrum in X by 10 cm^{-1}

shuttle

Changes the mode of operation of the sample shuttle, and if this is **manual**, moves the shuttle in or out of the beam.

Key command ***shuttle***

Format **shuttle** *mode* [*position*]

Parameters

mode
the mode of operation of the sample shuttle
values: **manual**, **semi**, or **auto**

position
the position of the sample shuttle
values: **in** or **out**

Examples

shuttle manual out
sets the mode of operation of the sample shuttle to manual, and moves the shuttle out of the beam

shuttle auto
puts the sample shuttle into automatic mode

Reference *Routine Operations*, *Collecting Spectra*

signal

Controls the operation, reading and writing to the three input and three output lines available with the Spectrum RXI User I/O port.

Format

signal
This returns the current value for the six lines in the v-variables named in the table below. The output lines give the current output setting; the input relays are read directly.

signal *line*
returns the current setting of the named line in v0

signal *line state*
sets an output line to the target state; if the external scan start line is set in this way, the automatic operation of this line during a scan is disabled.

For an input line, the command waits for the line to match the target state before returning. Only **CANCEL** or **HALT** can break the system out of this wait.

Old versions of the command, **signal high** and **signal low**, are supported for backward compatibility - these default to the **start** line.

signal start auto
enable automatic operation of the external scan start. This is the equivalent of the old signal scan command, which is still supported.

signal enable on|off
enable or disable the automatic wait at the start of a scan or group of scans and the automatic reject of intermediate scans when the enable line is held low.

Parameters

line

name	in/out	v#
external scan start	out	5
out 1	out	3
out 2	out	4
external scan enable	in	2
in 1	in	0
in 2	in	1

state
high | low

NOTE: *The state of the lines is not stored in NVRAM. In addition, the choice of SCAN or not SCAN is stored in the INPUT device record and so is not disturbed by* **restore setup**.

As a consequence of the internal architecture of the Spectrum RXI, input pulses less than approximately 100 ms may not be detected, and the minimum width output pulse that can be generated is > 33 ms.

References *Advanced Operations*, Chapter 3, *Communicating with Other Devices*

smooth

Smooths a spectrum.

Key command ***smooth***

Format **smooth** *region width*

Parameters *region*
a spectrum region
width
a smoothing width

Example **smooth X 5.2**
smooths the spectrum in region X using smoothing width 5.2

Reference *Routine Operations*, *Viewing and Processing*

status

Displays a status report on each spectrum region currently on the screen.

Key command ***status***

Format **status**

Reference *Routine Operations*, *Viewing and Processing*

survey

Key command

Format **survey**

Parameters none

Example **survey**
collects one scan and stores it in spectrum region X (the same as **scan x 1**)

Reference *Routine Operations*, *Collecting Spectra*

t

Changes the current ordinate display mode to transmittance

Format **t**

Parameters none

Example Make sure that the overlaid spectra are plotted in transmittance mode
t
xyz
plot

Reference *Routine Operations*, Chapter 3, *Viewing and Processing*

t/a

Changes the current ordinate display mode between %T and absorbance.

Key command T/A

Format **t/a**

Parameters none

Reference *Routine Operations*, *Viewing and Processing*

text

Switches the screen display between graphics and text.

Key command text

Format **text**

Parameters none

Reference *Routine Operations*, *Viewing and Processing*

tr

Reports the transmittance that corresponds to an absorbance that you type.

Key command none

Format **tr** *number*

Parameters *number*
the absorbance value that you want changed into transmittance

Example **tr 0.11**
reports the transmittance that corresponds to the absorbance 0.11

view autex

Switch continuous ordinate expansion on or off.

Key command setup view autex

Format **view autex on|off**

Parameters **on**
the ordinate scale continuously expands to fill the screen

off
the ordinate scale does not automatically expand to fill the screen when you redisplay a spectrum

Reference *Routine Operations*, *Viewing and Processing*

view color

Changes the screen colors.

Key command setup view OTHERS colors

Format **view color** *scheme*

Parameters *scheme*
the name of the color scheme

Example **view color factory**
changes the screen colors to the colors in the factory setup

Reference *Advanced Operations*, Chapter 1, *User Preferences*

view hold

Sets the center for ordinate expansion for ⇕ and ⇕.

Key command setup view hold

Format **view hold bottom|top|mid|auto**

Parameters **bottom**
expands about the bottom tick mark on the ordinate axis

top
expands about the top tick mark on the ordinate axis

mid
expands about the midpoint between the bottom and top tick marks on the ordinate axis

auto
If no horizontal cursor is present, a baseline in the spectrum is used as the center of expansion; if a horizontal cursor is present, it becomes the center of ordinate expansion; if a vertical cursor is present, the intersection of the cursor with the spectrum is the center of expansion

Reference *Routine Operations*, *Viewing and Processing*

view peaks

Sets how the peak cursor works

Key command *setup* *view* *peaks*

Format **view peaks base|band|both** *threshold*

Parameters

base
the peak cursor finds only base points

band
the peak cursor finds only peaks

both
the peak cursor finds both base points and peaks

threshold
the minimum ordinate difference between a base point and a peak that the peak cursor considers as a peak. This is set in the ordinate mode (A or %T) that is currently displayed.

Example **view peaks both 2**
The peak cursor finds both base points and peaks with a difference of 2%T or greater between them (assuming %T was the ordinate mode)

Reference *Routine Operations*, *Viewing and Processing*

view rerange

Sets the rerange limits. If you are currently viewing an interferogram, you will change the upper and lower limits for interferograms. If you are currently viewing a spectrum, you will change the upper and lower limits for spectra.

Key command setup (view) (rerange)

Format **view rerange** *upper lower*

Parameters

upper
upper rerange limit

lower
lower rerange limit

Examples

view rerange 4000 2500 (you are currently viewing spectra)
sets the upper and lower rerange limits for spectra to 4000 and 2500 cm^{-1}, respectively.

view rescale reset
resets the rescale limits of all data types to their factory default values.

Reference *Routine Operations*, *Viewing and Processing*

view rescale

Rescales the axes, using the units that you are currently using. That is, if the spectrum is displayed in absorbance, the numbers that you type refer to absorbance. If the spectrum is displayed in transmittance, the numbers that you type refer to transmittance.

Key command setup (view) (rescale)

Format **view rescale** *low high*

Parameters

low
the lower rescale limit

high
the higher rescale limit

Examples

view rescale 0.00 100.00
sets the rescale limits to 0.00 and 100.00

Reference *Routine Operations*, *Viewing and Processing*

view schange

Switches the scale change at 2000 cm^{-1} on and off.

Key command setup view OTHERS schange

Format **view schange on|off**

Reference *Routine Operations*, *Viewing and Processing*

Using the Disk Drive 6

Directory Structure

Several types of file are produced by the Spectrum RXI: they can contain spectra, interferograms, methods or reports. You can store these files on a floppy disk (FD:\), if your Spectrum RXI has one. You can organize your disk space by storing different sets of files in different directories. A directory can contain not only files, but also other directories, and this results in a tree structure, with each branch containing different files. An example of a directory tree is shown in Figure 6-1.

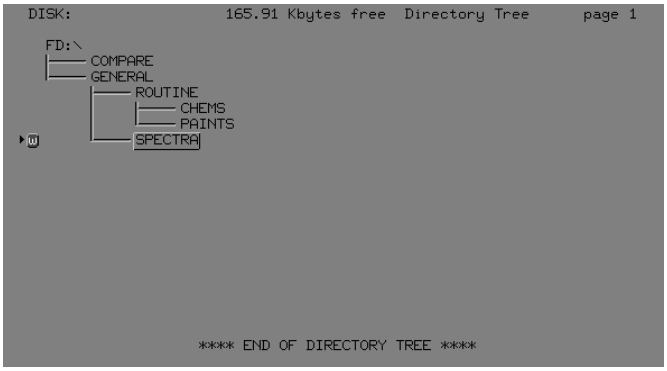


Figure 6-1 A Directory Tree

Limits on the directory structure

The directory structure is DOS-compatible, so the maximum length of the pathname is 64 characters (including backslashes). On the screen, you are limited by the number of characters that will fit across the screen: you can create and display a maximum of eleven levels of branching, but you may be restricted to a smaller number of levels if the directory names are long. If you are displaying the directory structure of a floppy disk that has more than eleven levels of branching, only the first eleven levels are displayed.

The working directory

This is the directory that is used by default by certain commands in the Spectrum RXI. For example, if you copy to or from disk, the working directory is the default directory. When the directory tree is displayed, the working directory is identified by W. During any interaction where you specify a pathname, you can reset the directory path so that it is not to the working directory.

Organizing the directory structure

A well-organized directory structure that is customized to the needs of your laboratory will help the users to store, retrieve, and backup their files much more quickly and easily.

When you are organizing the directory structure, we recommend that you create directories and subdirectories that are compatible with the working practices in your laboratory: for example, it may be appropriate to create a directory for each type of sample or analysis. When you create a directory, you can associate a comment with the directory name; we recommend that you use the comment to describe the contents of the directory.

It is also important to consider the number of files that will be stored in each directory: if you have a small number of directories, or subdirectories, and each contains many files, it will be more difficult to find a single file within any directory; if you have a large number of directories, or subdirectories, but each contains only a few files, it will be more difficult to find the directory that contains the file that you are searching for. Also, if the directory structure has too many levels, it will be complicated to use and path names will be very long.

If several users regularly use your Spectrum RXI, you may find it helpful for them to use separate disks.

Files with the same name

You can have two files with the same name in different directories, but not in the same directory.

Displaying a File List

Displaying a file list

A file list is a list of the files that the floppy disk directory contains. You can choose whether you want to display all the files or just some of them. Then, using the List Options, you can display the file list in different ways.

1 At Ready For Next Command, press **dir**.
The DIR screen appears, with the working directory indicated by a **W**. *See Figure 6-2.*

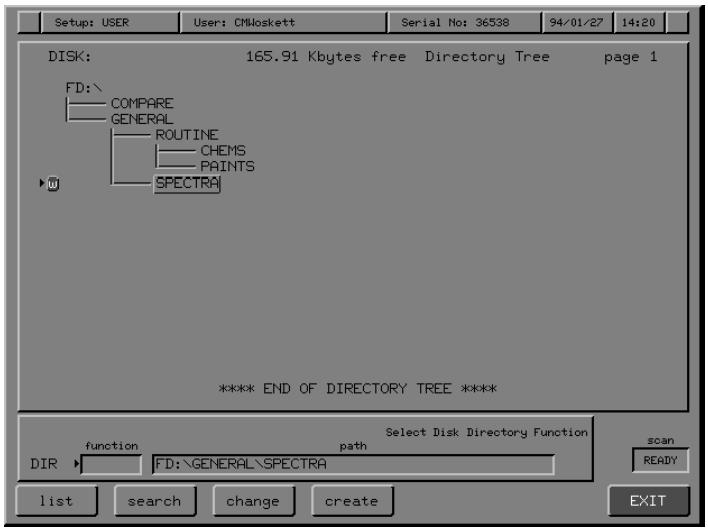


Figure 6-2 The Working Directory

NOTE: *If there is no disk in the disk drive, the following message appears:* **Error: drive not ready**; *if the wrong disk is in the disk drive (that is, it does not contain the current working directory), the message is* **Warning: working directory not found on disk**. *When you insert another disk, you do not have to press any keys; the Spectrum RXI reads the disk automatically.*

2 Press **list**.
The Directory List command line and soft keys are displayed (Figure 6-3).

Figure 6-3 The Directory List Command Line and Soft Keys

NOTE: *working is not displayed when the working directory is selected.*

3 Use pgup and pgdn to select the directory to list.
The selected directory appears in the **directory** *field.*

4 If you want to display all the files in this directory, press EXECUTE.
The file list is displayed.

or

If you want to display only one type of file:

a Press enter.
The cursor moves to the **files** *field, and the soft keys for choosing a file type are displayed (Figure 6-4).*

Figure 6-4 Soft Keys for Choosing a File Type

b Choose a file type by pressing one of the action keys.
Only the files of this type are listed.

or

Use regular expressions (see below) to specify the **files**, then press EXECUTE.

The file list is displayed, showing only files of this type. The List Options command line and soft keys are displayed (Figure 6-5).

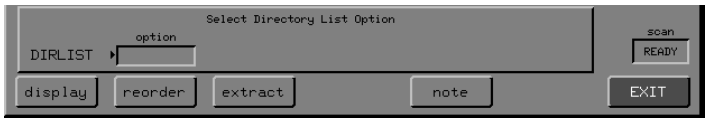


Figure 6-5 Soft Keys for Choosing a Directory List Option

Regular Expressions

Regular expressions can be used when you want to, for example, list or delete more than one file, and the files have the same pathname. The regular expression replaces some or all of the characters in the filename and/or the extension. The regular expressions that you can use are:

? replaces one character, for example, **INK?.SP** selects the spectral files INK1 through INK9 inclusive.

***** replaces the entire filename or extension, for example, ***.IG** selects all the interferogram files in the directory, or **BLUPAINT.*** selects files of all types with the filename BLUPAINT.

[] replaces any of the characters in the brackets, for example, **[ABC]*.SP** selects all spectral files whose filename starts with A, B or C.

The List Options

Now that the file list is displayed, the List Options (see Figure 6-5) enable you to change it in several different ways. You can:

- change the amount of information about each file that is displayed;
- change the order in which the files are displayed;
- extract filenames from the list;
- save the extracted filenames to the notepad.

Changing the information displayed

The display option enables you to change the amount of information that is displayed about each file :

full Displays the filename, comment, and additional information about how the data were collected.

comment Displays the filename and comment.

nameonly Displays the filename only.

diskinfo Displays the filename and the disk information.

1 With the file list displayed, press ***display*** .
The command line and soft keys in Figure 6-6 are displayed. They enable you to choose how much file information is displayed.

Figure 6-6 Soft Keys for Choosing File Information to Display

2 Choose the type of file information that you want to display.
The new file information is displayed, and the List Options soft keys return.

Changing the order of files

The Spectrum RXI can order the files in a list in three different ways:

- alphabetically,
- with the newest files first,
- with the oldest files first.

1 With the file list displayed, press ***reorder*** .
The soft keys for re-ordering the list are displayed.

Figure 6-7 Soft Keys for Changing the Order of a List

2 Choose how you want to order the list by pressing one of the action keys.
The list is re-ordered, and the List Options soft keys return.

Extracting files

You can extract filenames from the displayed file list, and save them to the notepad (described on the next page).

1 With the file list displayed, press ***extract*** .
The soft keys for selecting and deselecting files are displayed (Figure 6-8).

Figure 6-8 Soft Keys for Extracting Files

2 Select the files you require, using the arrow keys to move the cursor, and ***select*** to highlight a file.

3 Press ***EXECUTE*** .
Only the selected files are displayed, and the List Options soft keys return.

Notepad

The notepad enables you to prepare a list of files, for example, you can use it to create a file list that contains just a few selected files from one directory, or files from several directories. You can append files to the list in the notepad, or overwrite the current list by creating a new one. There is only one list of files in the notepad at one time, and this list is lost when the Spectrum RXI is switched off. You can access and use the files in the notepad whenever ***notepad*** is displayed, for example, when you are copying or backing up.

Saving filenames to the notepad

You can now save the files that you have extracted to the notepad.

1 Press ***note*** .
The soft keys for saving a list are displayed.

Figure 6-9 Soft Keys for Saving a List

NOTE: ***append*** *is not displayed if the notepad is empty.*

2 If the notepad is empty, press newlist or EXECUTE to create a new list.

or

If the notepad is not empty, press append or EXECUTE to add files to the notepad (and keep those that are already there), or press newlist to overwrite the list of files in the notepad.

Searching for a File

You can search a directory branch for files of a particular type, or files with a particular filename. You may find it helpful to use regular expressions if you are searching for several files with similar filenames. (Regular expressions are described on page 6-5.)

NOTE: *When you are saving files to disk, you can save spectra or interferograms to sequentially-named files in the current working directory. To find out how to automatically increment the filename, see* Routine Operations*, page 5-7.*

1 At Ready for Next Command, press dir search .
The directory search command line and soft keys are displayed, with the selected directory in the **directory branch** *field.*

Figure 6-10 The Directory Search Command Line and Soft Keys

2 Use pgup and pgdn to select the directory to search.
The selected directory appears in the **directory branch** *field. This directory and all its sub-directories, which are highlighted, will be searched.*

3 To search for all the files in this branch of the directory, press EXECUTE .
The files in each directory are listed.

4 To choose a file type or type a filename, press enter .
The cursor moves to the **files** *field, and the keys for choosing a file type are displayed.*

5 Choose a file type by pressing one of the action keys.
Only the files of this type are listed.

or

Use regular expressions (see below) to specify the **files**, then press EXECUTE.

The file list is displayed, showing only files of this type. The List Options command line and soft keys are displayed.

Changing the Working Directory

The working directory is the directory that is used by default by certain commands in the Spectrum RXI. For example, if you copy to or from disk, the working directory is the default directory.

1 At Ready for Next Command, press **dir**.
The directory tree is displayed. The working directory is indicated by a W.

2 Press **change**.
The soft keys for changing the working directory appear, with the selected directory in the **path** *field.*

Figure 6-11 Soft Keys for Changing the Working Directory

3 Use **pgup** and **pgdn** to select the directory to search.

4 Press **EXECUTE**.
The selected directory becomes the working directory, and now has the W *beside it.*

Creating a New Directory

1 At Ready for Next Command, press **dir**.
The directory tree is displayed.

2 Press **create**.
The create directory command line and soft keys are displayed (Figure 6-12), with the selected directory in the **path** *field. In the display area, a sub-directory called* **new directory** *appears below the selected directory.*

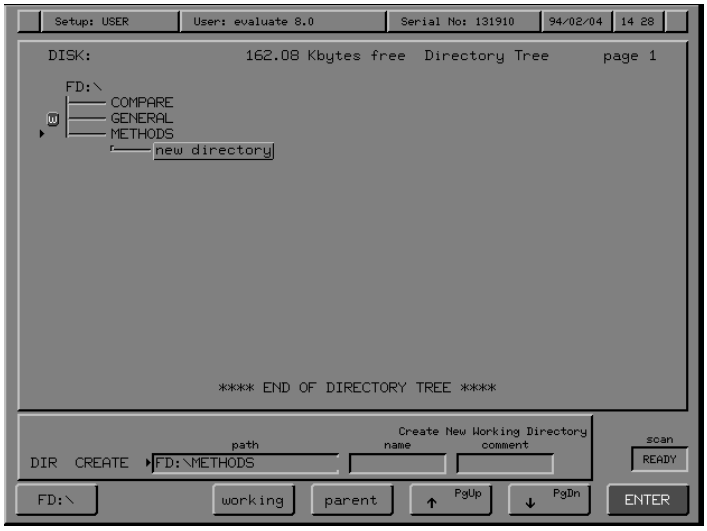


Figure 6-12 Creating a New Directory

3 Use **pgup** and **pgdn** to move the **new directory**. To move one level closer to the root, press **parent**.

4 Press **enter**.
The cursor moves to the **name** *field.*

5 Type a name for the new directory and press **enter**.
The cursor moves to the **comment** *field.*

6 If you want to store a comment about the directory, for example, a description of the type of files that the directory will contain, type the information in the **comment** field.
You can read the stored comment when you are listing or searching the directory.

7 Press EXECUTE .
The **new directory** *is inserted in the directory tree with the name you typed.*

NOTE: *The new directory is the working directory.*

If you want to create another new directory with the same parent, press create parent .

Deleting a File or Directory

NOTE: *You can only delete a directory if it is empty.*

1 At Ready For Next Command, press
setup OTHERS disk OTHERS delete .
The names of the files in the working directory are displayed (Figure 6-13).

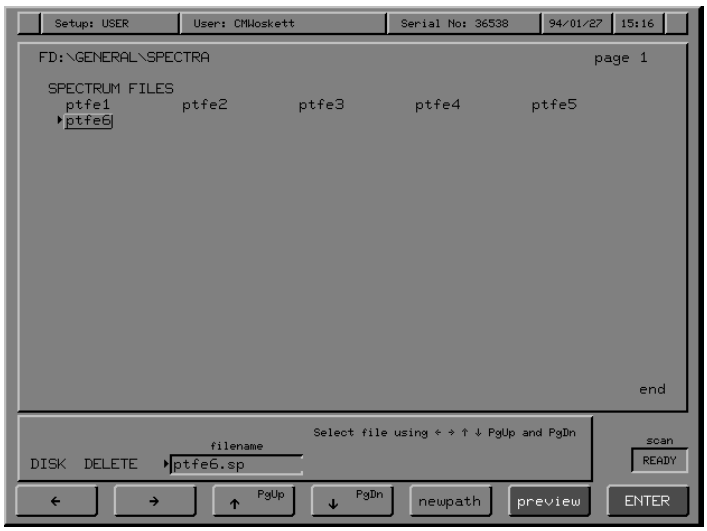


Figure 6-13 Screen for Selecting a File to Delete

2 Highlight the file that you want to delete, or press newpath to choose another directory.
The name of the file also appears in the **filename** *field. To view the file, press* preview .

NOTE: *If you are deleting a directory, the final character of the* **filename** *must be \.*

3 Press ENTER EXECUTE .
The file or directory is deleted from the disk, and the Disk options screen returns.

Deleting several files

You can delete several files using a *regular expression*, which includes the ***** character. (Other regular expressions are described on page 6-5.)

To delete all the files in the selected directory:

1 Press ***clear***.
The **filename** *field is cleared.*

2 Type ***.*** in the **filename** field.

3 Press ***ENTER*** ***EXECUTE***.
All the files in the directory are deleted from the disk, and the Disk options screen returns.

You can use ***** to represent any set of characters in a filename or extension. For example, typing ***.sp** in the filename field will delete all spectrum files in the directory; **xy*.*** will delete all files that begin with xy.

Renaming a File or Directory

NOTE: *You cannot rename the working directory.*

1 Press setup OTHERS disk OTHERS rename .
The names of the files in the working directory are displayed.

If necessary, use newpath to change directory (page 5-5 Routine Operations.

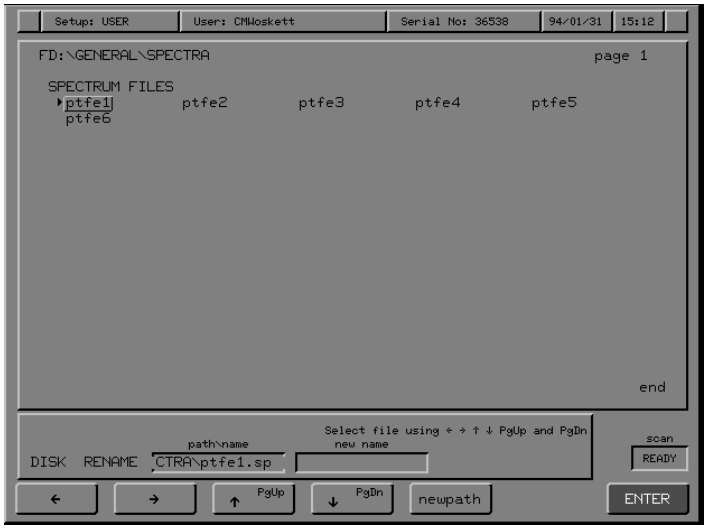


Figure 6-14 Renaming a File or Directory

2 Use the arrow keys to highlight the filename or directory.
The highlighted name is in the **path\name** *field.*

NOTE: *If you are renaming a directory, the final character of the* **path\name** *must be a backslash* (\).

3 Press ENTER .
The cursor moves to the **new name** *field.*

4 Type the new name.

5 Press EXECUTE .
The file or directory is renamed.

Backing Up

The Spectrum RXI enables you to back up files from one floppy disk to another or from the notepad to a floppy disk. You can also verify that backed up files have been copied correctly and delete the source files.

Backing up

1 At Ready for Next Command, press ***setup*** ***OTHERS*** ***disk*** ***backup*** .
The Backup screen is displayed.

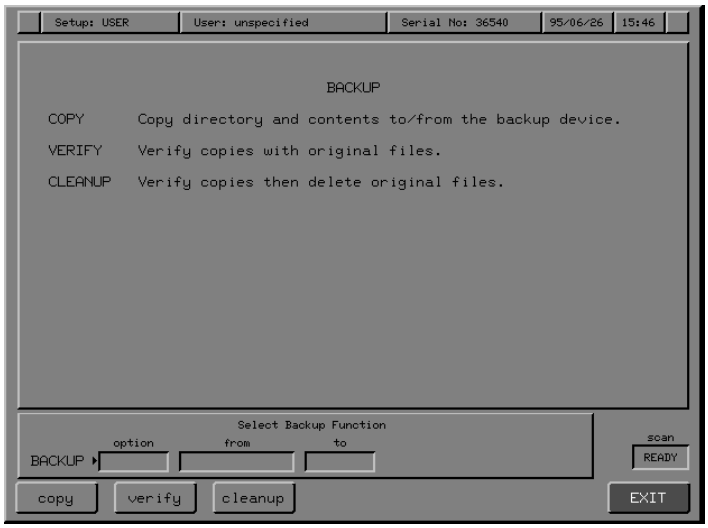


Figure 6-15 The Backup Screen

2 Press ***copy*** .
The Backup Copy screen is displayed.

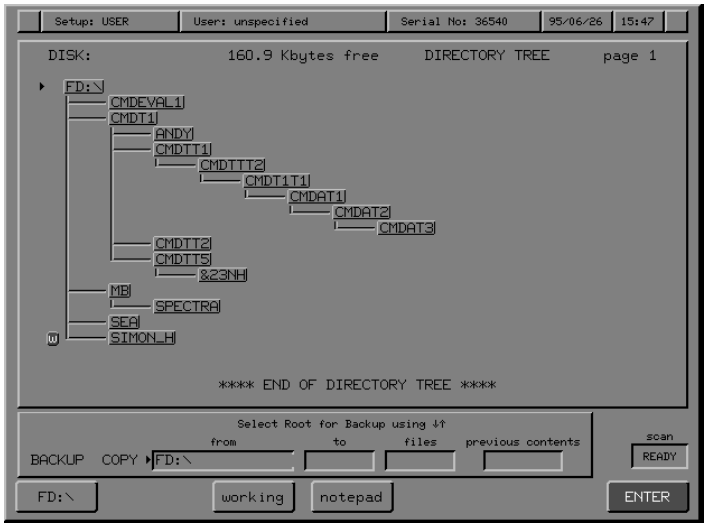


Figure 6-16 The Backup Copy Screen

3 Choose the directory that you want to back up. Use the soft keys and the arrow keys if necessary.
The pathname of the highlighted directory or file is displayed in the **from** *field.*

4 Press ENTER .
The cursor moves to the next field that you need to fill in.

If you are backing up from the notepad, the **to** *field is automatically set to* **FD:**, *and the* **files** *field is automatically set to* **ALL**. *The cursor moves to the* **files** *field. Go to step 6.*

5 If you are backing up from floppy disk, choose the directory that you want to back up to, then press ENTER .
The **files** *field is automatically set to* **ALL**, *and the cursor moves to the* **previous contents** *field.*

Figure 6-17 Previous Contents

6 Choose one of the **previous contents** options.
You can choose to:

erase — *erase all the files on the backup disk before backing up to it;*

update — *overwrite existing files on the backup disk if they have the same name.*

preserve — *not backup files that have the same name as files already on the backupdevice. This is the default value.*

7 Press EXECUTE or print .
The files are backed up . During the backup, information about the progress of the backup is displayed; when the backup has finished, you can read the information in the scroll buffer. If you pressed print , this information is also printed; you may find it useful to store the printout with the backup disks.

If an error occurs during a backup, some of the following keys are displayed:

skip — *an error has occurred while reading a file; press skip to ignore that file and back up the next file.*

format — *an error has occurred while writing the first file to the disk; press format to format the disk.*

retry — *an error has occurred while reading or writing the file; press retry to begin backing up to that floppy disk again.*

STOP — *press STOP to stop the backup at any time.*

Verifying a backup

You can use the verify command to verify that the files in the directories that you have backed up have been copied correctly.

1 At Ready for Next Command, press
setup OTHERS disk backup verify .
The verify screen appears, with the text cursor in the **backup** *field.*

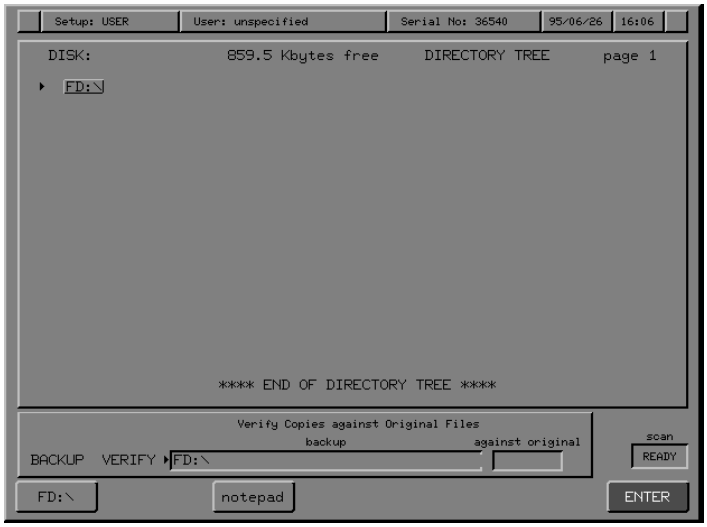


Figure 6-18 The Backup Verify Screen

2 Use the arrow keys to select the directory (and all its sub-directories) on the backup disk that you want to verify against the original directory.
The selected directory appears in the **backup** *field.*

3 Press ENTER .
The text cursor moves to the **against original** *field.*

4 Select the original disk.

5 Press EXECUTE or print .
The backup is verified, and the results appear on the screen. During the verification, information about the progress of the verification is displayed; when the verification has finished, you can read the information in the scroll buffer. Each file is either **verified correctly** *or* **differs from original**.

If you pressed print , the results of the verification are also printed; you may find it useful to store the printout with the backup disks.

Cleaning up the original disk

The cleanup option works in the same way as backup verification, but in addition to verifying that the backup has been completed correctly, it deletes the files from the original disk. If any file has not been verified as having been copied correctly, it is not deleted from the original disk; each file is either **verified and deleted** or **differs from original**.

Setting the Floppy Disk Options

There are four floppy disk options, accessed by pressing ***setup*** ***OTHERS*** ***disk*** ***options*** .

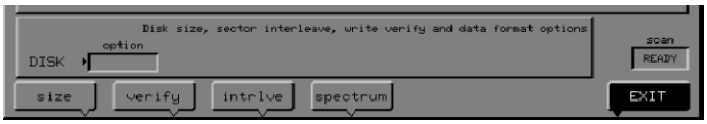


Figure 6-19 The Disk Options Command Line and Soft Keys

- ***size*** – defines how the Spectrum RXI will format disk size.
- ***verify*** – is for write verification, used when the Spectrum RXI is writing files.
- ***intrlve*** – defines how the Spectrum RXI will format disk sector interleave.
- ***spectrum*** – defines the data format.

Diskette Size

The diskette size can be set to one of two values:

- **720 Kb** – double-sided, double-density;
- **1.4 Mb** – double-sided, high-density.

Setting the diskette size

1 At Ready for Next Command, press ***setup*** ***OTHERS*** ***disk*** ***options*** ***size*** .
The command line and soft keys in Figure 6-20 are displayed.

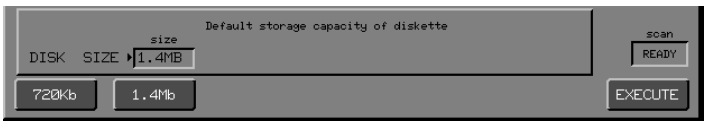


Figure 6-20 The Disk Size Command Line and Soft Keys

2 To change the current setting, press *720Kb* or *1.4Mb*; to keep the current setting, press *EXECUTE*.
The Disk options screen returns.

Write Verification

When the Verify option is switched **on**, the Spectrum RXI reads each file it writes to disk, to make sure that the file was written correctly. Because this slows disk operations considerably, the factory default setting is **off**.

Switching write verification on or off

1 At Ready for Next Command, press
setup *OTHERS* *disk* *options* *verify*.
The command line and soft keys in Figure 6-21 are displayed.

Figure 6-21 The Disk Verify Command Line and Soft Keys

2 To change the current setting, press *on* or *off*; to keep the current setting, press *EXECUTE*.
The Disk options screen returns.

Sector Interleave

There are two interleave options; both are DOS-compatible:

- **1** formats the disk as a PC would format it;
- **2** formats the disk so that it will work faster with Search and backup.

Setting the sector interleave

1 At Ready for Next Command, press
setup *OTHERS* *disk* *options* *intrlve*.
The command line and soft keys in Figure 6-22 are displayed.

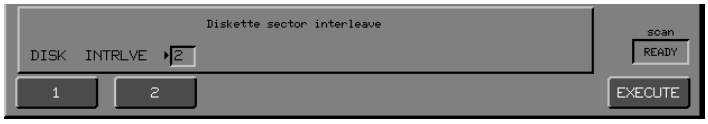


Figure 6-22 The Disk Interleave Command Line and Soft Keys

2 To change the current setting, press *1* or *2* ; to keep the current setting, press *EXECUTE* .
The Disk options screen returns.

File Header Format

The file header format can be set for IRDM (IR Data Manager) or SPECTRUM (Spectrum for Windows).

Setting the file header format

1 At Ready for Next Command, press
setup *OTHERS* *disk* *options* *spectrum* .
The command line and soft keys in Figure are displayed.

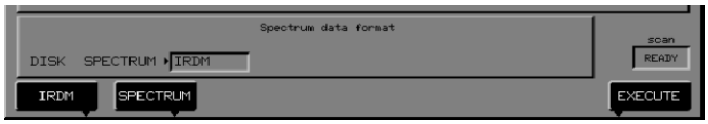


Figure 6-23 The File Header Format Command Line and Soft Keys

2 To change the current setting, press *IRDM* or *SPECTRUM* ; to keep the current setting, press *EXECUTE* .
The Disk options screen returns.

Labelling a Disk

You can specify the volume label for a diskette.

1 Insert the disk to be formatted into the disk drive.

2 At Ready For Next Command, press **setup** (OTHERS) (disk) (label).
The command line and soft keys in Figure 6-24 are displayed.

Figure 6-24 The Command Line and Soft Keys for Labelling a Disk

3 If you want the disk to have a volume label, type the name in the **label** field.

NOTE: *The volume label must not contain any spaces.*

4 Press (ENTER).
The cursor moves to the **comment** *field*

5 If you want to include a comment about the disk, type the information in the **comment** field.

6 Press (EXECUTE).
The disk is labelled.

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