



**Spectrum2 Thermal Printer
Operator's Guide**



Copyright Notice

Copyright ©1996-2002 by MF DIGITAL All rights reserved.

This manual and the accompanying illustrations may not be copied, reproduced, electronically transmitted, or translated into another language, in whole, or in part, without the written consent of MF DIGITAL

MF DIGITAL, CD2CD, CD2CD PRO, CD-5400L, CD-5908, CD-5916, CD-3701, CD-3703, CD-3704, CD-3706, CD-3706P, cdDIRECTOR, AP-1301i, AP-1301t, Easi-DAT Easi-AUDIO Spectrum and Spectrum2 are trademarks of MF DIGITAL

Other trademarks referred to are the property of their respective trademark or registered trademark holders.

Warranty

MF DIGITAL warrants to the original purchaser that the equipment that you have purchased is free from defects in materials and workmanship, for a period of time as follows:

Duplicator Electronics & Mechanical Parts	1 year
CD-R/RW Recorders	1 year (through MF DIGITAL)

This warranty is applicable when the warranty registration has been completed and returned to MF DIGITAL within a reasonable period of time following the purchase and the warranty is NOT transferable. This warranty does not apply to malfunctions caused by misuse, negligence, accident, or alteration, nor is MF DIGITAL responsible for consequential damages related to the use of this equipment.

This warranty is made in lieu of any other warranty expressed or implied.

CD-R/RW Recorder Warranty Policy

Individual CD-R/RW recorder manufacturers are responsible for the products they provide. As a convenience, MF DIGITAL will honor any service issue related to a defective recorder while under its respective manufacturer's warranty providing that the recorder has been purchased from MF DIGITAL either directly or indirectly. MF DIGITAL assumes no responsibility for products NOT purchased through MF DIGITAL

Piracy

The copying of audio, video, or software without the permission of the copyright holder is illegal. MF DIGITAL accepts no responsibility for the copyright use or misuse of this equipment. It is the sole responsibility of the user to ensure that the legal rights of copyright in duplicating are respected.

MF DIGITAL
121 Carolyn Blvd.
Farmingdale, NY 11735
Tel.: 631 249 9393
Fax.: 631 249 9273
Email: info@MFDIGITAL.com
www: www.mfdigital.com

Table of Contents

Introduction	5
Minimum PC Requirements	6
Printer Installation Overview	7
Quick Setup Directions	8
Installation - Unpacking	9
Installation - Parts Identification	11
Installation - Connecting the Printer	12
Spectrum2 Printer Driver Installation	13
Printer Driver Installation for Windows 98	14
Printer Driver Installation for Windows NT	15
Printer Driver Installation for Windows 2000 and XP	17
Label Software Installation	18
Windows 98: Installation of Spectrum2 Designer software:	18
Windows 2000: Installation of Spectrum2 Designer software:	18
Windows NT: Installation of Spectrum2 Designer Software:	19
Printer Operation	20
Printer Ribbon Installation	21
CD Label Printing	22
Control Panel Operation	23
Manual Loading CD Media	24
CD Label Printing	25
Maintenance: General	26
Storage	26
Startup and Shutdown	26
Maintenance: Printer Ribbon Installation	27
Installing Print Ribbon	28
Printer Ribbon Installation Chart – Part 1	29
Printer Ribbon Installation Chart – Part 2	31
Installing Spacer for Color, Mono-Color Blue and Red Ribbon)	33
Maintenance: Printhead	34

Cleaning the Print Head	34
Printhead Replacement	36
Printhead Replacement Procedure	37
Troubleshooting Section	39
Quick Recovery Strategy	39
Test CD Strategy	39
Common Printer Issues	39
Clearing Improper Placement of CD	39
Printer is not printing checklist	40
Print Quality	42
CD Positioning Errors	42
CD Printing Techniques Section	43
Spectrum2 CD Media & Ribbon Selection Guide	44
Graphics Tips	45
Common Label Issues	47
Strobe Setting Examples	49
CD Media & Strobe Setting examples	50
Printer Driver Settings: Win 98	51
Spool Settings	54
Printer Driver Settings: Win 2000 / XP	55
Spool Settings	57
Printer Driver Settings: Win NT 4.0	58
Spool Settings	60
Optimizing Color Labels	61
Optimizing Color Labels	62
CD Printing Techniques Chart	66
Thermal Transfer & Inkjet CD Printer Comparison	71
Supported Ribbon and Ribbon Specifications	73
Ribbon Usage with a Minimum Print Size	73



Autoloader Port	74
Autoloader Port Pinouts:	74
Error Codes for Status LED	76

Introduction



Figure 1: The MF DIGITAL Spectrum2 CD Printer shown

Spectrum2 CD Printer

The MF DIGITAL Spectrum2 CD Printer is a thermal transfer printer capable of printing labels up to 600 dots per inch (DPI) on several types of CD-R, DVD-R or CD-ROM media surfaces, using appropriate wax/resin thermal transfer ribbons. MF DIGITAL's thermal transfer CD labeling technology allows creation of cost effective, durable, waterproof labels that are printed directly on the surface of the disc.

The Spectrum2 CD Printer prints CD labels designed using the MF DIGITAL CD Labeling software (**Spectrum2 Designer** software). Labels created with the **Spectrum2 Designer** software can contain text, graphics, and serial numbers. The **Spectrum2 Printer Driver** for the Windows environment controls the operation and performance configurations for the Spectrum2 CD printer. The **Spectrum2 Printer Driver** must be installed prior to printing with the Spectrum2 CD printer.

Spectrum2 CD Printer Key features

The MF DIGITAL Spectrum2 CD Printer offers several features not found on other CD printers:

- Instant re-print of last label printed
- Flip open chassis to allow easy ribbon change or print head maintenance
- Software and hardware support for automated printing systems
- Spectrum2 Designer, user-intuitive label design software and electronic print templates

- Standard CD-R / DVD-R media tray
- Quick change, easy and fast ribbon thread feature
- Local store, 1.5 MB memory for local print image storage
- Ribbon saver feature, maximizes ribbon life
- Ribbon out, automatic notification when ribbon runs out
- Prints black, red, blue, or multi-color
- Parallel interface for standalone operation
- Serial interface for use with automation
- 1 year warranty (print head not included)

Minimum PC Requirements

Operating System	Windows NT4, Windows 98/SE, Windows 2000, or Windows XP
Processor	Pentium 233 or greater
RAM	64MB
Available hard drive space	30MB or greater: Depends on number of stored labels desired and the resolution and color depth of clipart.
Ports	One Parallel port (LPT1 or LPT2)

Printer Installation Overview

The Spectrum2 User's Guide includes two Setup sections and Appendix.

Quick Setup Directions

- These are brief instructions for printer and software setup by technical computer users

Standard Setup Directions

- These are more detailed instructions for printer and software setup by non-technical computer users

General information and Appendix follow Setup Directions

- Printer maintenance
- Ribbon replacement
- Optimizing label print quality

Quick Setup Directions

Unpack Printer

- Remove Printer from shipping box and foam inserts



Printer is shipped with:

- Power cable
- Parallel cable
- Printer Software (CD-ROM disc)
- Printer is shipped with a black ribbon installed
- Serial cable (for automation)



Connect printer to computer and power

- Parallel cable is (DB-25 to DB-25 type of cable) that connects to computer's parallel port
- Power Cable connects to 110/220 VAC power
- Note: power supply is auto switching and compatible with 110/220 VAC power



Install Printer Driver Software

- Printer Driver Software is located on Spectrum2 Software CD-ROM
- The printer driver is located in the Printer Drivers directory.
- Follow standard printer driver install or *Add Printer Wizard* procedures and select appropriate drivers for the



Inst
Des

-



er

um2

on

the Spectrum2 Software CD-ROM

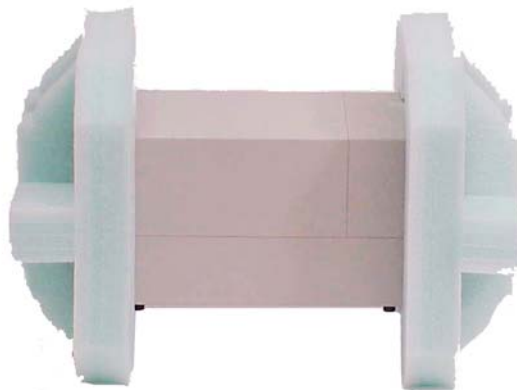
- The CD labeling software is located in the Spectrum2 Designer directory
- Follow standard software install (add program) procedures and select the Setup file for the **Spectrum2 Designer** application

Start CD labeling software (Spectrum2 Designer)

- Load blank CD (label side up) into printer (press tray button on printer to open tray)
- Click on **Spectrum2 Designer** Icon to start program
- Create Label design and save label to a file
- Select Spectrum2 Printer Driver
- Select File Menu, then Print, (confirm Spectrum2 is selected) then Click OK to print.

Installation - Unpacking

Figure 2: Spectrum2, unboxed, but still in protective shipping foam



Unpacking

- Open the top of the box
- Lift the Spectrum2 by gripping the underside of the narrow sides of the unit
- Set the Spectrum2 and foam on a sturdy, flat surface
- Support either end of the Spectrum2 with an arm and carefully pull the foam off the elevated end. Repeat for the shipping foam on the other end

Note:

- Printer is shipped with black ribbon installed
- Printer is shipped with top cover secured by plastic wrap or tape

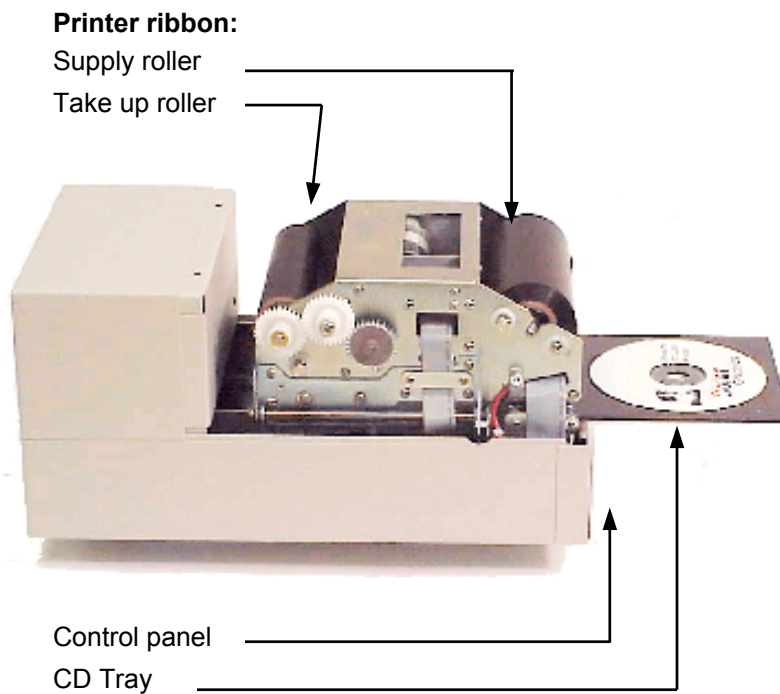
Re-packing for shipment

- Important: Make sure Printer Chassis is locked. Check by lifting the chassis up. The chassis should not move. To re-lock, pull Chassis Lock Knob out, then release and check by lifting chassis. When locked the chassis will not open. (See Parts Identification section for location of Chassis Lock Knob)
- When re-packing for shipment, secure outer top cover by plastic wrap or tape before placing printer into foam pieces.

Installation - Parts Identification

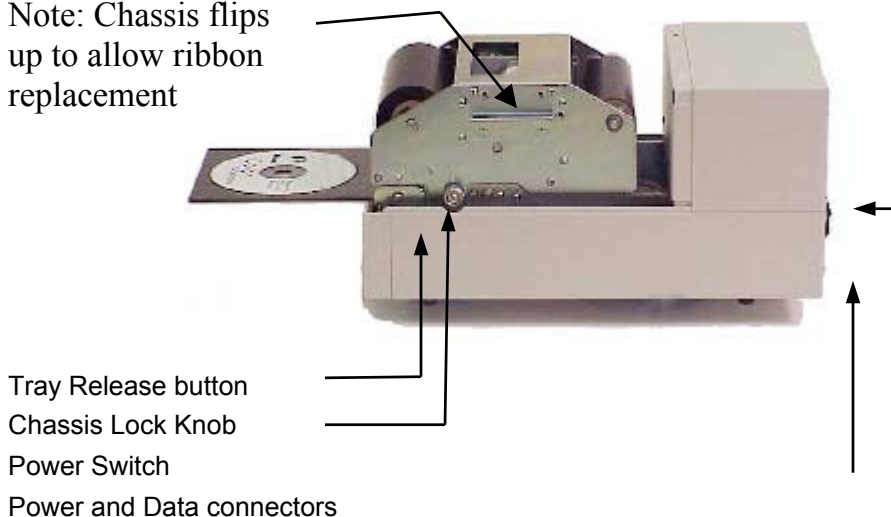
You should become familiar with the parts of the printer before attempting to operate it. See the **Maintenance** section of this manual for help installing printer ribbons.

- Power switch
- Control panel
- Printer ribbon
- Ribbon supply roller
- Take-up roller (geared)
- Roller clips
- CD Tray
- Parallel Port
- Power Cord
- Autoloader Port



Chassis

Note: Chassis flips up to allow ribbon replacement



Installation - Connecting the Printer

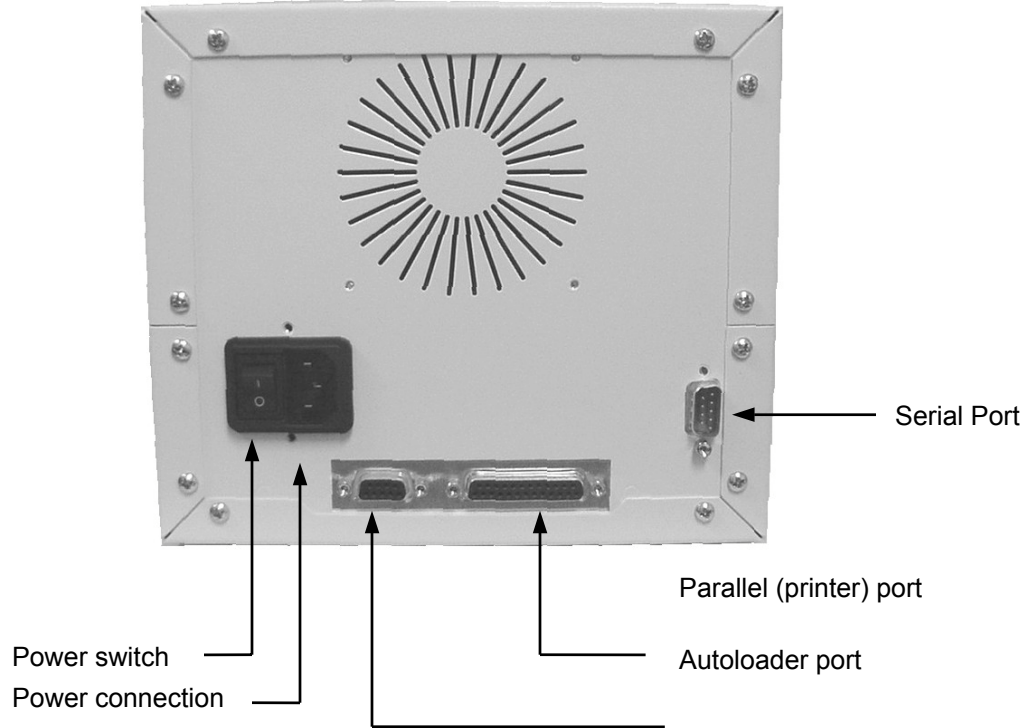


Figure 3: Spectrum2 data and power connections

Connecting the Printer

The MF DIGITAL Spectrum2 has only three main connections for operation:

- AC power connection – for 110/220 VAC power
- Parallel port connection – DB-25 “straight through” cable
- Serial for automation

Before operating the Spectrum2, make sure these connections have been made:

- Plug the supplied power cord into the power connection at rear of the Spectrum2.
- Connect the supplied parallel printer cable to the parallel port on the Spectrum2 and to the printer port on your host computer.
- Printer is shipped with a black ribbon installed. If a printer ribbon is not installed, follow the instructions in the **Installing the Printer Ribbon** section.

Spectrum2 Printer Driver Installation

Spectrum2 Software

The Spectrum2 requires:

- Printer Driver for Windows 98, NT, XP, or 2000
- Spectrum2 CD labeling software

This software is on the Spectrum2 Software CD included with printer.

Printer Driver

The printer driver controls the operation for the Spectrum2. The printer driver must be installed prior to using the Spectrum2 for the first time. The printer driver installation varies with the version of Windows used (see detailed instructions for specific version of Windows). The printer driver allows the MF DIGITAL CD Labeling software or other labeling programs to be used with the printer.

CD Label Software

The CD Label Software, which is named **Spectrum2 Designer**, is used to create the label that will be printed on the CD. The CD Label Software provides tools to incorporate text and graphics of the label. The CD Label program provides convenient CD templates that correspond to a variety of CD media. In addition, the CD Label software can import graphic files (such as entire labels) from other programs.

Printer Driver Installation for Windows 98

In order to print labels on discs, the Spectrum2 printer needs to be connected to a computer that has the Spectrum2 printer driver software installed. The printer driver software controls the printer's functions and allows adjusting the print density (darkness or lightness of label), and other printing characteristics. Typically, when printing a disc label, the printer driver dialog box is displayed showing the name of the printer and choices for selecting the number of copies and selecting printer properties. Listed below are instructions for installing the Spectrum2 printer driver for Windows 98.

Printer driver installation for Windows 98:

- Place Spectrum2 CD-ROM disk into computer's CD-ROM drive
- Click on *Start* from Windows Menu Bar
- Select *Settings*
- Click on *Printers*
- Double click *Add Printer*
- Click *Next*
- Click *Have Disk* button
- Select *Install From Disk*
- Click *Browse*, under Drive List Box, select the CD-ROM drive that contains Spectrum2 CD-ROM disk
- Double Click Drivers Folder
- Click on Spectrum2 folder
- Double Click Win98 Folder
- Select PPRO_G2.INF and then Click *OK*
- Click *OK* again
- Confirm that MF DIGITAL Spectrum2 is selected and Click *Next*
- Select LPT1: *Port*

- Click *Next*
- To set the Spectrum2 Printer as Default, select *Yes* (select *No* if another printer is normally the default printer)
- Click *Next*
- When prompted to print test page, select *No*
- Click *Finish*
- Windows 98 requires re-starting computer to complete the installation process

Printer Driver Installation for Windows NT

In order to print labels on discs, the Spectrum2 printer needs to be connected to a computer that has the Spectrum2 printer driver software installed. The printer driver software controls the printer's functions and allows adjusting the print density (darkness or lightness of label), and other printing characteristics. Typically, when printing a disc label, the printer driver dialog box is displayed showing the name of the printer and choices for selecting the number of copies and selecting printer properties. Listed below are instructions for installing the Spectrum2 printer driver for Windows NT.

Printer driver installation for Windows NT:

- Place Spectrum2 CD-ROM disk into computer's CD-ROM drive
- Click *Start* button (found on Windows toolbar)
- Select *Settings* (a list will be displayed)
- Click on *Printers*
- Double Click *Add Printer*
- Select My Computer
- (If not selected, Click *Next*, Select LPT1: Click *Next*, Click *Have Disk Button*)
- Click *Browse*, click *Cancel* when A:\ is not accessible
- Select the CD-ROM Drive that has the Spectrum2 Software CD
- Double Click Drivers folder
- Double Click Spectrum2 folder
- Double Click WinNT folder
- Double Click Color folder
- Select PPNTC600.INF
- Click *Open*, then Click *OK*
- Select MF DIGITAL Spectrum2 Color

- Click *Next*
- At Printer Name Click *Next*
- Set settings to *Not Shared*
- Click *Next*
- When prompted to print test page, Select *No*
- Click *Finish*
- Re-start Computer

Printer Driver Installation for Windows 2000 and XP

In order to print labels on discs, the Spectrum2 printer needs to be connected to a computer that has the Spectrum2 printer driver software installed. The printer driver software controls the printer's functions and allows adjusting the print density (darkness or lightness of label), and other printing characteristics. Typically, when printing a disc label, the printer driver dialog box is displayed showing the name of the printer and choices for selecting the number of copies and selecting printer properties. Listed below are instructions for installing the Spectrum2 printer driver for Windows 2000.

Printer driver installation for Windows 2000:

- Place Spectrum2 CD-ROM disk into computer's CD-ROM drive
- Click *Start* button (found on Windows toolbar)
- Select *Settings*
- Click on *Printers*
- Double Click *Add Printer*
- Click *Next* at Add Printer Wizard, make sure Local Printer is selected, then click *Next*
- Select LPT1: then Click *Next*
- Click Have Disk Button
- Click *Browse*
- Select the CD-ROM Drive that has the Spectrum2 Software CD
- Double Click Drivers folder
- Double Click Spectrum2 folder
- Double Click WIN2000 folder
- Select Spectrum2, Click *Open*
- Click *OK*
- Highlight MF DIGITAL Spectrum2, Click *Next*
- Select *Yes* to set printer as default, Click *Next*. This makes the Spectrum2 printer selected first over other printers attached to the computer.
- Select *Do Not Share* this printer, Click *Next*
- When prompted to print test page, Select *No*
- Complete the Add Printer selection, Click *Finish*
- Wait for the Driver installation process to finish, then re-start the computer

Label Software Installation

The MF DIGITAL Label Software (named Spectrum2 Designer) is a graphics program with built-in disc label templates that allow the design and creation of labels to be printed on CD media. The Spectrum2 Designer software is supplied on the Spectrum2 Software CD-ROM.

Windows 98: Installation of Spectrum2 Designer software:

- Place Spectrum2 Software CD into CD-ROM drive
- From Windows Desktop, Click on: *Start Icon*
- Select *Settings*, Click on *Control Panel*
- *Double Click* on *Add/Remove Program Icon*
- Click *Install*, Follow *Prompts*
- Click *Browse*, then browse for CD-ROM drive
- *Select* CD-ROM drive, *Select* Spectrum2 Designer Folder
- *Select* and *Double Click* on SETUP.EXE from Spectrum2 CD-ROM from Spectrum2 Designer directory and follow *Prompts* to install the Spectrum2 Designer software
- Run the **Spectrum2 Designer** software and create a CD label

Windows 2000: Installation of Spectrum2 Designer software:

- Place Spectrum2 Software CD into CD-ROM drive
- From Windows Desktop, Click on: *Start Icon*
- Select *Settings*
- Click on *Control Panel*
- *Double Click* on *Add/Remove Program Icon*
- *Select* Add New Programs, Follow *Prompts*
- Click *Browse*, *Browse* for CD-ROM drive
- *Select* CD-ROM drive, *Double Click* on Spectrum2 Designer Folder
- *Select* and *Double Click* on SETUP.EXE from Spectrum2 CD-ROM from Spectrum2 Designer directory and follow *Prompts* to install the Spectrum2 Designer software
- *After Clicking* on *Finish*, re-start computer
- Run the **Spectrum2 Designer** software and create a CD label

Windows NT: Installation of Spectrum2 Designer Software:

- Place Spectrum2 Software CD into CD-ROM drive
- From Windows Desktop, Click on: *Start Icon*,
- Select *Settings*
- Click on *Control Panel*
- Double Click on *Add/Remove Program Icon*
- *Select* Add New Programs, Follow *Prompts*
- Click *Install, Browse* for CD-ROM drive
- *Select* CD-ROM drive, *Double Click* on Spectrum2 Designer Folder
- *Select* and *Double Click* on SETUP.EXE from Spectrum2 CD-ROM from Spectrum2 Designer directory and follow *Prompts* to install the Spectrum2 Designer software
- After Clicking on *Finish*, re-start computer
- Run the **Spectrum2 Designer** software and create a CD label

Printer Operation

Once the Spectrum2 is properly connected to the host computer, printer ribbon installed, and the printer driver and Spectrum2 Designer software are installed on the host computer, the printer is ready for use.

CD Printing Sequence

- Connect printer power cord
- Connect printer to computer parallel port
- Computer must have Spectrum2 printer driver and CD Label software installed
- The printer driver should be set to Black and White if black ribbon is used or color if color ribbon is used. Printer driver should show strobe set to Auto.
- Power ON printer
- Load CD into printer tray (press TRAY button to open printer tray)
- Create a CD label using the CD Labeling software
- Save the Label file
- Print the label
- If print is too light or too dark, try adjusting printer driver's print strobe setting and print from Label Software program
- The CD Label is now stored in the printer re-print buffer, pressing the PRINT button on printer's control panel allows printing additional copies of this label.

Power ON and OFF Information

- If the power cord is not already connected, make sure the power switch is off before connecting the power cord.
- If the power cord is connected, then turn the power switch ON to power up the Spectrum2. The Spectrum2 CD Printer will flash Status LEDs and advance ribbon. If Black ribbon is detected status LEDs will flash twice, if color ribbon detected the LEDs flash four times. When power on process is complete printer will show Ready LED. If an error appears, such as no ribbon is detected, the printer will flash the status LED with an error code. See error code listing in the appendix for more details.
- To shutdown the Spectrum2, make sure no print jobs are executing, and turn the power switch OFF. Always shutdown the Spectrum2 with the power switch, and avoid disconnecting the power cord with the power ON.

Printer Ribbon Installation

The thermal transfer ribbons used by the Spectrum2 must be installed correctly for proper label printing. See the Maintenance section for ribbon installation instructions.

CD Label Printing

Printing a CD Label with Spectrum2 Designer

To begin printing labels on CD media, first follow the Power Up and Loading procedures outlined in the *Printer Operation* section.

- 1) *Select* the **Print** from the File Menu of the **Spectrum2 Designer** software
- 2) Make sure the Spectrum2 is selected as the printer to be used.
- 3) Important: In Properties area *select* appropriate Color or Black and White selection in print driver to match the type of ribbon (Color or Mono-color) used in the printer
- 4) Important: In Properties area check that Strobe Setting, which controls print density (darkness or lightens of label), is set to Auto. The Spectrum2 Designer's default strobe settings are shown below.

For steps 4 and 5, please see Maintenance section for more detail on Printer Driver settings

Resolution	600 DPI mode		300 DPI mode	
Ribbon type	Black	Color	Black	Color
Strobe Setting	54	54	54	54

Figure 4: The Spectrum2 Designer default strobe settings for AUTO setting

You may save these settings in the label file, see Settings Menu selection of Spectrum2 Designer. Saving Settings with the label file is useful when re-printing the label in the future.

- 5) When all preferences are set as desired, click 'OK' to begin printing the current label.
- 6) After one CD has been successfully printed, the label image is stored in the printer's memory. Successive prints can be done manually by pressing the 'Print' button after loading a new disc. The label image stored in memory is lost after shutdown (power off).
- 7) See the *Spectrum2 Designer User's Guide* for instructions using *Spectrum2 Designer* to create CD labels. Follow the procedures in the *Spectrum2 Designer User's Guide* to get a label file ready for printing.

Note: A CD label printed on the Spectrum2 is stored in the Spectrum2's memory as long as the Spectrum2 is ON. Only one CD label will reside in the Spectrum2's memory at a time. To re-print additional CDs with this stored label, open printer tray by pressing the TRAY button, load an unlabeled CD, then press the PRINT button on the printer's control panel.

Control Panel Operation

Spectrum2 keypad

The Control Panel consists of three buttons and status LEDs, which controls the operation of the Spectrum2 as described below.

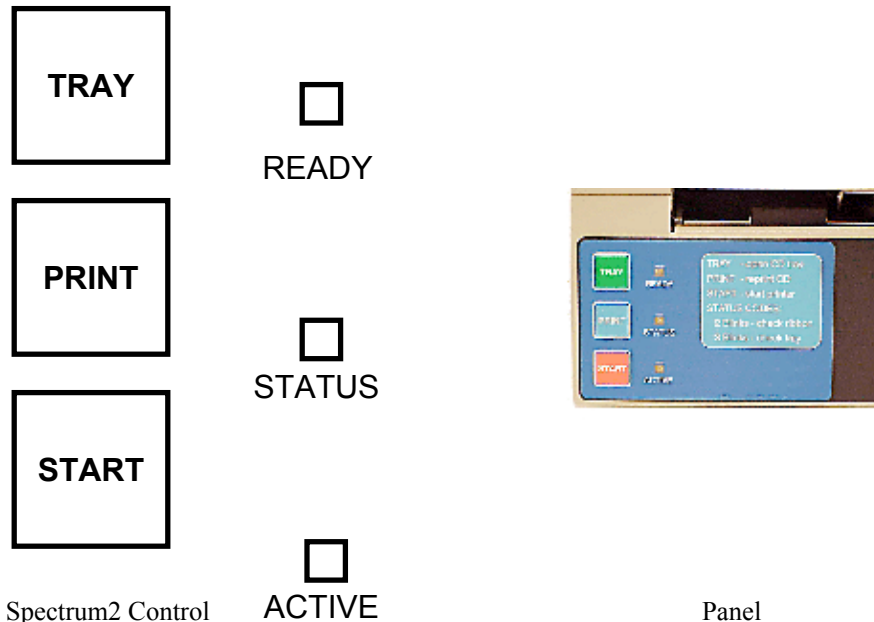


Figure 5: Spectrum2 Control Panel

Tray Button

The 'Tray' button will extend and retract the CD tray. Use this button for manually opening the CD tray for loading and unloading CD media.

Print Button

The 'Print' button is used to reprint the most recent label. The CD tray is closed automatically when the print is started.

Start Button

The 'Start' button is used to re-start printer after error condition (ie. ribbon out) is cleared. Pressing 'Start' resets the printer and may allow quick resumption of the print job. (Some errors may require resubmitting the print file after pressing 'Start')

Ready LED

This LED indicates printer is ON and ready to accept a print job

Status LED

This LED indicates error conditions by flashing error codes (See error code list section)

Active LED

This LED lights when printer is processing data or printing

Manual Loading CD Media

Prior to loading the CD

Before manually loading or unloading discs into the Spectrum2, first make sure the power is on and the 'Ready' LED is on. If the CD tray is already extended, a new CD may be placed with the printable side up on the cushioned surface. If the tray is not extended, press the 'Tray' button to open it. The printable side of the CD surface is facing up when the stacking ridge near the center edge of the CD is facing down, as shown below. Please note: DVD media can have a stacking ridge on either side of the disc.

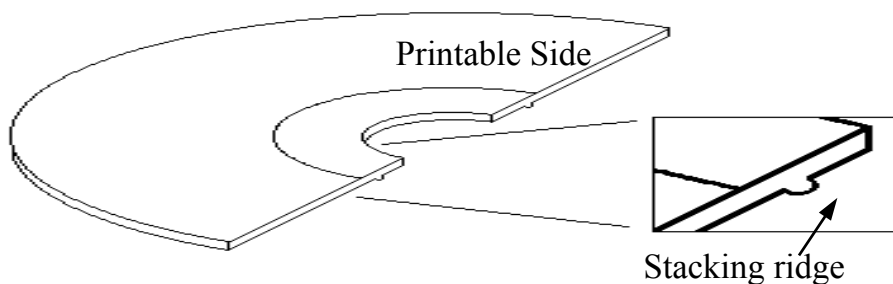


Figure 6: CD Stacking Ridge.

Loading the CD

Place the CD on the cushioned surface so that it does not rest on any part of the CD Positioning Surface or on the centering pin. (See photo).

When the CD is properly positioned, press the 'Tray' button to retract the tray.

Note: When handling CD's, always grip the CD by only the center or outer edges. Avoid touching the flat surfaces of the CD. Fingerprints on the printable surface of the CD may make printing inconsistent.



Figure 7: CD Tray open .

CD Label Printing

For those new to the Spectrum2 CD printer, MF DIGITAL recommends experimenting with a single CD and using a label design that only covers part of the CD (for example a vertical bar). This allows repeated prints on the CD (by rotating the CD) and observing changes made by adjusting the printer driver and label software settings.

Many printing issues can be resolved with adjustment of strobe setting, media type, or graphics. For printing questions please contact your Spectrum2 dealer, and save the label file in question for review.

Guidelines for successful CD label printing

- 1) Use of appropriate CD-R media for the thermal transfer printing
 - Silver media works best with a black ribbon
 - White thermal transfer type media with a smooth surface works best with color ribbon
 - White inkjet type media with a rough surface will not provide good results
- 2) Use of appropriate strobe setting (which controls the darkness or lightness of the label) for the type of CD-R media and label design.
 - Spectrum2 printer driver software's "Auto" strobe setting should work with most media
 - If label is too light try increasing the strobe setting in increments of 5 until label has best appearance. If printing does not improve, try another brand of CD-R media.
 - If label is too dark or light try decreasing or increasing the strobe setting in increments of 5 until label has best appearance. If printing does not improve try another brand of CD-R media.
 - Use of appropriate text or graphics that are within the range of printer capabilities, labels that print best include:
 - Text only, line art, and clip art
 - Mixed text and graphics
 - Photos with limited range of colors
 - Spot colors
- 3) Labels that may not print properly are:
 - Large single color or reversed out text or graphics
 - Photos with wide range of color gradient

Maintenance: General

To keep the Spectrum2 functioning at its best, follow these Usage Guidelines:

Storage

- Keep the Spectrum2 on a flat, stable surface.
- Keep the Spectrum2 in a room temperature environment, and away from excessive heat or cold

Startup and Shutdown

- Always use the power switch when powering up or shutting down the Spectrum2
- A power strip (surge protector) is always a good way to protect electronic equipment, but is not meant as a means of turning on/off the power to the Spectrum2

Maintenance: Printer Ribbon Installation

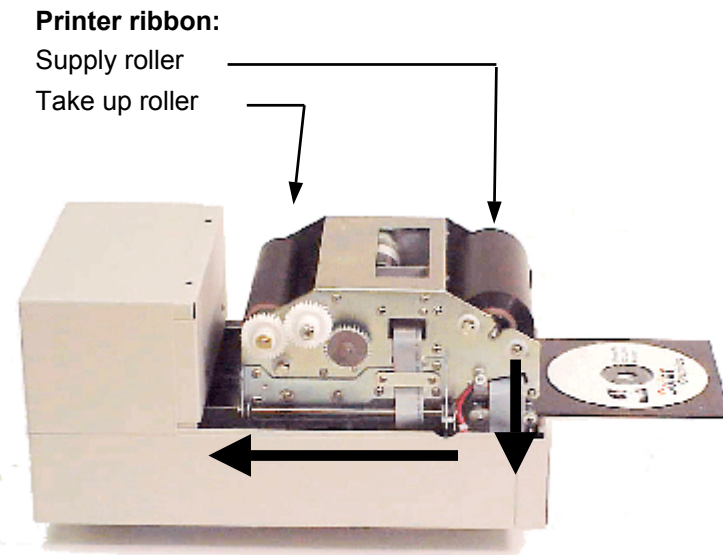


Figure 8: Direction of ribbon travel shown with arrows



Figure 9: Printer Chassis shown closed and open

Installing Print Ribbon

The Ribbon Installation procedure is easiest to perform with the CD tray open. It is recommended that the Spectrum2 be turned OFF during ribbon installation.

General information

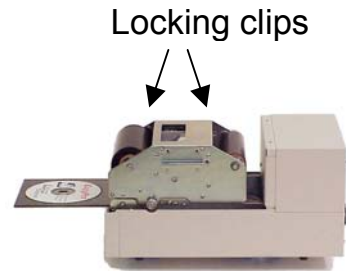
- The Spectrum2 uses ribbon rollers to hold the supply ribbon (ribbon rolled on tube) and the take up core (empty cardboard tube).
- The supply ribbon is put on a silver roller and the take up core is placed on a gray (geared) roller
- The supply ribbon roller is placed in slots in the front of the printer
- The take-up core is placed in slots in central area of the printer
- The ribbon is threaded around the chassis and attached to the take up core using the adhesive strip on the end of the ribbon (or adhesive tape).
- After the rollers are placed in the Printer Chassis, the chassis must be opened to thread ribbon through the printer
- Open Printer Chassis by unscrewing the Chassis Lock Knob
- Lift Printer Chassis upward
- When printer ribbon is installed, close chassis gently and screw the Chassis Lock Knob back into place.
- Try to lift the chassis upwards to confirm that it is locked, and secure.
- Ribbon is now installed and the printer is ready for printing CD Labels
- Please see Printer Ribbon Installation Chart for more details.

Printer Ribbon Installation Chart – Part 1

Remove Cover

- Remove the top cover by carefully lifting and pulling forward. Remove used ribbon from printer

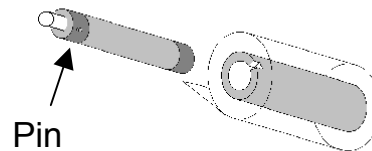
Note: Ribbon rollers are held in place by locking clips secured by thumbscrews. Loosen but do not remove thumbscrews to adjust roller clips.



Load Ribbon Rollers

- Insert the supply ribbon core onto the silver supply spindle (shown)
- Insert the take up core on to the gray take up spindle

Note: Ribbon roller has a metal pin that fits into a notch in the ribbon core. There are two pin positions for different length ribbons.



Putting Rollers in printer

- Supply Roller is placed into area at the front of the printer.

Note: Supply Roller has metal shaft with square end that fits into square hole in printer frame

- Take up core is placed in area at in the middle of the printer.

Note: Take up core Roller has metal shaft with round end that fits into round



hole in printer frame

Open printer chassis

- Open printer chassis
- Loosen chassis knob to release chassis lock

Note: Lift chassis up using handle on side of the chassis. Printer chassis will stay in vertical position when it is fully opened.



Chassis Lock

Printer Ribbon Installation Chart – Part 2

Feed ribbon from Supply to Take up Roller

- Take end of ribbon from Supply Roller and pull toward the rear of printer

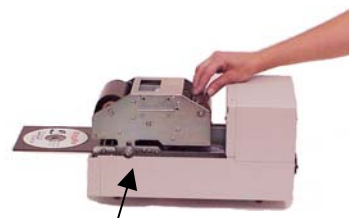


- Take ribbon around backside of Take up Roller



- Close printer Chassis

Note: Check that Chassis Lock knob has slipped into locked position.



Chassis Lock

- Attach ribbon to Take up Roller
New ribbons: the ribbon has a leader with an adhesive strip. Use this strip to adhere the ribbon to the cardboard core of the Take up Roller

Used ribbon
 Start &
 Print keys
 Wind ribbon



- Power On printer as usual. Wind ribbon as usual.

- Ribbon can also be wound by pressing Start and Print buttons simultaneously
- Ribbon change complete - check software settings for proper color or black ribbon selection prior to printing.

Note:

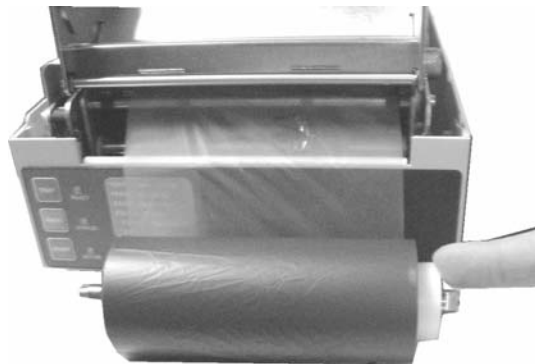
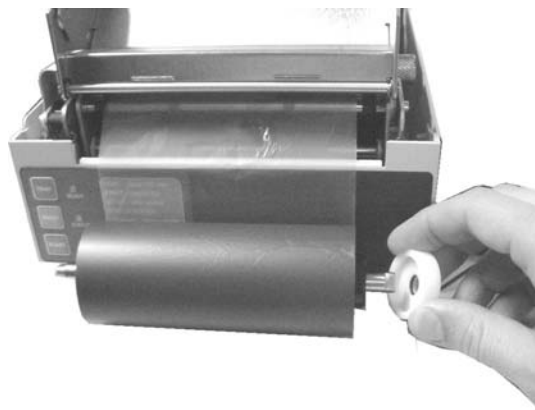
When installing a mono-color blue or red ribbon, please follow the instructions below in order to disable the ribbon sensor:

- Press and hold the print button
- Turn on the power to the printer
- Continue to hold the print button down for 25 seconds
- Release the print button when the ribbon spools
- The ready light will come on at this point
- If done improperly, a large amount of ribbon will be spooled and the status button will blink twice.
- There is no need to enable the ribbon sensor if you want to install a color or black ribbon. Simply turn the printer off and on again, and the ribbon sensor will be enabled.

Installing Spacer for Color, Mono-Color Blue and Red Ribbon)

A spacer is used to prevent color, mono-color blue and red ribbons from sliding back and forth on the supply spindle. Please see below for installation instructions.

- The spacer should be positioned opposite the metal pin that fits into the ribbon core.
- Slide the spacer onto the supply spindle as seen below.
- After the spacer is placed onto the supply spindle, install the ribbon into the printer as you normally would.



Maintenance: Printhead



Figure 10: Printer open showing printhead

Cleaning the Print Head

If the CD prints begin to look smeared or develop vertical streaks, it may be time to clean the print head. The printhead uses a row of heat producing "printing elements" to heat the ribbon to transfer label ink to the disc. Typically, the printhead may have a dust particle or possibly a melted piece of ribbon adhered to the heating elements. These particles prevent the printhead from transferring ink to the disc label. Cleaning the printhead consists of rubbing a cotton swab soaked in alcohol (use standard alcohol that is labeled Isopropyl or rubbing alcohol typically available at drug stores) over the printing elements to remove any debris.

Important: The printhead is fragile and can be damaged by improper cleaning. Only use cotton swabs with alcohol to clean the printhead. The printhead heating elements can be damaged if touched by hard or abrasive objects. A damaged printhead may leave "white" vertical lines through all labels, requiring replacement of printhead for proper label appearance.

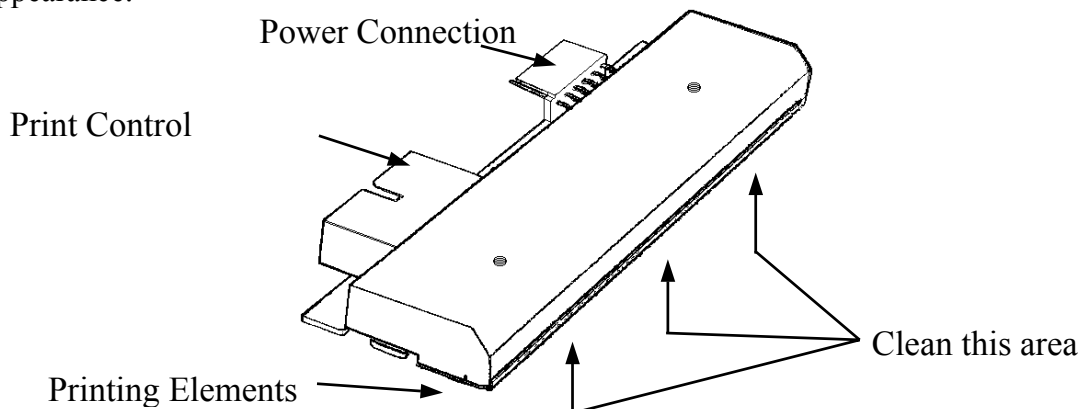
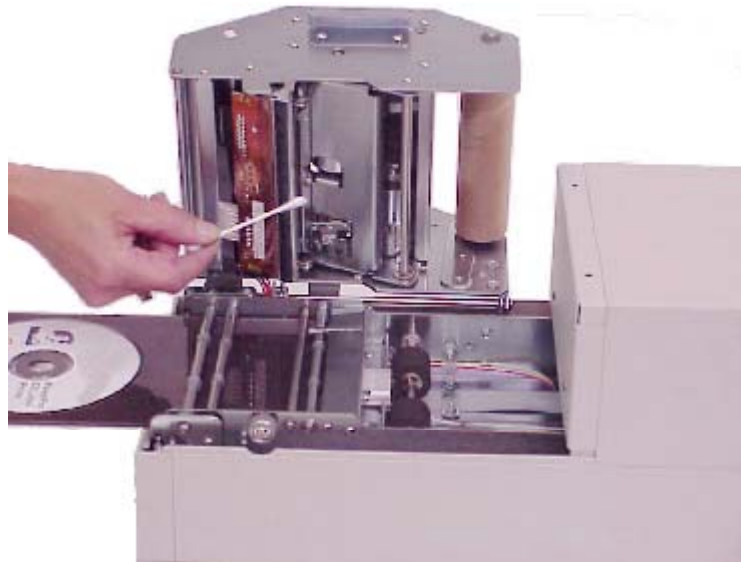


Figure 11: Printhead Unit.



Chassis Release Button is located inside case

Figure 12: Printhead cleaning with ribbon removed

Printhead Cleaning Procedure

- If tray is in, press Tray Button to extend tray
- Remove the top cover by carefully lifting and pulling forward. Set the cover aside.
- Open printer chassis by pulling chassis release knob and lifting chassis up by chassis handle.
- Remove Ribbon Supply Roller from printer and place on CD Tray, this will expose the printhead. (As an alternative, remove ribbon completely from printer)
- Printhead is now visible from the inside of Printer chassis
- Move the Supply Ribbon roller and ribbon forward and away from the front of the unit, exposing the printhead.
- Use a cotton swab or Q-tip with a few drops of isopropyl alcohol to gently rub the printing surface of the print head.
- Use a sweeping motion starting from one end of the printhead and move past the other end to remove any dust particles (do not lift up Q-tip in middle of printhead since that may leave residue in that area).
- Allow the printhead a minute to dry before moving ribbon spindle back on to chassis.

- Printer will wind slack ribbon at power ON, or pressing Start and Tray button simultaneously will also wind slack ribbon.

Printhead Replacement

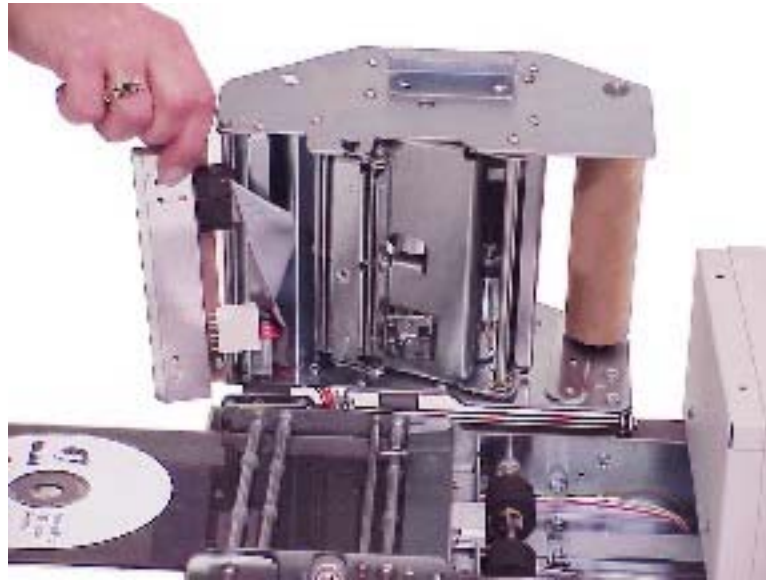


Figure 13: Printhead partially removed

Replacing the Printhead

A damaged printhead may leave “white” vertical lines through all labels, requiring replacement of the printhead for proper label appearance. If the print head must be replaced, use the following guidelines for replacing the print head.

Note: A "dirty" printhead may produce prints similar to a damaged printhead. Always clean the printhead and check with a test print to determine if printhead is not damaged, but only needs to be cleaned.

Cautions in handling printhead

Important: The printhead is fragile and can be damaged by improper handling. The printhead heating elements can be damaged if touched by hard or abrasive objects.

Important: Always place printhead on clean soft cloth or paper towel. Do not place printhead on metal or other hard or abrasive surfaces. Printhead heating element area is fragile.

Important: The printhead's power connection has three black ground wires. The ground wires must be connected to the pins of the power connector closest to the center of the print head.

Printhead Replacement Procedure

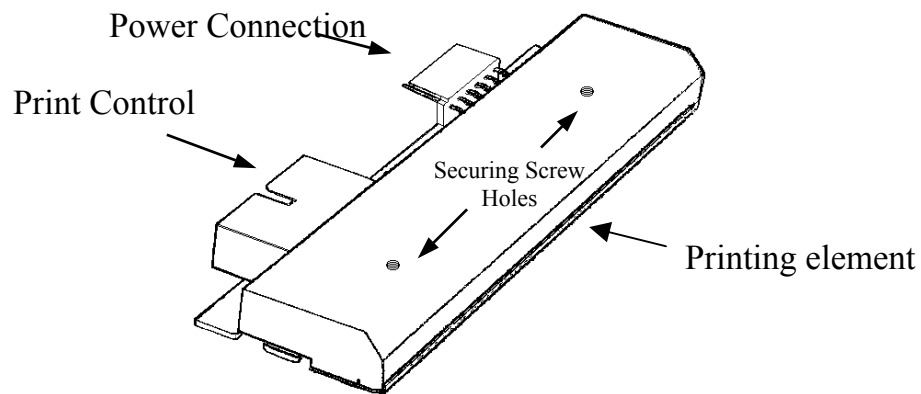


Figure 14: The printhead's printing element is fragile, avoid touching the printing element

To replace printhead, you will need the following tools:

- Phillips-head screwdriver

Important: Always turn power off and unplug printer prior to removing print head.

Important: The printhead is fragile. Avoid touching the printing element and always store the printhead on a soft area such as a clean paper towel

Wait until all printing has finished, and remove any CD still on the Tray.

- Power off and unplug printer
- Remove the top cover, remove ribbon, and set aside.
- Printhead is held by two Philips head screws
- Look down top of chassis to locate Philips head screws
- Use screw driver to loosen screw (note: screws are captive and will not fall out)
- Open Chassis (pull chassis knob out, and lift chassis)
- Printhead will hang from two cable connectors

- Note the position and orientation of the connectors
- Remove printhead from cable connectors, and place aside
- Attach cable connectors (noting orientation) to new printhead
- Lightly hold printhead in place and tighten the two Philips head screws
- Close chassis and completely tighten screws
- Printer is now ready to resume operation

Printhead Replacement, cont'd.

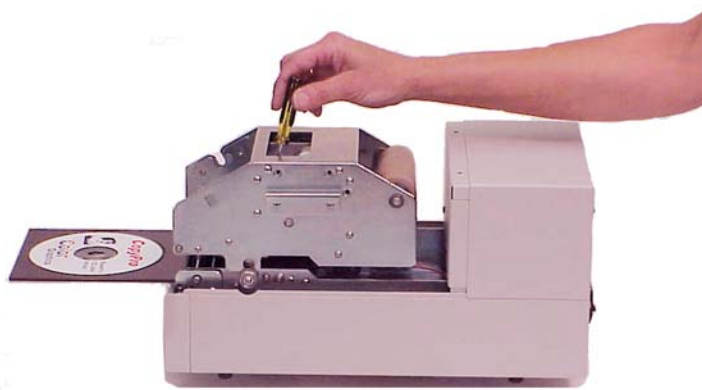


Figure 15: Printhead is retained by Philips type screws accessed from top of printer

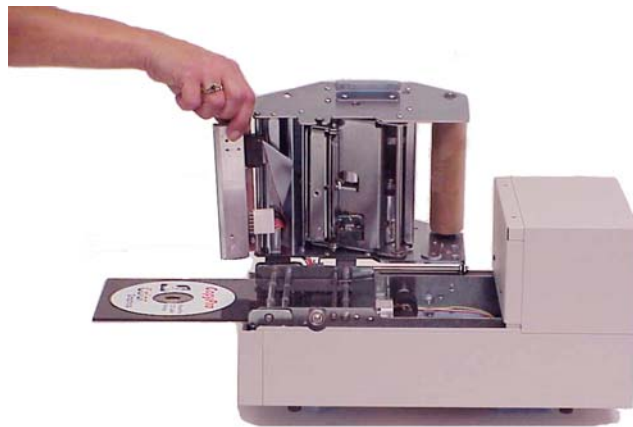


Figure 16: Printhead power and data cables shown after printhead screws removed

Troubleshooting Section

Quick Recovery Strategy

- Clear error condition (if needed, see Error Code Chart at end of this document)
- Press “START” key (to reset printer) or power printer OFF and then power back ON
- Re-try printing label

Test CD Strategy

- For testing printer issues, make sure a CD is loaded in printer's CD Tray
- To conserve media while testing, test print with small label and rotate the CD after each print. This allows multiple test prints on a CD.

Common Printer Issues

Printing Issues

- Fingerprints on CD may cause unprintable areas
- Strobe setting (CD label is printing too light or too dark)
- Printer driver set for Color when Black ribbon is installed (error results)
- Spectrum2 Printer driver not selected, therefore computer is not sending print data to printer
- Parallel Port on computer is set to ECP, SPP or EEP Modes, change Parallel Port Mode to Normal

Clearing Improper Placement of CD

- If the CD is improperly placed on the CD tray, the CD tray will open and the status light will blink three times.
- Correct the placement of the CD on the CD tray.
- Press Start
- Press Print

Printer is not printing checklist

Use list below to determine cause for non-printing printer error.

Cables and connections

- Check "Status" LED for flashing Error Code. (See ERROR CODES Chart below)
- Check all power connections, and make sure the printer is ON and "Ready" LED is ON.
- Make sure the printer cable is connected to the parallel port on the Spectrum2, and to the printer port of the host computer.
- Make sure there is a CD loaded properly on the tray.
- Make sure the Spectrum2 Printer Driver is selected as the Windows print destination.
 - From Windows, select FILE menu, then PRINT. A dialog box will appear and the Spectrum2 printer should be listed. If not, click on dialog box to select Spectrum2. If Spectrum2 is not shown as a selection, then the Spectrum2 printer driver needs to be installed.
- Make sure Printer Driver is set for Black & White printing if Black ribbon is installed
- Make sure Printer Driver is set for Color printing if Color ribbon is installed

Active LED shows activity, but no label is printed

- Check if "Active" LED does not light, after issuing a print command.
 - Windows 98 may not operate properly with very large graphics files. Test by printing CD label with smaller graphics files to check printer operation. Try printing label with Spectrum2 Printer Driver set to 300 DPI. Also, try reducing file size as needed or attempt to print label by using Windows NT/2000 host computer

Parallel port setting on computer

- Make sure the Computer's Parallel Port mode is configured as: Normal, Compatible, SPP or Output Only. Normal is the recommended setting. Note: ECP Mode works with most systems.

To check parallel Port configuration requires checking the Computer's BIOS Settings and setting the Parallel Port setting to Normal.

To check Computer BIOS settings:

- Power OFF the computer
- Power ON the computer

- As the computer starts up it will display a message on how to check computer BIOS setup.
- Usually, this requires pressing the DEL or ALT or F2 or some other key
- After pressing the appropriate key, a list of choices or menu will be displayed
- Choose to review the advanced settings, look for Parallel Port Mode listing or Integrated Peripherals listing
- Proper settings are:
 - Parallel Port Mode setting shows: ECP or EPP
 - Change to: Normal
 - Exit the BIOS settings by selecting Exit, and save any changes.
 - Shutdown then re-start computer, then start Spectrum2 Designer Program and try printing a CD label.

Print Quality

Fuzzy prints and smudges

- Make sure the CD print surface is a printable (lacquer or matte) surface.
- Check the CD surface for fingerprints, oils, etc
- Clean the printing surface of the CD
- Make sure the print ribbon is a supported ribbon type
- Check the CD position
- Check the Printing Alignment in the CD labeling software

Faded prints

- Check the Strobe setting (this controls darkness or lightness of print density). If printing from *Spectrum2 Designer*, check the Strobe setting on the host computer.
- Increase or raise Strobe Setting by 5 units and reprint

Horizontal Streaks or Arc shaped Streaks

- Lower or reduce Strobe Setting
- Re-arrange graphics to reduce large coverage areas
- Check the Strobe setting (this controls darkness or lightness of print density).

Sticking or Torn Ribbon

- Vertical Lines or streaks - Printer makes snapping or popping sounds during printout
- Lower or reduce Strobe Setting
- Clean the Printhead

CD Positioning Errors

Reload CD on tray according to the loading instructions in the Printer Operation section of this manual.

- Make sure the CD centering pin is positioning the CD when the tray closes. The CD centering pin should touch only the outside edge of the CD. The CD should not rest on top of the CD centering pin.

CD Printing Techniques Section

The Spectrum2 CD Printer offers a convenient way to print labels on CDs, this section describes ways to get the best possible printouts within the printer's labeling capabilities.

- The Spectrum2 Printer automatically selects default print density setting, (lightness or darkness of print) which is called the Strobe Setting based on what type of ribbon is installed in the printer (black or full color) and on the print mode (300 DPI or 600 DPI mode). In general, the default settings will work for a wide range of labels, however some types of CD media may require adjusting the Strobe Setting to a lower range (for lighter label) or for high range (darker label).
- Create text in Spectrum2 Designer program and use one of the seven primary colors for text.
- Graphics files from Photo or Paint type programs should be saved at either 300 or 600 DPI.
- Graphics files taken from websites typically are set at 72 DPI resolution and may look smaller than expected when added to a CD Label design that is printing at 300DPI or 600 DPI.

Please see the following CD Printing Techniques Chart for more detailed information on CD Label printing techniques.

Spectrum2 CD Media & Ribbon Selection Guide

For best results, use the CD Media and Ribbon Section Guide to choose the appropriate CD Media, Ribbon, and Printer Strobe setting for your CD labeling job.

	Label Project: • Black Text & Graphics	Label Project: • Color Text & Graphics	Project Printing Tip
Ribbon	Black or Monocolor Ribbon	Full Color Ribbon	<i>Spectrum2 requires thermal transfer type white coated discs with smooth coating for optimum color results.</i>
CD Media	Silver or Gold Discs (lacquer finish)	White Discs (Smooth white coated finish)	White coated inkjet type discs (for inkjet CD printers) with a rough surface will not provide good output
Strobe Setting Strobe setting controls darkness or lightness of print To set strobe setting in Windows: select File / Print / Properties / Device Option	54	54	If label is too light try increasing the strobe setting in increments of 5 until label has best appearance If label is too dark try decreasing the strobe setting in increments of 5 until label has best appearance

<p>Label Graphics</p>	<p>Labels the print best in monochrome are:</p> <ul style="list-style-type: none"> • Text only • Line art and Clip art • Mixed text and graphics • Mixed graphics • Photos with limited grayscale range 	<p>Labels the print best in color are:</p> <ul style="list-style-type: none"> • Text only • Line art and Clip art • Mixed text and graphics • Mixed graphics • Photos with limited range of colors • Spot colors 	<p>Labels that may <u>not</u> print properly are:</p> <ul style="list-style-type: none"> • Large single color areas • Reversed out graphics (example: clear text on solid black background) • Photos with wide range of colors

Graphics Tips

<p>Label Graphics Tips</p>	
<p>Resolution</p>	<p>Set resolution of graphics files for 600 DPI (or 300 DPI) prior to saving graphics. If using Photo or Paint programs, save files as 300 or 600 DPI JPEG files, with images sized for placement on CD. Import graphic file to Spectrum2 Designer. Set Printer Driver for 300 or 600 DPI mode accordingly prior to printing.</p>
<p>Web Graphics</p>	<p>Website graphics are typically 72DPI, which means they will shrink in size when brought over to a label file. If possible, avoid expanding size of graphics. Expanding to a larger size may result in “rough” looking graphics.</p>
<p>Text Color</p>	<p>For color text, choose the 8 basic colors (bottom row of color selection within Spectrum2 Designer)—this will consistently give best results. If using Photo or Paint programs, set to CMY and select colors that utilize only one or two of the CMY colors.</p>

Color Graphics

Most clip art in Windows Meta File format (WMF) provide good results. JPEG, BMP, and TIFF files may use dithering of CMY colors; you may need to use a Photo or Paint program to adjust color density to achieve best results.

Full disc single color graphics and reversed out graphics are not recommended for thermal transfer CD printers.

Common Label Issues

Issue	Cause	Possible Correction
Label is too light or too dark	Strobe Setting is either too high or too low. The Strobe Setting controls printhead heat and print density.	If label is too dark decrease Strobe Setting. If label is too light increase Strobe Setting. Make changes in 5 unit increments.
Curved marks in graphic	Strobe Setting is too high. Overheated ribbon causing "wrinkle" marks in graphics.	Decrease strobe setting. If needed, clean print head.
Graphics or text are not printed near CD edge or hub	CD has unprintable areas near outer edge and inner hub, also check template size in CD label program	Template adjustment is made from the CD label program, see Settings Menu. Adjust label template to mask unprinted areas. Template mask creates uniform boarder for crisp presentation.
Jagged or rough looking graphics or text that have been imported from other program or WebPages	Low-resolution graphics appear jagged or rough. Graphics re-sized to larger size lose resolution.	Create graphics sized for label at 300 DPI, then import into CD Label program. WebPage graphics at 72 DPI will become "rough" if resized.
Text appears light or faded (text created in CD label program)	Text color not optimized for CD printer	From label program change text color to one of the seven solid colors. These colors are shown in Custom Colors area of Color Menu. See Optimizing Color Labels.
Text appears light or faded (text created in	Text color not optimized for CD printer	From Paint or Photo program to increase color

<p>Photo or Paint program and imported to label program)</p>		<p>density of text prior to import to the label program. Also change CMYK values to minimize dithering. See Optimizing Color Labels.</p>
<p>Graphics appear light or incomplete</p>	<p>Some colors in graphic not optimized for CD printer</p>	<p>Use Paint or Photo program to increase color density of graphic prior to import to the label program.</p>
<p>Vertical line across label</p>	<p>White vertical line through label indicates printed requires cleaning</p>	<p>Clean printhead; see Maintenance Section of User Manual. If cleaning does not correct issue printhead may be damaged.</p>
<p>Unprinted area or marks on label</p>	<p>Possible finger print or dust interferes with printing</p>	<p>Avoid touching printable area of CD prior to printing.</p>

Strobe Setting Examples

Strobe Setting Examples

1 Strobe setting is too low

- Print is light or no print at all
- Shaded graphics light or not printed

2 Strobe setting is correct

- Text and graphics are clear
- Shaded graphics are clear

3 Strobe setting is too high

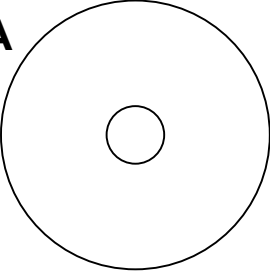
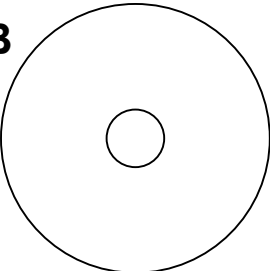
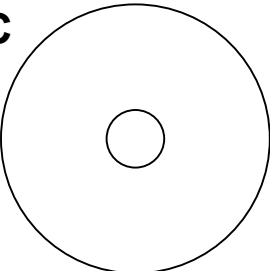
Case 1 - strobe is set a little too high

- Print and graphics too dark

Case 2 - strobe is much too high

- Print and graphics very uneven
- Ribbon is tearing

CD Media & Strobe Setting examples

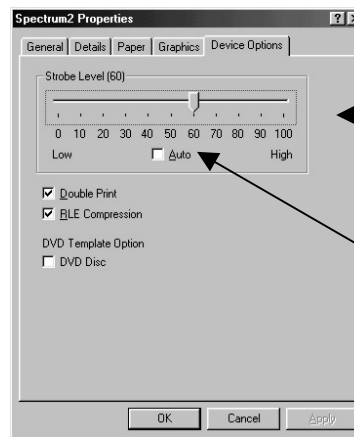
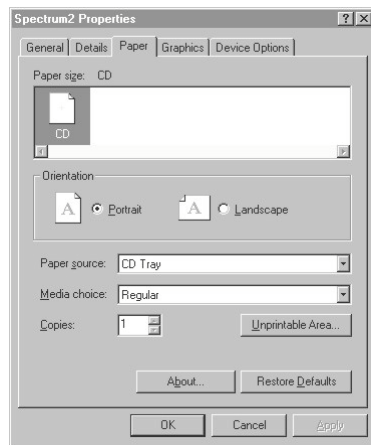
Recommended CD media, ribbon type and strobe setting	
<p>A <u>Silver</u> CD discs (also called lacquer finish disc)</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • Use with black ribbon • Strobe setting: 54 	<p>A</p> 
<p>B <u>White Coated</u> CD discs (with <u>smooth</u> surface)</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • Use with black ribbon • Strobe setting: 54 • Use with color ribbon • Strobe setting: 54 	<p>B</p> 
<p>C <u>White Coated</u> CD discs (with <u>rough</u> surface for use with inkjet type CD printer)</p> <p>Recommendations:</p> <ul style="list-style-type: none"> • <u>Not recommended</u>, light poor quality output will result • Disc's rough surface does not accept label ink properly • Strobe setting: 54 	<p>C</p> 

Printer Driver Settings: Win 98

The key printer driver settings for the Spectrum2 CD printer are:

- **Strobe Setting** (controls lightness and darkness of label)
- **Color or Black Ribbon** selection. This setting needs to match the type of ribbon (black or color) installed in the printer.

Strobe Setting



Strobe Setting slider bar for manually setting strobe value

Strobe Auto checkbox for factory set default Strobe setting. The Auto setting works with most types of CD media

Figure 17: Win 98 Print Driver Properties Window

Strobe Setting Adjustment

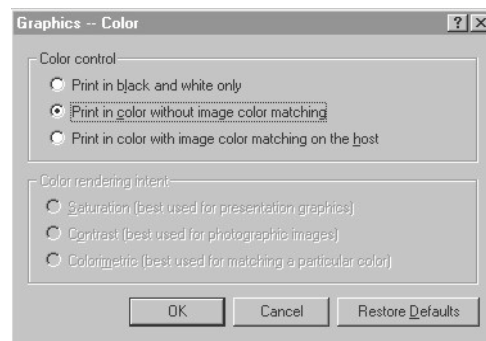
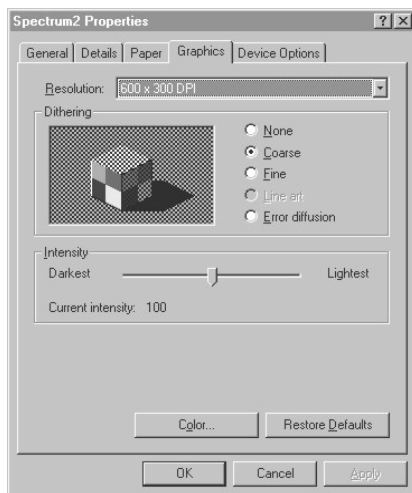
To adjust Printer Driver settings from Windows 98:

- From Windows Desktop, Click on: *Start Icon*
- Select *Settings*, Click on *Printers*
- *Right Click* on *Spectrum2 Icon*
- Double click *Properties*, Follow *Prompts*
- Click *Device Options Tab*, then check for Print Strobe setting.
- Strobe value may be set by clicking the Auto check box (recommended) or manually by slider bar selection (for fine tuning the darkness or lightness of print).
- For Auto setting: use Auto Checkbox to set Strobe to Auto. When checked, printer will use factory default settings that should work with most standard CD

discs. While the value of the Auto Setting is not shown, typically for black ribbon it is 54 and for a color ribbon is 54.

- For manually setting the Strobe Setting, use the Slider Bar to adjust strobe over a range of values. In general, higher strobe settings results in darker labeling.
- If label is too dark reduce strobe setting by 5 units and re-print, repeat this process until proper print out is obtained.
- If label is too light increase strobe setting by 5 units and re-print, repeat this process until proper print out occurs. In some cases a very high strobe setting will result in too light a print, and increasing the strobe setting further may cause the ribbon to melt or tear when printing. This may then require cleaning the print head (see Maintenance Section for print head cleaning information).

Black & White, or Color printing settings for Win 98



<p>Black & White for black ribbon</p> <p>Color for color ribbon</p>

Color or Black Ribbon selection procedure:

- While in the Printer Driver Properties box
- Click *Graphics Tab*
- Note: recommended **Dithering** setting is the **Course** selection
- Click the *Color button*

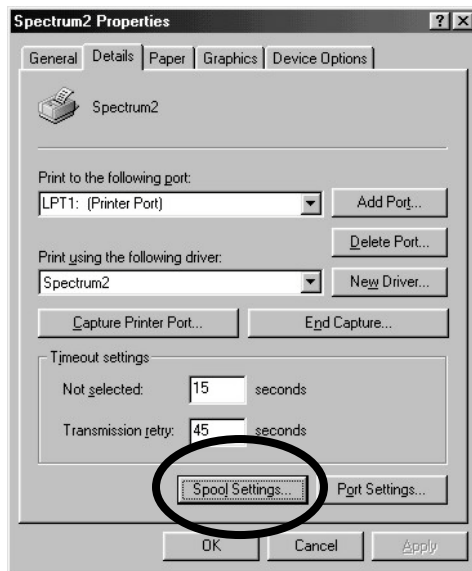
Select the following:

- If black ribbon is installed in printer select: **Black and White only**
- If color ribbon is installed in printer select: **Color without image matching**

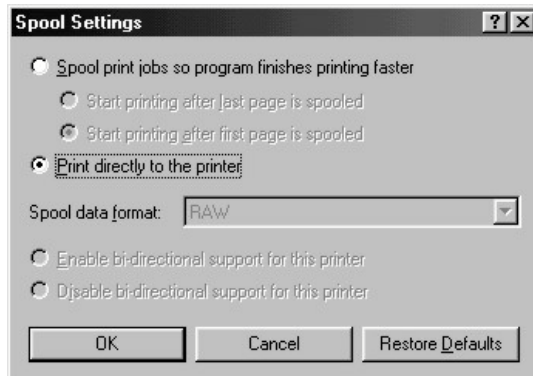


Spool Settings

- Set spool settings as indicated below:
 - Go to **Printer Properties**
 - Click the **Details** tab and click **Spool Settings**



- If you are operating a standalone printer click **Spool print jobs so program finishes printing faster**.
- If you are operating with automation click **Print directly to printer**.
- Click **OK**

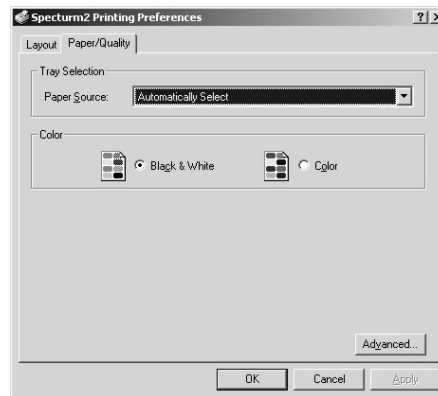
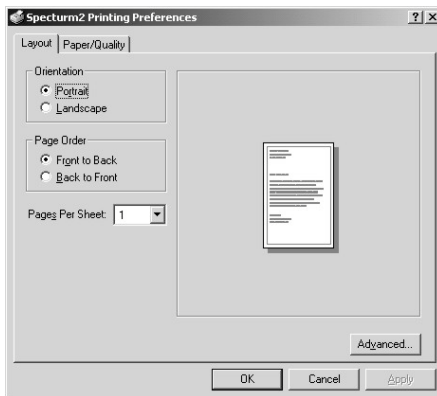


Printer Driver Settings: Win 2000 / XP

Strobe and Ribbon Color Settings

The key printer driver settings for the Spectrum2 CD printer are:

- **Strobe Setting** (controls lightness and darkness of label)
- **Color or Black Ribbon** selection (this setting needs to match the type of ribbon, mono-color or color, installed in the printer)



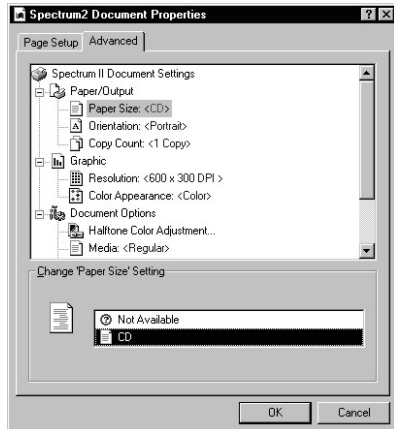
To adjust Printer Driver settings from Windows 2000:

- From Windows Desktop, Click on: *Start Icon*
- Select *Settings*, Click on *Printers*
- *Right Click* on *Spectrum2 Icon*,
- Click *Printing Preferences*, Follow *Prompts*
- Click *Paper Quality Tab*

Ribbon Color Settings

- Select *Black and White* or *Color* setting to match type of ribbon installed in printer
- Click *Advanced Button*, the *Advanced Options box* will display

Strobe Setting Adjustment



Ribbon Color Setting: this should match type of ribbon installed in printer

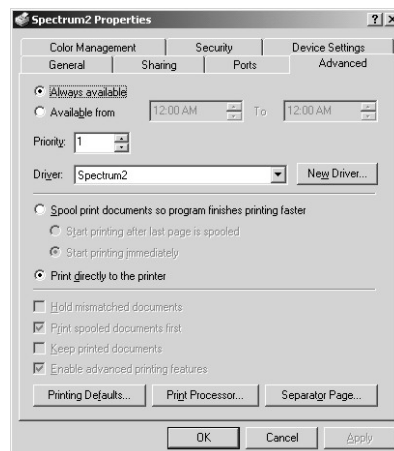
Strobe Setting: the higher the value, the darker the label

- From the *Printing Preferences* Window
- Click on Print Strobe number box
- Strobe value may be set by clicking the Auto check box (recommended) or manually by slider bar selection (for fine tuning the darkness or lightness of print).
- For Auto setting: use Auto Checkbox to set Strobe to Auto. When checked printer will use factory default settings that should work with most standard CD discs. While the value of the Auto Setting is not shown, typically for black ribbon it is 54 and for a color ribbon is 54.
- For manually setting the Strobe Setting, use the Slider Bar to adjust strobe over a range of values. In general, higher strobe settings result in darker labeling.
- If label is too dark reduce strobe setting by 5 units and re-print, repeat this process until proper print out is obtained.
- If label is too light increase strobe setting by 5 units and re-print, repeat this process until proper print out occurs. In some cases a very high strobe setting will result in an uneven print, and increasing the strobe setting further may cause the ribbon to melt or tear when printing. If this occurs, reduce the strobe setting and check the printout. If print out is fuzzy, cleaning the print head may be required (see Maintenance Section for print head cleaning information).
- Close Printers Window to exit.
- Print Strobe setting and ribbon setting (color or black) are now set.
- Strobe value may be set by clicking the Auto check box (recommended) or manually by slider bar selection (for fine tuning the darkness or lightness of print).

- For Auto setting: use Auto Checkbox to set Strobe to Auto. When checked, printer will use factory default settings that should work with most standard CD discs. While the value of the Auto Setting is not shown, typically for black ribbon it is 54 and for a color ribbon is 54.
- For manually setting the Strobe Setting, use the Slider Bar to adjust strobe over a range of values. In general, a higher strobe setting results in darker labeling.
- If label is too dark, reduce strobe setting by 5 units and re-print. Repeat this process until proper print out is obtained.
- If label is too light increase strobe setting by 5 units and re-print, repeat this process until proper print out occurs. In some cases a very high strobe setting will result in an uneven print, and increasing the strobe setting further may cause the ribbon to melt or tear when printing. If this occurs, reduce the strobe setting and check the printout. If print out is fuzzy, cleaning the print head may be required (see Maintenance Section for print head cleaning information).

Spool Settings

- Set spool settings as indicated below:
 - Go to **Printer Properties**
 - Click the **Advanced** tab
 - If you are operating a standalone printer click **Spool print jobs so program finishes printing faster.**
 - If you are operating with automation click **Print directly to printer.**
 - Click **OK**

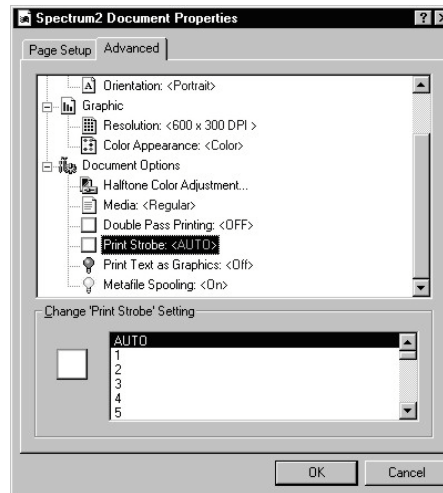
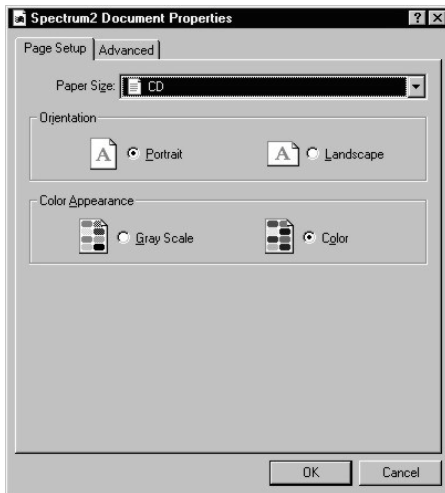


Printer Driver Settings: Win NT 4.0

Strobe and Ribbon Color Settings

The key printer driver settings for the Spectrum2 CD printer are:

- **Strobe Setting** (controls lightness and darkness of label)
- **Color or Black Ribbon** selection (this setting needs to match the type of ribbon, mono-color or color, installed in the printer)



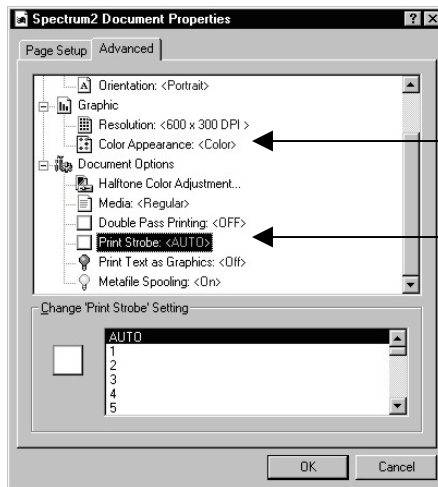
To adjust Printer Driver settings from Windows NT 4.0:

- From Windows Desktop, Click on: *Start Icon*
- Select *Settings*, Click on *Printers*
- *Right Click* on *Spectrum2 Icon*,
- Click *Printer Properties*, Follow *Prompts*
- Click *Page Setup* tab

Ribbon Color Settings

- Select *Black and White* or *Color* setting to match type of ribbon installed in printer
- Click *Advanced Button*, the *Advanced Options box* will display

Strobe Setting Adjustment



Ribbon Color Setting: this should match type of ribbon installed in printer

Strobe Setting: the higher the value, the darker the label

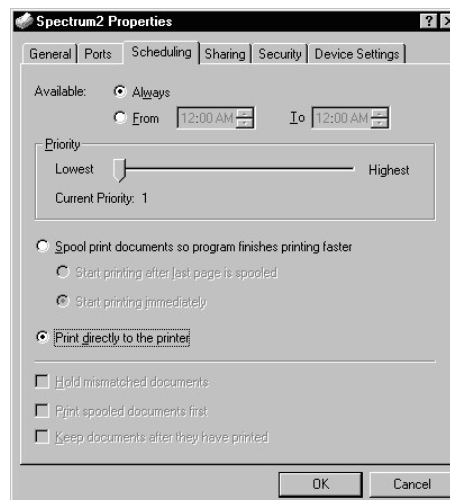
- From the *Printer Properties* Window
- Click on Print Strobe number box
- Strobe value may be set by clicking the Auto check box (recommended) or manually by slider bar selection (for fine tuning the darkness or lightness of print).
- For Auto setting: use Auto Checkbox to set Strobe to Auto. When checked printer will use factory default settings that should work with most standard CD discs. While the value of the Auto Setting is not shown, typically for black ribbon it is 54 and for a color ribbon is 54.
- For manually setting the Strobe Setting, use the Slider Bar to adjust strobe over a range of values. In general, higher strobe settings result in darker labeling.
- If label is too dark reduce strobe setting by 5 units and re-print, repeat this process until proper print out is obtained.
- If label is too light increase strobe setting by 5 units and re-print, repeat this process until proper print out occurs. In some cases a very high strobe setting will result in an uneven print, and increasing the strobe setting further may cause the ribbon to melt or tear when printing. If this occurs, Click OK, then Click OK.
- Close Printers Window to exit.
- Print Strobe setting and ribbon setting (color or black) are now set.
- Strobe value may be set by clicking the Auto check box (recommended) or manually by slider bar selection (for fine tuning the darkness or lightness of print).
- For Auto setting: use Auto Checkbox to set Strobe to Auto. When checked, printer will use factory default settings that should work with most standard CD discs. While

the value of the Auto Setting is not shown, typically for black ribbon it is 54 and for a color ribbon is 54.

- For manually setting the Strobe Setting, use the Slider Bar to adjust strobe over a range of values. In general, a higher strobe setting results in darker labeling.
- If label is too dark, reduce strobe setting by 5 units and re-print. Repeat this process until proper print out is obtained.
- If label is too light increase strobe setting by 5 units and re-print, repeat this process until proper print out occurs. In some cases a very high strobe setting will result in an uneven print, and increasing the strobe setting further may cause the ribbon to melt or tear when printing. If this occurs, reduce the strobe setting and check the printout. If print out is fuzzy, cleaning the print head may be required (see Maintenance Section for print head cleaning information).

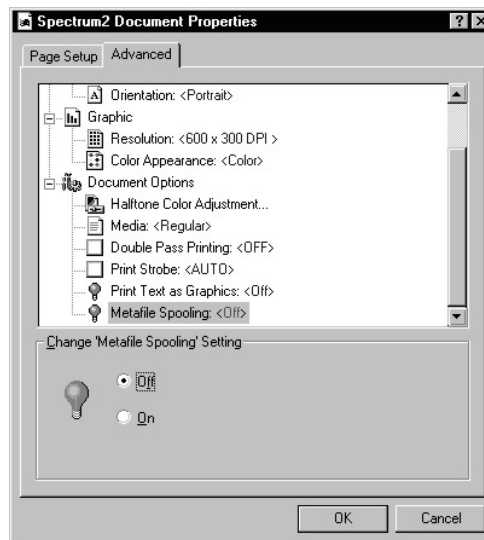
Spool Settings

- Set spool settings as indicated below:
 - Go to *Start / Settings / Printers* and right click on *Spectrum2*
 - Click *Properties* and click the *Scheduling* tab
 - If you are operating a standalone printer click **Spool print documents so program finishes printing faster.**
 - If you are operating with automation click **Print directly to printer.**
 - Click **OK**



Spool Settings (cont.)

- With the Spectrum2 printer selected, click *File / Print / Properties*.
- Click the *Advanced* tab
- Click on *Metafile Spooling*
- If you are operating a standalone printer click **Off**.
- If you are operating with automation click **On**.
- Click **OK**



Optimizing Color Labels

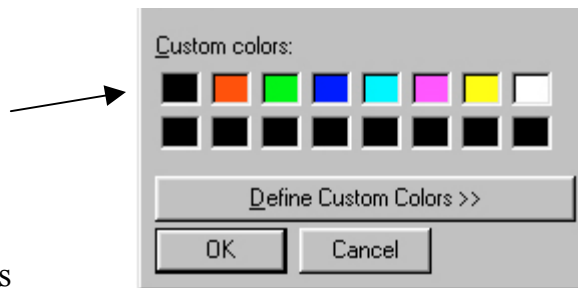


Optimizing Color Labels

For full color printing, the Spectrum2 CD Printer uses a paneled ribbon that includes a Cyan (blue), Magenta (Red), and Yellow panels, commonly referred to as CMY colors. The printer mixes (by dithering) these colors to create the colors on the label. Mixing the CMY panels creates a range of colors. For example, green would be a mix of blue and yellow, and black a mix of all three panels. Due to the limitations of dithering some color combinations appear more intense than others.

There are seven standard colors that provide good color intensity for text and graphics. These colors are shown in the first row of the Custom Colors of the Color Selection Menu in the CD Label program. These colors are red, green, blue, light blue, purple, yellow, and black.

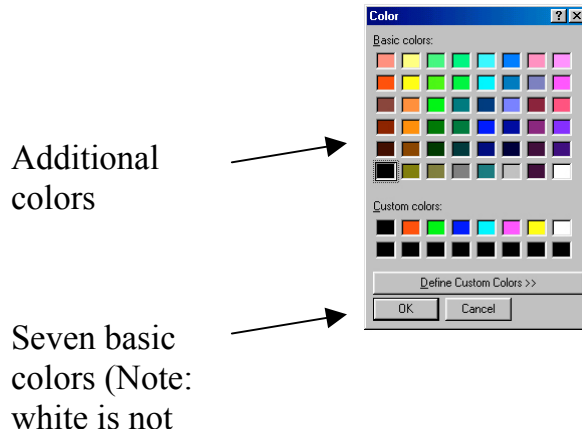
For best color output: Use the Seven standard colors shown in the Custom Colors box. (Note: white is not printed)



Recommendation for optimum text and graphics: Use the seven standard colors for text color or graphic shape color for boxes, circles, lines, and color filled shapes. These colors are selected from within the CD Label program.



In addition to the standard colors are the basic colors, which provide more color choices, but may appear to print lighter than they appear on-screen.



Preparing Color Graphics for import into the CD Label Program

The CD Label Program allows import of several standard graphics files, including versions of BMP, JPG and TIF file formats. The Spectrum2 prints at 300 and 600 DPI modes, so graphics should be set for 300 DPI resolution and properly sized for the disc label. Typically, in Paint and Photo editing programs there are features that allow setting resolution and imaging size. Having the correct size and resolution eliminates the need to "re-size" the image in the CD Label software. Small images or low-resolution images may need to be stretched to a larger size, however this may cause the graphic to appear to have a "rough" or "jagged edged" appearance.

Recommendation for preparing graphics for labels:

- Set graphic image resolution to 300 DPI when preparing graphic in Photo or Paint programs.
- Make text or graphic the correct size for the CD label.
- If possible, avoid re-sizing graphic in CD Label program.
- Importing web page graphics: on-screen web page graphics are typically set for 72 DPI (low resolution) and will appear to "shrink" in size when imported into the CD Label program which is displaying the graphic at 300 DPI. Re-sizing this type of graphic to a larger size may cause the graphic to become fuzzy or have jagged edges.

Advanced Recommendations:

- In Photo and Paint programs, if possible, select colors that mix only two of the three CMY colors to minimize dithering.
- In Photo and Paint programs, adjust contrast and brightness settings to make "brighter" and denser images.
- In Photo and Paint programs, use the color saturation adjustment (Ex. color curves) to increase color density of graphic.

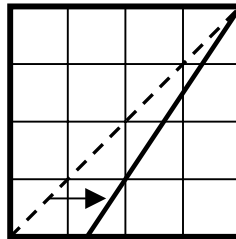


Figure 18: For graphics created in Photo and Paint programs, adjust the color curves to increase color density of graphic for best color output

CD Printing Techniques Chart

Use this chart to help address printing issues.

Area	Issue	Reason	Suggestion	Additional tips
A	With black ribbon: Text created in the Spectrum2 Designer program does not print clearly.	Check Strobe setting...setting of too high or too low will affect text quality. If strobe is too high you may have a ribbon tear or hear a "crackle" sound while printing, indicating ribbon is overheated.	Try a Strobe setting of 54 and increase strobe value in increments of 5 until you have good results.	CD media may not be suitable for thermal transfer labeling. Try different brand of CD media.
B	Graphics and Text have light horizontal lines	Check strobe setting...see above. Strobe setting is too high, causing ribbon to wrinkle.		
C	Text or Graphic fades at outer edge of disc or near hub ring area	Printer can not print to outer edge of disc or near hub ring area	1. Move text or Graphic away from edge or hub area	
		Some CD-R discs are not perfectly flat and have raised areas near hub ring area and on the outer edges of the disc. The raised areas lifts the printhead away from the disc causing print to fade	2. Adjust disc template - see Settings Menu in Spectrum2 Designer - select Template & Adjust	

			3. Change to white coated CD media for better results	White coated media provides flatter / smoother printing surface compared to some types of silver CD media
	Text or graphics at top or bottom of disc is not printing or is cutoff	Printer may not print completely to edge disc	See above.	
D	Web page graphics copied to a disc label have a "rough" or "jagged" quality	Web page graphics are usually set at 72 DPI, which will cause them to appear very small when imported into Spectrum2 Designer label program	Do not enlarge or stretch web graphics. Enlarging reduces quality of the graphics	Tip: Some graphics files (WMF files: Windows Meta Format) can be enlarged without reduction in quality
D	Printed graphics look "rough" or "jagged" as compared to what is shown on-screen	<p>The graphics may have been created or saved at a low resolution, then placed in the label.</p> <p>Low resolution graphics may have been "expanded" or "stretched" to larger size</p>	<p>Use high resolution graphics for best looking 300DPI or 600DPI printout</p> <p>Create and Save all Graphics at least 300DPI or higher.</p> <p>Note: Graphics that are created and saved at a low resolution can not convert back to higher resolution.</p>	When creating graphics, create graphics close to size used on CD label. In your graphics program, set resolution to 300 DPI and use rulers to check size. This will eliminate the need to "expand" or "stretch" graphics which may reduce the quality of the graphic object



--	--	--	--	--

CD Printing Techniques Chart

E	With color ribbon: Text created in the Spectrum2 Designer program does not print clearly	For best text quality use one of the printer's seven primary colors as a text color. Also, check strobe setting. See above.		
F	With color ribbon: Text created in a 3 rd party graphics program does not print clearly	The text may be a bitmap or JPEG graphic, with a color that does not print well.	Adjust to color of the text to more closely match the printer's seven primary colors	Tip: If adjusting colors does not provide good results. Use the Spectrum2 Designer software to create the text or text and background.
F	Graphics objects appear washed out or are not completely printing	Check strobe setting. See above. IF Strobe setting OK, graphic may be too light.	Adjust graphics in photo or paint program by increasing darkness or density in 10% increments and if needed reduce contrast by 10%.	CD media may not be suitable for thermal transfer labeling. Try different brand of CD media.

CD Printing Techniques Chart

<p>GI</p>	<p>Vertical “White” line or “non printing line” is across disc label</p>	<p>Printhead has a particle of ribbon or dust stuck to it.</p> <p>It is possible that printhead is damaged and needs replacement. If cleaning printhead does not correct problem. Contact MF DIGITAL Service department for replacement printhead.</p>	<p>Clean printhead</p>	<p>Tip: If strobe setting is too high, this may cause ribbon to melt and ribbon particle stick to printhead.</p> <p>After cleaning printhead, set strobe setting to 54 and increase in strobe value increments of 5 until you have good results.</p>
<p>G</p>	<p>One half of the label is not printed on all discs</p>	<p>Print head may need servicing, please contact your reseller or MF DIGITAL service department</p>		<p>Tip: Save a copy of the labeled CD and label file to allow quick problem solving</p>
<p>G</p>	<p>Dot or spec on disc label</p>	<p>Dust particles on ribbon cause spots on disc label</p>	<p>Check printer for dust. Use printer in less dusty area. Operate printer with top cover on.</p>	<p>Take care not to touch printhead when inspecting for dust.</p>

Thermal Transfer & Inkjet CD Printer Comparison

The Spectrum2 series of printers use thermal transfer technology to apply resin type ink to the surface of a plastic CD or DVD disc. Thermal transfer printers have a print head that heats portions of a ribbon as disc moves under the printer head, as the disc goes past the print head the resin type ink cools and adheres to the surface of the disc. Thermal Transfer printers provide one of the few methods to print on CD discs in an office environment.

CD Printer Comparison Chart

	Inkjet CD Printer	Thermal Transfer CD printer	Key Point
Print speed	Slow	Fast	Thermal Printer is faster
Waterproof Label	Not waterproof	Waterproof	Thermal Printer label more durable
Requires coated CD media	Yes	No – prints black directly on Silver or gold media Yes – prints color on white coated media	Thermal Printer has lowest cost per label for black only labels and media
Quality of output	Good Text Excellent Graphics	Excellent Text Good Graphics	Thermal transfer Printer offer good labeling characteristics
Coverage of Disc	Can cover entire disc with graphics	Can cover most of the disc with graphics. Some unprintable areas at edges of disc and hub area	Thermal transfer Printer label coverage good for most business CD labeling applications
Best labeling	Color photos on	Black text and	Thermal transfer

<p>applications</p>	<p>white inkjet type coated media</p>	<p>graphics on silver / gold media Spot color on silver on white coated media Mixed text and color graphic on white coated media</p>	<p>Printer allows wide range of label types</p>
<p>Not recommended labeling applications</p>	<p>Permanent Labeling of disc Disc that will be handled in wet or humid conditions (ink will smear)</p>	<p>Full color photos or graphics covering the entire label area of the disc</p>	<p>Thermal Transfer Printer full coverage labels possible but not recommended</p>

Supported Ribbon and Ribbon Specifications

The MF DIGITAL Spectrum2 supports the following thermal transfer ribbons.

<i>Vendor</i>	<i>Ribbon Type</i>	<i>Spindle Width</i>	<i>Labels per ribbon</i>
MF DIGITAL	Black	130MM	<ul style="list-style-type: none">• 2361 full CD labels• 4,000 to 6,000 partial CD labels• Over 6,000 labels if label is consists of single line of text
Rimage	Full Color	122MM	<ul style="list-style-type: none">• 500 labels full CD

Ribbon Usage with a Minimum Print Size

The amount of ribbon used will vary depending on the particular print, and the amount of CD surface the print is intended to cover. A minimum print (ex. line of text) is one that uses the smallest amount of ribbon. The Take-up Roller typically winds 7/8" to 9/8" of ribbon with a minimum print.

Autoloader Port

Connector and Signal information:

<i>Pin Number</i>	<i>Signal Name</i>	<i>I/O</i>	<i>Function</i>	<i>Logic 1 (5 Volts)</i>	<i>Logic 0</i>
1	CPBSY	Output	Printer Busy	Printer Busy	Printer Available
2	CTOUT	Output	Tray Out	Tray Extended	Tray Retracted
3	CTIN	Output	Tray In	Tray Retracted	Tray Extended
4	CCDINTRAY	Output	CD on Tray	CD Present	No CD Present
5	P_CCMD	Input	Print Buffer Command	No Action	Prints label image in buffer
6	O_CCMD	Input	Move Tray Command	No Action	Toggles tray In or Out
7	CPERR	Output	Printer Error	Error Exists	No Error
8	CRIBOUT	Output	Ribbon Out	No Ribbon Detected	Ribbon Detected
9	Ground		Ground	N/A	N/A

Note:

- P_CCMD and O_CCMD must receive a logic low pulse of at least 70ms for the command to be valid.
- MF DIGITAL Autoloaders send valid P_CCMD and O_CCMD pulses of 800ms.

Autoloader Port Pinouts:

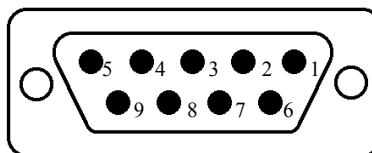


Figure 19: DB-9 Female type connector on printer

Error Codes for Status LED

The Status LED is located on the front of the printer.

<i>Number of Flashes</i>	<i>Area to check</i>	<i>Action</i>
1	Timeout	Power OFF / Power ON printer
2	Ribbon out	Install new ribbon, press START
3	No CD	No CD in tray. Place CD in Tray, press START to continue.
4	Tray error	Press START to home tray
5	Head motor error	Power OFF / Power ON printer
6	Memory error	Memory error detected. Power OFF / Power ON printer
7	Print buffer overflow	Press START key (check label size - use RLL setting in driver to reduce label)
8	Positioning	Power OFF / Power ON printer
9	Data error	Check driver color setting matches type of ribbon installed in printer. Power OFF / Power ON printer