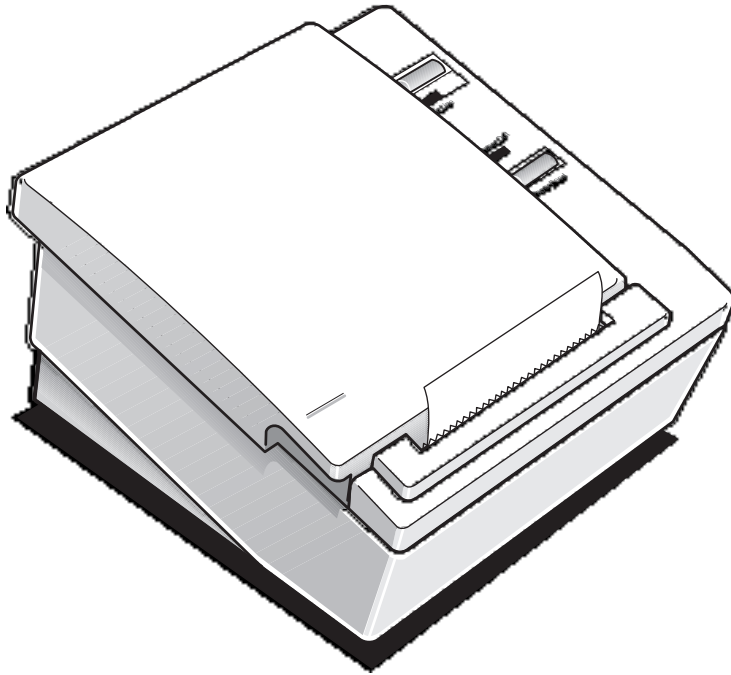


7193 Thermal Receipt Printer Owner's Guide



7193-D100-V001

It is the policy of Axiohm IPB to improve products as new technology, components, software, and firmware become available. Axiohm IPB, therefore, reserves the right to change specifications without prior notice.

All features, functions, and operations described herein may not be marketed by Axiohm IPB in all parts of the world. In some instances, photographs are of equipment prototypes. Therefore, before using this document, consult your Axiohm IPB representative or office for information that is applicable and current.

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Federal Communications Commission (FCC)
Radio Frequency Interference Statement

Warning

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

Information to User

This equipment must be installed and used in strict accordance with the manufacturer's instructions. However, there is no guarantee that interference to radio communications will not occur in a particular commercial installation. If this equipment does cause interference, which can be determined by turning the equipment off and on, the user is encouraged to contact Axiohm immediately.

The Axiohm IPB company is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Axiohm IPB. The correction of interferences caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

Quick Reference

This Quick Reference will direct you to key areas of the Owner's Guide. For a complete listing of topics, see the Contents or Index.

Ordering Paper and Supplies **page 4**

Information on where and how to obtain paper and optional items.

Setting Up the Printer **page 9**

Basic requirements for unpacking and installing the printer.

Loading and Changing Paper **page 19**

A brief discussion of the simple paper loading procedure.

Testing the Printer **page 23**

Procedures for running a test to check the print quality of the printer.

Solving Problems **page 29**

What to do if a problem occurs.

Diagnostics **page 33**

A technical discussion of the three levels of diagnostics available.

Communication Interfaces **page 45**

Specifications for the RS-232 and Parallel communication interfaces.

Commands **page 63**

Lists and descriptions of the programming commands.

Specifications **page 101**

Technical specifications for the printer.

How to Use This Book

Use this book as an installation guide for setting up and preparing the printer to run, as a training guide for teaching users how to operate the printer, or as a reference for programming the host system to communicate with the printer. In addition, information is also provided about the character sets and graphics that are available. The book is divided into chapters that relate to each of these areas.

See the Quick Reference, Contents, or Index for detailed listings.

Who Should Use this Book?

This book is intended as a general guide for operators and supervisors who need to know how to set up and use the printer. It is also intended as a technical guide for programmers and system integrators who need to know the technical information about the printer's communication and the programming commands used by the host system to control the functions of the printer.

How to Obtain More Information

For more information about the 7193 printer and to order the following documentation, please contact your Axiohm supplier:

- 7193 Thermal Receipt Printer: Service Guide (7193-D200-V001)
Service and disassembly procedures (you must be a trained service representative to service the printer)
- Parts Information Manual (7193-D300-V001)

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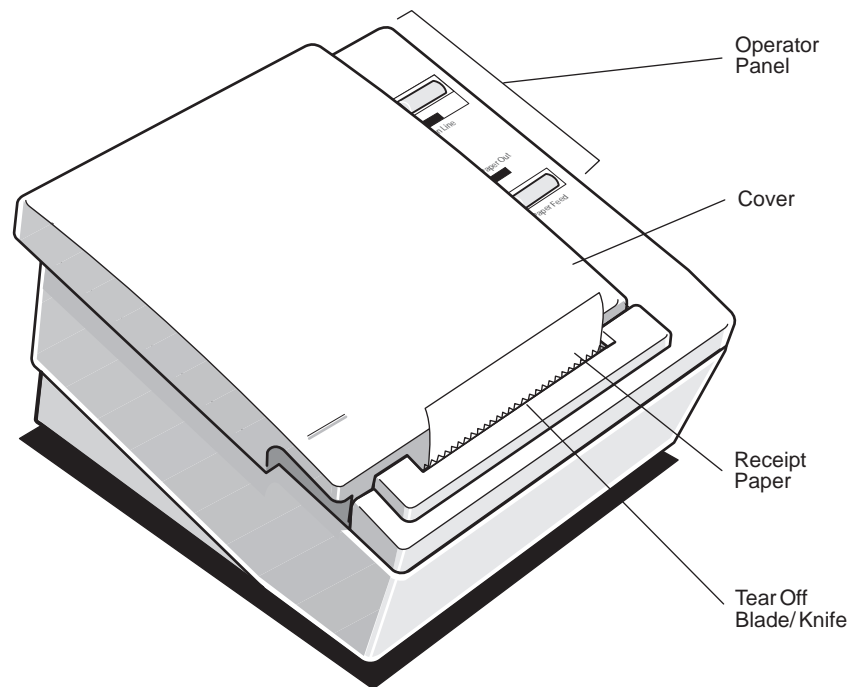
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About the 7193 Printer

The 7193 thermal receipt printer is fast (at 600 lines per minute), quiet, and very reliable. With thermal printing technology, there is no ribbon cassette to change, and paper loading is extremely simple. The printer is small enough to fit almost anywhere and is easy to use with the receipt exiting from the top. There is no journal as it is kept electronically by the host system.



Models

There are several models of the 7193 depending on the communication interface and the combination of options selected.

Communication Interfaces

- RS-232C
- Parallel

See the “Communication” chapter later in this book for more information.

Options

The following options are available:

- Paper cutter
- Cash drawer drivers: will open a separately purchased cash drawer under software command
- Wall-mount kit for hanging the printer on a wall (see “Setting Up the Printer” later in this book)

Features

All models come with the following features:

- Remote power supply with wall-mount kit (see “Setting Up the Printer” later in this book)
- Drop-in paper loading which does not require using a spindle or threading the paper through a paper path
- Host-selectable 44 or 56 columns of print on 80 mm wide “fax grade” thermal paper
- 600 print lines per minute
- Two resident selectable character sets:
 - PC Code Page 437 (US)
 - PC Code Page 850 (Multilingual)
- 16K RAM available for downloadable character sets and bit-mapped graphics
- 4K buffer

- History EEROM
- Speaker
- Resident bar codes
 - Code 39
 - UPC-A
 - UPC-E
 - JAN8 (EAN)
 - JAN13 (EAN)
 - Interleaved 2 of 5
 - Codabar

Thermal Printhead

The 7193 uses a thermal printhead which is extremely fast and quiet. Because it uses heat to print directly on paper, there is no cassette or ribbon to change, eliminating soiled fingers and paper dust.

The printhead is designed for a very long life, but it may be replaced if needed. Only a trained service technician may replace the printhead. See “Solving Problems” later in this book to determine if the printhead needs to be replaced. If the printhead needs to be replaced, contact your Axiohm authorized service organization. See “Cleaning the Printer” later in this chapter for cleaning instructions for the printhead.

Ordering Paper and Supplies

Thermal receipt paper and other supplies can be ordered from several recommended and qualified suppliers.

Ordering Thermal Paper

The 7193 requires "fax grade" thermal paper with the following dimensions:

- Diameter: 80 mm maximum (3.15 in.)
- Length: 83 meters (273 ft.)
- Width: 80 mm \pm .5 mm (3.15 \pm .008 in.)

The paper must not be attached at the core or the printer will be damaged when the paper runs out. When the paper runs out, the printer stops printing and turns on the Paper Out light (red) on the operator panel. There is no indication or automatic signal when the paper runs low. It is recommended that you use a paper roll with a colored stripe at the end of the roll to indicate that the paper is running low.

Recommended Suppliers

The grades of paper listed here will give the best print quality. When more than one stock or paper grade number is listed, the first number (standard density) provides better image density. You may order paper directly from AT&T Global Information Solutions. Contact your Axiohm supplier for ordering paper manufactured by Kanzaki (paper grades listed on the next page).

AT&T Global Information Solutions Company

Media Products Division

9995 Washington Church Road

Miamisburg, OH 45342

Voice: 1(800)543-8130 (toll free), or local listing of Media Products sales office

Stock numbers: 878559 (standard density), 856966 (light density)

Kanzaki Specialty Papers

In U.S. A.

Imaging Products

Voice: 1(413)736-3216, 1(800)628-8386 (toll free)

Fax: 1(413)731-8864

Paper grade: F380 (standard density), F180 (light density)

In Japan:

New OJI Paper Co., Ltd.

Voice: (03)3563-4763

Fax: (03)3563-1136

Paper grade: KF-740-2EX (standard density), KF-740-1EX (light density)

In Germany:

Kanzan Spezialpapiere GMBH

Voice: 011 49 2421 5924 20

Paper grade: KF-60 (standard density), KF-50 (light density)

Other Qualified Suppliers

The following companies manufacture thermal receipt paper which has been tested with the 7193 and may be used if desired. Contact your Axiohm supplier for further information.

Appleton Papers, Inc.

Voice: 1(414) 734-9841

Paper grade: T1012

Arjo-Wiggins Thermal Papers, Ltd.

Voice: 44 (0) 522 681212

Fax: 44 (0) 522 690972

Paper grade: S552, S662

Nippon Paper Industry Co., Ltd.

Business Communication Paper Division

Voice: (03)3218-8049

Fax: (03)3216-1397

Paper grade: TP50 KS

Ordering the Power Supply and Cables

Contact your Axiohm supplier to order the power supply and cables. The Axiohm numbers are for reference only. Suppliers may use different numbers.

- Power supply with attached cable (to printer) and wall-mount kit: 7193-F301
- Separate power supply cord (to outlet)
Order for appropriate power connector
 - United States: 7193-F320
 - International: 7193-F321
 - United Kingdom: 7193-F322
 - S.E.V.: 7193-F323
 - Australia: 7193-F324
 - Japan: 7193-F325
- Communication cables
 - RS-232C 25-pin (host) to 9-pin: 1420-C001-0030 (3 meters—9.8 ft.)
 - RS-232C 9-pin to 9-pin: 1416-C057-0030 (3 meters—9.8 ft.)
 - Parallel 25-pin to 25-pin: 1420-C003-0030 (3 meters—9.8 ft.)

Ordering the Printer Wall-Mount Kit

Contact your Axiohm supplier to order the printer wall-mount kit. The Axiohm number below is for reference only. Other suppliers may use a different number.

Printer wall-mount kit: 7193-K260-V001

Ordering Cash Drawers

The following cash drawers may be used with the 7193 printer:

- AT&T Global Information Solutions
(NCR Cash Drawer): Model 7052-K657
- M-S Cash Drawer Corp.: Model EP-125 K series,
EP-127, EP-102
- APG Cash Drawer: Model 237
- Indiana Cash Drawer: Model SLD

Cleaning the Printer

There is no customer maintenance required for the 7193. However, you may occasionally clean the cabinet as needed to remove dust and finger marks. Use any household cleaner designed for plastics, but test it first on a small unseen area. The cabinet materials and finish are durable and are resistant to the following items:

- Cleaning solutions
- Lubricants
- Fuels
- Cooking oils
- Ultraviolet light

If the receipt paper bucket is dirty, wipe it with a clean, damp cloth.

Caution: Do not spray or try to clean the thermal printhead or the inside of the printer with any kind of cleaner as this may damage the thermal printhead and the electronics.

If the printhead appears dirty, wipe it with cotton swabs and rubbing alcohol. If spotty or light printing problems persist after cleaning the thermal printhead, see “Solving Problems” later in this book.

Note: The thermal printhead does not normally require cleaning if the recommended paper grades are used. If non-recommended paper has been used for an extended period of time, cleaning the printhead with cotton swabs and rubbing alcohol will not be of much benefit. See “Recommended Suppliers” earlier in this chapter for the recommended paper grades.

Setting Up the Printer

What Is in the Box?

The following items are packed in the shipping box:

- Printer enclosed in a plastic bag and foam pack
 - Thermal paper roll, wrapped with a foam strip (inside printer)
 - Test printout protecting the printhead (inside printer)
- 7193 Setup and User's Guide
- Rubber feet and hook and loop fasteners (fasteners used to anchor printer)
- Power supply with attached cable (to printer) and related items
 - Power cord (from power supply to outlet)
 - Wall-mount holder for the power supply with screws and wall anchors
 - Tie-wrap for cable

These items may be ordered as options and will be shipped separately:

- Wall-mount kit for the printer
- Communication cable (from host system to printer)
- Cash drawer with cables (see "Ordering Cash Drawers" on page 6)

Removing the Packing Material

1. Remove the printer from the foam pack and open the receipt cover by pulling up on the front left corner.
2. Remove the paper roll and test printout from inside the printer.
3. Remove the foam strip from around the paper roll.
4. Save all packing materials for future storing, moving, or shipping the printer.

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Repacking the Printer

1. Protect the printhead by placing a piece of receipt paper between the receipt cover and the printhead.
2. Place the printer in the plastic bag and foam pack.
3. Place the packed printer in the box and secure the box with packing tape.
4. If you are sending the printer in for repair, call Axiohm IPB for a Return Authorization Number at (607)274-2402.

Be prepared to answer questions concerning shipping and billing.

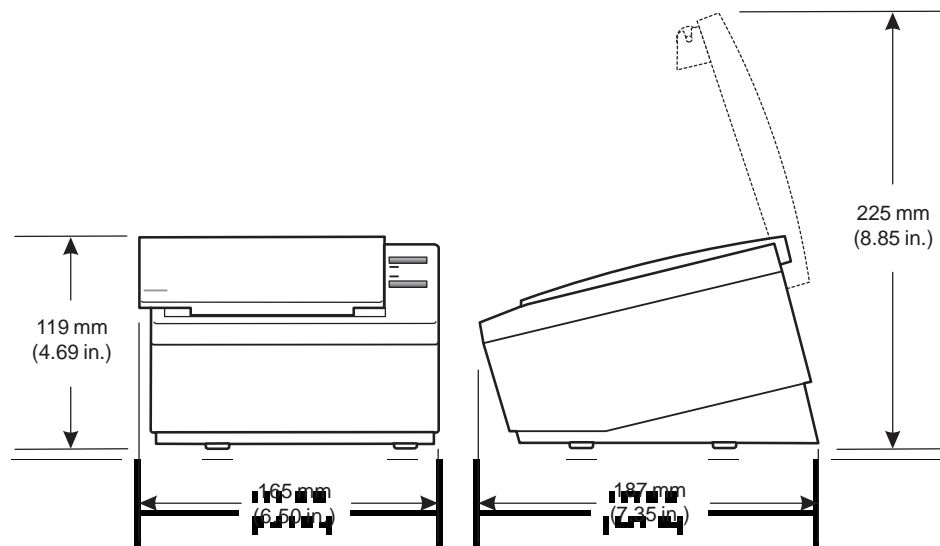
5. After you have received a Return Authorization Number, send the printer to the following address:

Axiohm IPB
950 Danby Road
Ithaca, NY 14850
U.S.A.

Choosing a Location

The 7193 is compact and requires little counter space. It may even be mounted on a wall if space is at a premium. See “Mounting the Printer on a Wall” later in this chapter. The power supply may also be mounted on a wall or under a table. See “Mounting the Power Supply on a Wall” later in this chapter. Be sure to plan for the length of the communication and power cables when choosing a location.

Make sure there is enough room to open the receipt cover and change the paper. The following illustration shows the actual dimensions of the printer, but leave several inches around the printer for connecting and accessing the cables.



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Setting Switches

A group of switches, called DIP switches, located on the bottom of the 7193 is used for the following purposes:

- To set variables for several printer functions (see the sections for the various printer functions in “Level 1 Diagnostics” in the “Diagnostics” chapter)
- To perform diagnostic tests (see the sections for the various diagnostic tests in “Level 1 Diagnostics” in the “Diagnostics” chapter)
- To set communication parameters for the RS-232C communication interface (see “RS-232C Switch Settings” in the “Communication” chapter)
- To set the data buffer for the Parallel communication interface (see “Parallel Switch Settings” in the “Communication” chapter)

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings do so carefully to avoid changing other functions.

Before changing any of the switches, first run the print test to print out the current switch settings on the receipt. See “Testing the Printer” later in this chapter for instructions on running the print test and for a sample printout.

Note: Switch #1 is used to toggle between regular communication with the host system and Level 1 Diagnostics (used for the printer functions and level 1 diagnostic tests) as described below:

- Switch #1 set to OFF: printer is ready to communicate with the host system and receive data (online mode)
- Switch #1 set to ON: printer is in Level 1 Diagnostics (setup mode)

If you want the printer to communicate with the host system, be sure switch 1 is OFF. Use a paper clip or other pointed object to set the switch.

For additional information on the setup mode (Level 1 Diagnostics), see the “Diagnostics” chapter.

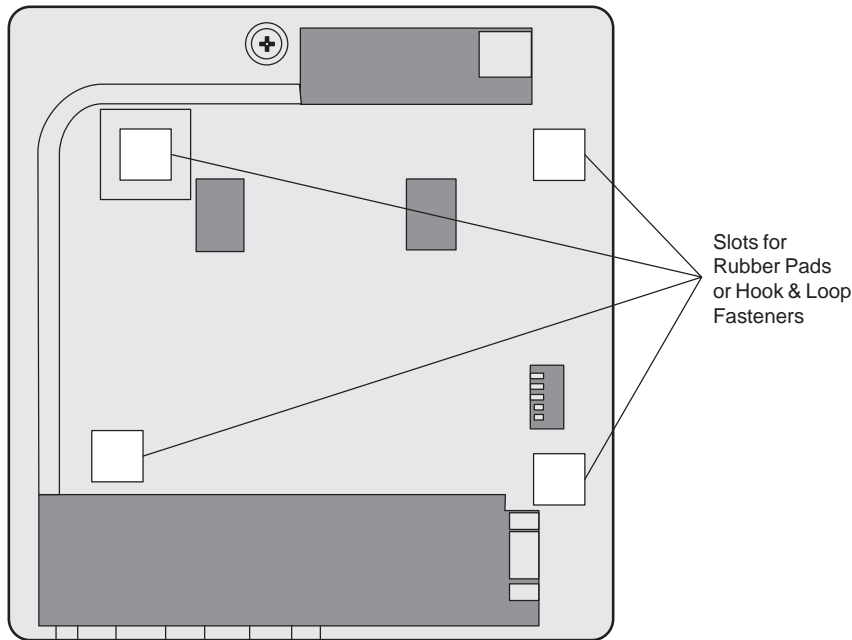
Note: Some 7193 models may appear slightly different than what is shown in the illustration. The procedures are the same for all models unless otherwise noted.

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Attaching the Feet

Use the hook and loop fasteners to anchor the printer to a flat surface; be sure the surface is clean and dry. Use the rubber pads if you are mounting the printer on the wall. See “Mounting the Printer on a Wall” later in this chapter.

Note: Some 7193 models may appear slightly different than what is shown in the illustration. The procedures are the same for all models unless otherwise noted.



Bottom of Printer

1. Remove the paper from the adhesive on the back of the pads or loop fasteners and affix them in the slots on the bottom of the printer.
2. Attach the hook fasteners to the loop fasteners (if used).

This will save you having to apply the hook fasteners separately and trying to match them to the loop fasteners on the printer.

3. Remove the paper from the adhesive on the back of the hook fasteners and place the printer firmly on the selected surface.

Connecting Cash Drawer Cables

The cash drawer option allows up to two cash drawers to be connected to the printer in a system with a PC that has no connectors for the cash drawer cables. The cash drawer cables usually come with the cash drawer.

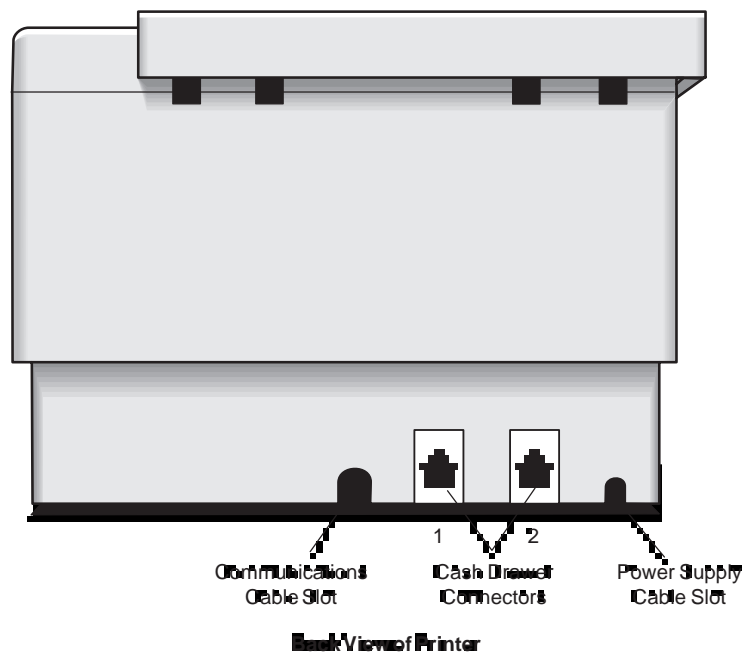
The cash drawers are operated by software command from the host system through the printer. For additional information on the printer commands used by the host system to activate the cash drawers, see "Commands" later in this book.

1. Plug the cash drawer cables into the connectors on the printer.

The connectors are standard phone connectors.

2. If only one cash drawer is used, plug the cable into the connector labeled 1.

Note: Some 7193 models may appear slightly different than what is shown in the illustration. The procedures are the same for all models unless otherwise noted.



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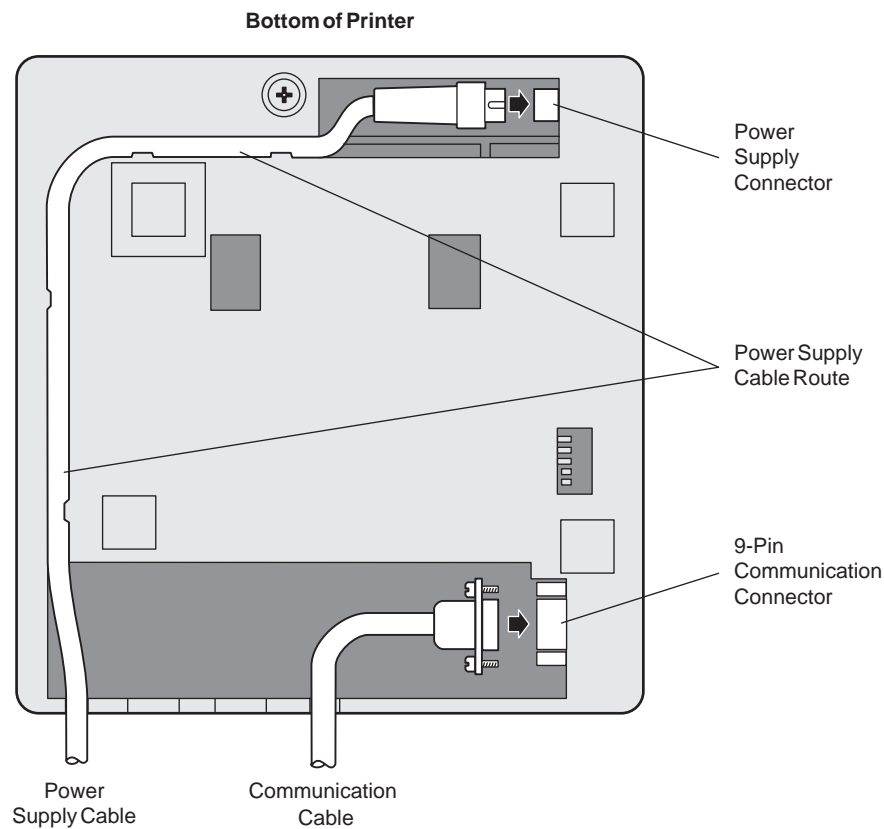
Connecting Communication and Power Cables

The printer receives power from a power supply and uses one cable for communication and a separate cable for power.

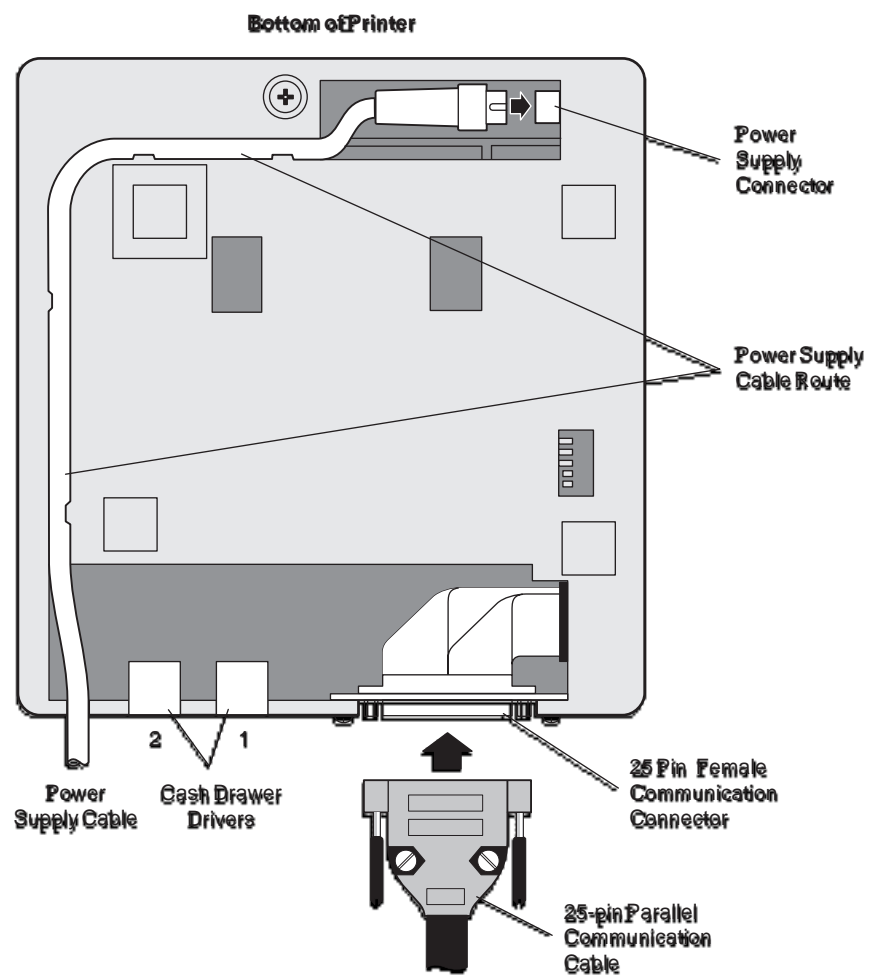
Caution: Be sure that all power is disconnected before connecting the cables.

1. Turn off the host system or unplug the power supply if it is plugged in.
2. Plug the power supply cable into the printer first, then plug the power cord into the power supply, then into an outlet.
3. Connect the communication cable to the printer, then to the host system.

RS-232C Models

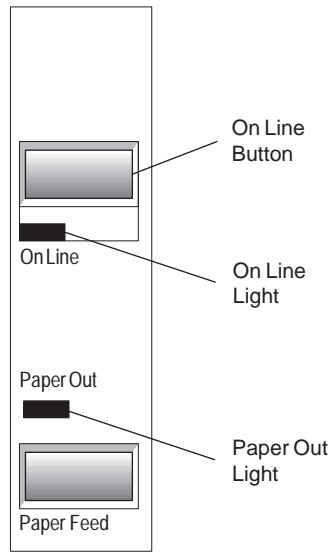


Parallel Models



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Turning On the Printer



Operator Panel (Remote Printer)

Note: The printer receives power when the power supply is on even if the printer is off-line. To remove power from the printer, press the On Line button to take the printer off-line (On Line light is off), then unplug the power supply power cord from the outlet.

1. Press the On Line button on the operator panel to put the printer on-line.

The printer goes through a self-test routine to ensure everything is working, then “beeps.” The On Line light (green) comes on indicating the printer is on-line. If the On Line light does not come on, or either the On Line light or Paper Out light flashes, see “Solving Problems” later in this book.

2. Press the On Line button again to take the printer off-line.

When the printer has completed its “startup” cycle it is ready to receive data. If the Paper Out light flashes, see “Solving Problems” later in this book.

Loading and Changing Paper

The 7193 features extremely simple paper loading. See the next two pages for detailed illustrations.

If you are loading paper for the first time and have already taken the roll out, go to "Putting In the Paper Roll" later in this chapter. If you have not taken the roll out, continue with the following instructions. Although the illustrations show a used roll being removed, the instructions still apply to loading paper for the first time.

When to Change the Paper

You will need to change the paper when you see a colored stripe on the receipt paper or when the Paper Out light (red) on the operator panel turns on.

- **Paper Low Stripe**
When the paper low stripe appears on receipts being printed, change the paper as soon as possible to avoid running out of paper part way through a transaction.
- **Paper Out light**
When the Paper Out light (red) on the operator panel comes on, the paper is completely out. Do not run a transaction without paper: the data may be lost.

Caution: Do not operate the printer or host system if the printer runs out of paper. The printer will not operate without paper, but it may continue to accept data from the host system. Because the printer cannot print any transactions, the data may be lost.

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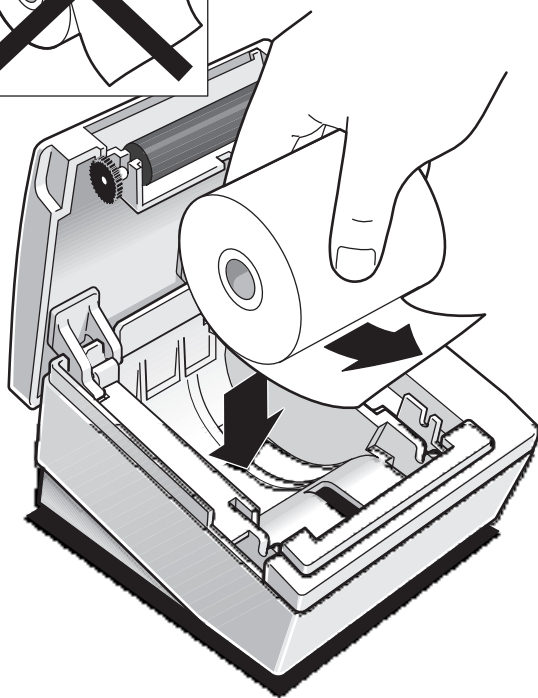
Removing the Paper Roll

Putting In the Paper Roll

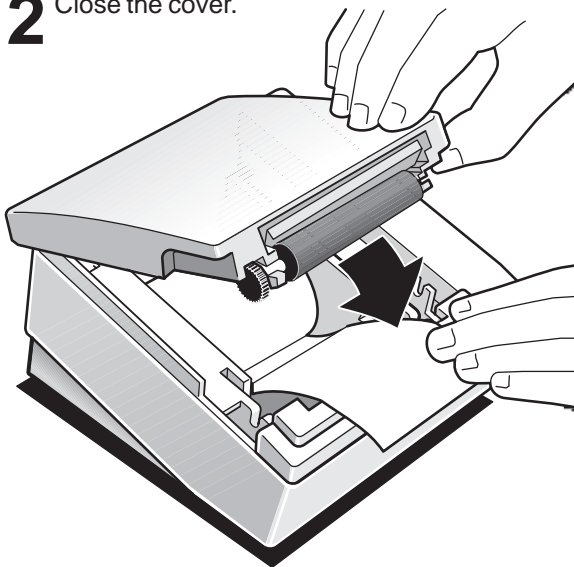
Before putting in a new roll, tear off the end of the roll so that the edge is loose.

- 1 Place the roll into the bin with a few inches of paper extending over the cabinet front (or top, if printer is vertically mounted).

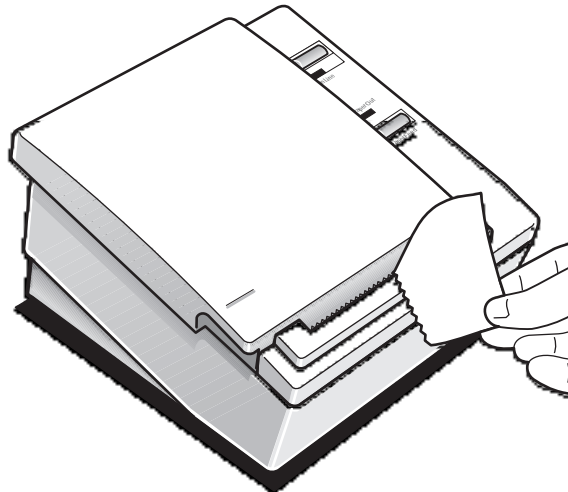
Warning: Be sure the paper unrolls from the bottom of the roll. Otherwise the paper will jam.



- 2 Close the cover.

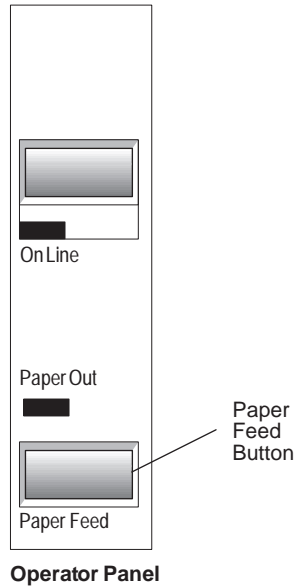


- 3 Remove the excess paper by tearing it against the tear off blade.



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Advancing Paper



Note: Some 7193 models may appear slightly different than what is shown in the illustration. The procedures are the same for all models unless otherwise noted.

1. To advance the receipt paper, press the Paper Feed button on the operator panel. The cover must be closed.
2. Tear off the excess paper against the tear off blade.

The paper is not cut if it has been manually advanced on printers with the knife option

Testing the Printer

Run this test to check the printer. The test prints the settings for several functions, prints all variations of the character sets, and partially cuts the paper between each variation. See the "Diagnostics" chapter for a description of the functions.

A sample printout (RS-232C) is shown later in this section. The printouts for other models are similar. The test ends with a partial cut, then begins again. Several feet of paper can be used to print one pass of the test.

Additional diagnostic tests may be performed by a trained service representative. For more information, see "Diagnostics" later in this book.

1. Press the On Line Button on the operator panel to take the printer off-line.

The On Line light turns off indicating the printer is off-line.

2. Press and hold the Paper Feed button while pressing the On Line Button.
3. Let go of the Paper Feed button once the printing begins.

The printer begins printing the data and character sets. This can be given to a service representative if it appears there is a problem.

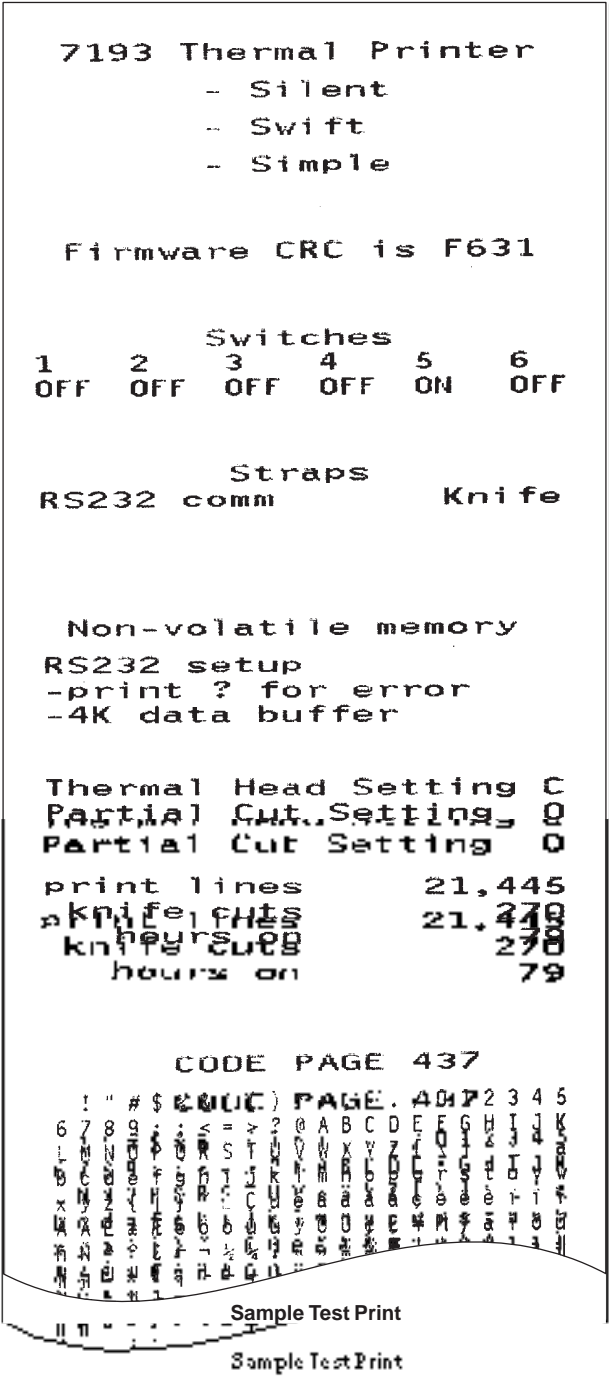
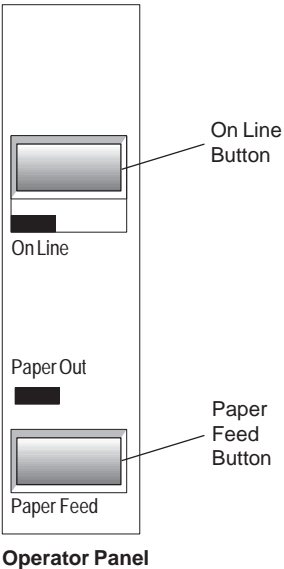
4. To stop the test, press the On Line button.

The On Line light turns off indicating the printer is off-line.

5. To return to the on-line mode, press the On Line button again.

The printer is ready to receive and print data from the host system.

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Mounting the Printer on a Wall

Use the wall-mount kit to mount the printer vertically on a wall. See “Ordering Paper and Supplies” in the chapter, “About the 7193 Printer,” for information on ordering the printer wall-mount kit.

The kit contains a mounting bracket, screws with plastic anchors, and a label. Once the printer is mounted on the wall, the operator panel will be upside down. The label corrects this so the panel can be easily read.

Select a wall that is accessible, but away from main traffic to keep the printer from being bumped or knocked off. Be sure there are no hidden wires or other obstructions in the wall where you mount the printer. Keep in mind the length of the cables when mounting the printer on the wall.

Be sure that the rubber pads have been attached to the bottom of the printer. See “Attaching the Feet” earlier in this chapter. The rubber pads help the printer to fit snugly against the mounting bracket.

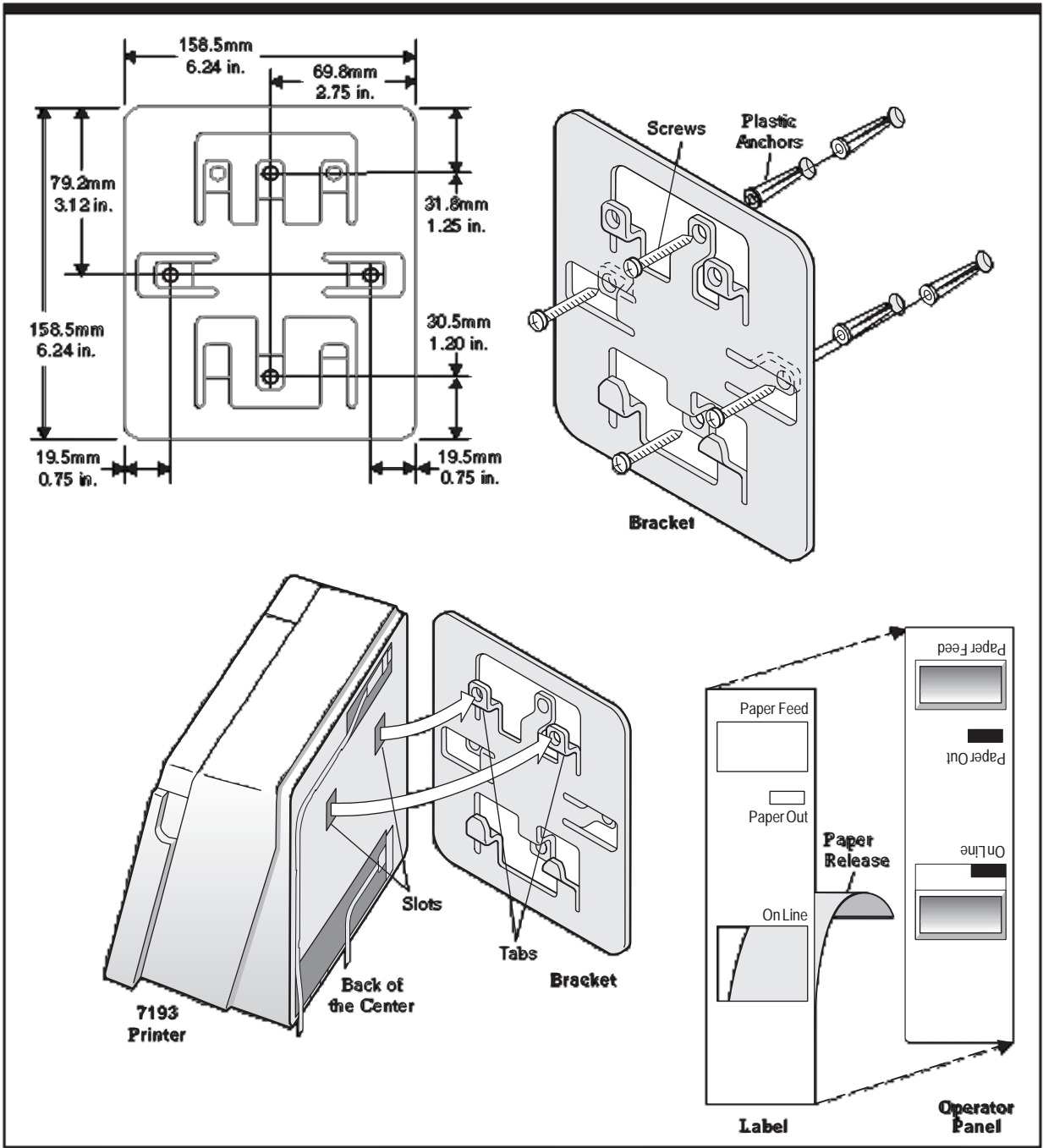
You will need a 1/4 inch drill bit and either a Phillips or standard screwdriver (screws are combination Phillips and pan-slotted).

1. Using the bracket as a template, mark and drill a hole for each plastic anchor 1.25 inches deep.
2. Insert the anchors into the holes so they are flush with the wall surface and screw the bracket against the wall, tightening the screws so that the plastic anchors expand and hold firmly in the wall.

Do not overtighten the screws.

Note: Because the power cable and communication cable connect to the bottom of the printer, they must be connected before the printer can be attached to the bracket. If you haven't connected the cables to the printer, do so now. See “Connecting Communication and Power Cables” earlier in this chapter.

3. Line up the tabs of the bracket with the slots on the back of the printer and attach the printer to the bracket.
4. Place the label on the cover.



Mounting the Power Supply on a Wall

The power supply comes with a wall-mount kit to mount the power supply on the wall or under a table. See "Ordering Paper and Supplies" in the chapter, "About the 7193 Printer," for information on ordering the power supply and wall-mount kit.

The kit contains a holder and screws with plastic anchors. Be sure there are no hidden wires or other obstructions in the wall where you mount the power supply.

You will need a 1/4 inch drill bit and either a Phillips or standard screwdriver (screws are combination Phillips and pan-slotted).

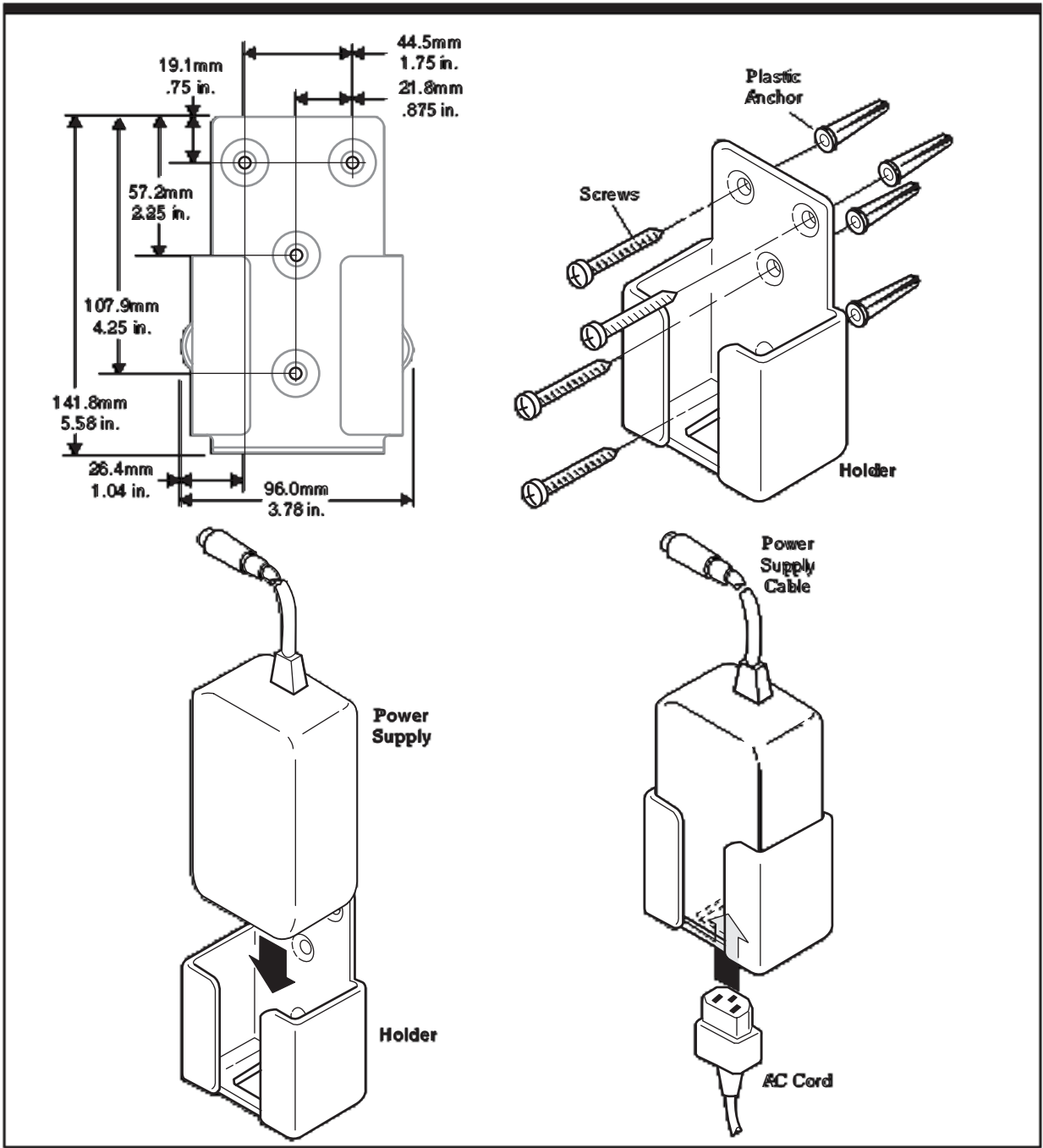
1. Using the bracket as a template, mark and drill a hole for each plastic anchor 1.25 inches deep.
2. Insert the anchors into the holes so they are flush with the wall surface and screw the holder against the wall, tightening the screws so that the plastic anchors expand and hold firmly in the wall.

Do not overtighten the screws.

Note: You must unplug the power cord in order to place the power supply in the holder. First, take the printer off-line by pressing the On Line button on the operator panel (the On Line light goes off indicating the printer is off-line), unplug the power cord from the outlet, then unplug the power cord from the power supply.

3. Place the power supply in the holder.
4. Plug the power cord into the power supply.
5. Plug the power cord into an outlet.

Note: You can use the tie-wrap to wrap the power supply cable to keep it out of the way.



Solving Problems

The 7193 printer is a simple, generally trouble-free printer, but from time to time minor problems may occur. For example, the power supply may be interrupted or the printhead may overheat for some reason.

Lights on the operator panel will signal that something may not be operating properly: one green light and one red light may either flash or glow continuously as described in the following table and on the following pages.

Operator Panel Lights

The following chart describes the operator panel lights. See "Correcting Problems" on the next page for more information about each of these conditions.

Light	Condition	Meaning	Action Required
Green ¹	On	Printer is on-line	None
Green ¹	Off	Printer is unplugged or off-line	Connect printer to host or power supply and turn on
Green ¹	Flashing	Printer is in diagnostics mode	Set DIP switch #1 to Off (see "Setting Switches," p. 12)
Red ²	Off	No fault conditions	None
Red ²	On	Paper out, cover open, or knife won't home	Reload paper, close cover, or clear paper jam
Red ²	Flashing	Printhead too hot or voltages out of range	Wait for printhead to cool down

¹Light labeled On Line.

²Light labeled Paper Out.

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Correcting Problems

Operator-Correctable Conditions

The following conditions can be corrected generally without calling for service. However, if problems persist, contact your service representative. See “Contacting a Service Representative” on the next page.

Paper Out

Replace the paper roll. Do not operate the printer or host system if the printer runs out of paper. The printer will not operate without paper, but it may continue to accept data from the host system. Because the printer cannot print any transactions, the data may be lost.

See “Loading and Changing Paper” on page 19 for more information. See “Contacting a Service Representative” on the next page.

Knife Failure or Paper Jam

A problem or jam has occurred with the knife. Open the receipt cover and visually inspect the knife inside the cover. Clear any jammed paper you can see. Tear off any excess paper against the tear off blade.

Contact your service representative if this does not resolve the problem. See “Contacting a Service Representative” on the next page.

Receipt Cover Open

Check that the receipt cover is completely closed. You can tell if it is not closed properly if it swings open easily. When closed properly, it requires some exertion to open because of the snug fit.

Service-Related Problems

The following problems may require you to contact your service representative to correct the problem.

Print Head Over/Under Temperature

There is a problem with the temperature of the printhead. It must remain within a certain temperature range to operate properly. This problem will most often occur when the printhead overheats rather than running under temperature.

The printhead may overheat when printing in a room where the temperature is above the recommended operating temperature or when printing graphics continuously. In either case, the printer will shut off. See "Appendix A: Specifications" for information on the recommended temperature range for operating the printer and on the restrictions of continuous graphics printing.

If the operating temperature is too hot, adjust the room temperature or move the printer to a cooler location. If the printhead is overheating because of printing graphics continuously, reduce the demand on the printer.

If the printer continues to overheat, contact your service representative. See "Contacting a Service Representative" on this page.

No Power to Printer or Power Voltages Incorrect

The power being supplied to the printer is not in the normal range. Check that all connections are correct. Make sure the power supply is plugged in and that the printer is on-line.

Contact your service representative if this does not resolve the problem. See "Contacting a Service Representative" on this page.

Print is Light or Spotty

The printhead may be dirty. Clean it with cotton swabs and rubbing alcohol.

Caution: Do not spray the thermal printhead with household cleaner as this may damage it and the electronics.

Note: The thermal printhead does not normally require cleaning if the recommended paper grades are used. If non-recommended paper has been used for an extended period of time, cleaning the printhead with cotton swabs and rubbing alcohol will not be of much benefit. See "Recommended Suppliers" on page 4 for the recommended paper grades.

Contact your service representative if the problem is still not resolved. See "Contacting a Service Representative" on this page.

Contacting a Service Representative

For serious problems, such as the ones mentioned in the previous section, contact your Axiohm authorized service organization to arrange for a service call.

Diagnostics

The following diagnostic tests are available for the 7193:

- Level 0 Diagnostics
Performed during the startup cycle
- Level 1 Diagnostics (setup mode)
Available in a dedicated environment and accessed through the DIP Switches
- Level 2 Diagnostics
Performed during normal printer operation

Level 0 Diagnostics

The printer performs level 0 diagnostics during the startup cycle when power is supplied or the printer is brought on-line. Level 0 diagnostics comprise the following actions:

- Motors are turned off
- Microprocessor timing is checked, CRC check of the firmware ROM is performed, external RAM is read (failure causes level 0 diagnostics to stop; the printer beeps once when the test is successfully completed)
- Checks if paper is present
- Homes knife (failure causes a fault condition)
- Checks if receipt cover is closed (failure does not interrupt the startup cycle)

When the last step is complete, the Paper Feed button is enabled and the printer is ready for normal operation. Information about the test is available to the communication interface through the commands.

If the printer has not been turned on before, or a new EEROM has been installed, the default values for the printer settings (set in Level 1 Diagnostics) will be loaded into the EEROM. The printer beeps twice when this occurs. See the tables in "Level 1 Diagnostics" for the printer settings. If the printer beeps twice at any other time, it indicates that the EEROM has failed.

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Level 1 Diagnostics

Level 1 Diagnostics (setup mode) allow you to change the settings for various printer functions (described on the following pages) and to run certain tests using the DIP switches.

Keep the following information in mind when changing the settings:

- Turn the power off (not required, but recommended): press the On Line button (although the printer still receives power, this is sufficient for changing the DIP switches)
- The settings can only be changed when the printer is in level 1 diagnostics (setup mode): switch 1 must be set to On.
- Turn the power back on. The printer beeps, and the On Line light (green) blinks.
- Once the settings have been changed and stored in the EEROM, the DIP switches must be set back to the on-line settings for the printer to operate.
- The stored settings for the functions are printed with a dump of all resident characters during a print test. See "Testing the Printer" on page 23.
- The default settings are set at the factory and are stored in the history EEROM.

Caution: If you change the switch settings, be sure they are the correct settings for that particular function or test to avoid accidentally changing the settings for another function or test. If the settings are accidentally changed, use the switch settings shown in the tables throughout this section to change those settings back. If you need assistance, contact your service representative.

The functions and tests are described in the following order in this section:

- Setting Data Error (RS-232C only) and Data Buffer options
- Setting printhead resistance
- Setting default lines per inch
- Setting partial cut distance
- Ignoring/using the carriage return
- Running the data scope mode

Setting Data Error and Data Buffer options

This function allows you to select the handling of data reception errors (RS-232C only) and to select the size of the data buffer.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions. Run the print test to see what the current selections are for this function. See “Testing The Printer” On Page 23.

- 1. Turn the power off.
- 2. Turn the printer over and note what the current DIP switch settings are.
- 3. Set the switches to the settings in the table you want for data reception errors and the data buffer.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Option
On	Off	On	Off	Off	Off	“?” for Data Errors ^{1, 2}
On	Off	On	Off	Off	On	Ignore Data Errors ²
On	Off	On	Off	On	Off	4K Byte Data Buffer ^{1,}
On	Off	On	Off	On	On	³ One Line Data Buffer

¹Default
²RS-232C only
Choose one of the Data Errors options and one of the Data Buffer options.

- 4. Turn the power back on to enter the settings into the EEROM.
The On Line light (green) blinks.
- 5. Turn the power off.
- 6. Set the DIP switches to the former settings.
DIP switch 1 must be Off to return the printer to the on-line mode.

Setting Printhead Resistance

This function allows you to change the setting for the printhead resistance. The setting (A-H) must match the letter stamped on the heatsink in back of the printhead. This is visible only by removing the L cover (operator panel) of the printer. Only a trained service representative may remove this cover.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions. Run the print test to see what the current selection is for this function. See "Testing The Printer" On Page 23.

1. Turn the power off.
2. Turn the printer over and note what the current DIP switch settings are.
3. Set the switches to the settings in the table that match the letter stamped on the heatsink in back of the printhead.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Printhead Setting
On	On	On	Off	Off	Off	A
On	On	On	Off	Off	On	B
On	On	On	Off	On	Off	C
On	On	On	Off	On	On	D
On	On	On	On	Off	Off	E
On	On	On	On	Off	On	F
On	On	On	On	On	Off	G
On	On	On	On	On	On	H

4. Turn the power back on to enter the settings into the EEROM.

The On Line light (green) blinks.

5. Turn the power off.
6. Set the DIP switches to the former settings.

DIP switch 1 must be Off to return the printer to the on-line mode.

Setting Default Lines per Inch

This function allows you to set the default for lines per inch to either 7.6 or 6.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions. Run the print test to see what the current selection is for this function. See "Testing The Printer" On Page 23.

1. Turn the power off.
2. Turn the printer over and note what the current DIP switch settings are.
3. Set the switches to the settings in the table that match the lines per inch setting you want as the default setting (when the printer is powered up).

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Default Lines per Inch
On	Off	On	On	On	Off	7.6 (Factory Setting)
On	Off	On	On	On	On	6.0

4. Turn the power back on to enter the settings into the EEROM.

The On Line light (green) blinks.

5. Turn the power off.
6. Set the DIP switches to the former settings.

DIP switch 1 must be Off to return the printer to the on-line mode.

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Setting Partial Cut Distance

This function allows you to change the length of the partial knife cut: the higher the number, the longer the cut.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions. Run the print test to see what the current selection is for this function. See "Testing The Printer" On Page 23.

1. Turn the power off.
2. Turn the printer over and note what the current DIP switch settings are.
3. Set the switches to the settings in the table that match the cut distance value you want (the higher the number, the longer the cut).

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Cut Distance Value
On	On	Off	Off	Off	Off	0
On	On	Off	Off	Off	On	1
On	On	Off	Off	On	Off	2
On	On	Off	Off	On	On	3
On	On	Off	On	Off	Off	4
On	On	Off	On	Off	On	5 (Default)
On	On	Off	On	On	Off	6
On	On	Off	On	On	On	7

4. Turn the power back on to enter the settings into the EEROM.

The On Line light (green) blinks.

5. Turn the power off.
6. Set the DIP switches to the former settings.

DIP switch 1 must be Off to return the printer to the on-line mode.

Ignoring/Using the Carriage Return

This function allows the printer to ignore or use the Carriage Return (Hex 0D) command depending on the application. Some applications expect the command to be ignored while others use the command as a print command.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions.

- 1. Turn the power off.
- 2. Turn the printer over and note what the current DIP switch settings are.
- 3. Set the switches to the settings in the table that match you want for ignoring or using the Carriage Return command.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Option
On	Off	On	On	Off	On	Ignore CR (Hex 0D)
On	Off	On	On	Off	Off	Use CR (Hex 0D) as Print Command (Default)*

*Emulates the NCR 7150™ printer.

- 4. Turn the power back on to enter the settings into the EEROM.
The On Line light (green) blinks.
- 5. Turn the power off.
- 6. Set the DIP switches to the former settings.
DIP switch 1 must be Off to return the printer to the on-line mode.

Running the Data Scope Mode

This test prints a Hex dump of all data sent to the printer: “1” prints as Hex 31, “A” as Hex 41 and so on. This helps troubleshoot communication problems, and runs during a normal host application (after being enabled in level 1 diagnostics).

Enter the Data Scope Mode

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions. Run the print test to see if the Data Scope Mode is on or off. See “Testing The Printer” On Page 23.

- 1. Turn the power off.
- 2. Turn the printer over and note what the current DIP switch settings are.
- 3. Set the switches to the settings in the table.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6
On	Off	Off	On	Off	On

- 4. Turn the power back on to enter the settings into the EEROM and enable the Data Scope Mode.

The On Line light (green) blinks.

- 5. Turn the power off.
- 6. Set the DIP switches to the former settings.

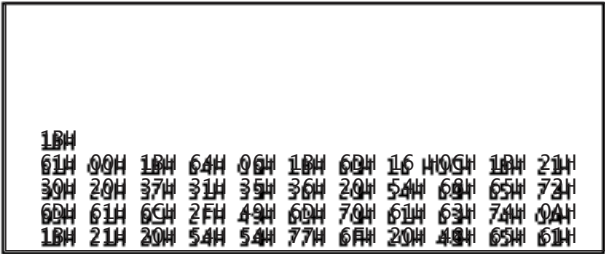
DIP switch 1 must be Off to return the printer to the on-line mode.

- 7. Turn the power back on.

The printer is on-line and can communicate with the host system.

- 8. Run a transaction from the host system.

All commands and data sent from the host system will be printed as Hex characters as shown in the following illustration.



Exit the Data Scope Mode

- 1. Turn the power off.
- 2. Set the switches to the settings in the table.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6
On	Off	Off	On	Off	Off

- 3. Turn the power back on to enter the settings into the EEROM and disable the Data Scope Mode.

The On Line light (green) blinks.

- 4. Turn the power off.
- 5. Set the DIP switches to the former settings.

DIP switch 1 must be Off to return the printer to the on-line mode.

- 6. Turn the power back on.

The printer is on-line and can communicate normally with the host system.

Testing Receipt Printing

This function allows you to select various print tests. You can also test the printing by following the procedures in “Testing the Printer” on page 23 without having to change the DIP switches. A sample test printout is on page 24.

Caution: The DIP switches are set at the factory to predetermined settings and should generally not be changed. If you must change the settings, do so carefully to avoid changing other functions.

- 1. Turn the power off.
- 2. Turn the printer over and note what the current DIP switch settings are.
- 3. Set the switches to the settings in the table that match the test you want.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Option
On	Off	Off	Off	Off	Off	Sample Receipt ¹
On	Off	Off	Off	Off	On	Continuous Sample Receipt
On	Off	Off	Off	On	Off	Character Sets ¹
On	Off	Off	Off	On	On	Continuous Character Sets ²

¹The Paper Feed button is used to begin the test.

²Default

- 4. Turn the power back on to enter the settings into the EEROM.

The On Line light (green) blinks. If either the continuous sample receipt or the continuous character sets is selected, the printer will automatically begin printing.
- 5. Press the Paper Feed button to print the sample receipt or the character sets (whichever was selected).
- 6. Press the Paper Feed button or turn the printer off to stop the test.
- 7. Turn the power off.
- 8. Set the DIP switches to the former settings.

DIP switch 1 must be Off to return the printer to the on-line mode.

Level 2 Diagnostics

Level 2 diagnostics run during normal printer operation. When the following conditions occur, the printer automatically turns off the appropriate motors and disables printing to prevent damage:

- Paper out, cover off, or knife unable to home
- Printhead too hot or voltages out of range

The lights on the operator panel will signal when these conditions occur as well as indicate what state or mode the printer is in. See “Solving Problems” earlier in this book for a table describing the operator panel lights and for general troubleshooting information.

Level 3 Diagnostics

Level 3 diagnostics keep track of the following tallies and prints them on the receipt during the print test. See the sample test printout on page 24.

- Number of lines printed
- Number of knife cuts
- Number of hours the printer has been on

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Communication

Communication Overview

In order for a receipt to be printed, a program must be in place that translates the data from the host system into a language that the printer can understand. This program must tell the printer exactly how to print each character. This chapter describes how to create such a program or modify an existing one.

Interfaces

In order for the printer to communicate with the host, a communication link must be set up. The 7193 supports the following three communication interfaces:

- RS-232C Interface
- Parallel Interface

Each of these has a protocol associated with it that the host must understand and adhere to. Only when the interface parameters are matched and the proper protocol is used will the host and the printer be able to communicate. See the respective sections in this chapter for a description of the protocol associated with each type of interface.

Sending Commands

Once the communication link is established, commands can be sent to the printer. This section describes how to send commands to the printer using DOS and BASIC. This section does not take into account the necessary protocol, but is meant as a general introduction to how the printer functions.

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Using DOS to Send Commands

One way of getting commands to the printer is to send them directly from DOS. For example, the command

```
COPY CON: COM1:
```

sets the computer up such that the Hex code corresponding to any key that was pressed would be sent to the communication port COM1 when the COPY mode is exited. If the printer is connected to COM1, then the data will go to the printer.

Exit the COPY mode by typing

```
CTRL Z
```

and then pressing the ENTER key. Once the computer knows to direct data from any print command to the proper port, commands can be sent from any software program.

Using BASIC to Send Commands

In BASIC, printer commands are sent as a string of characters preceded by the LPRINT command. For example,

```
LPRINT CHR$( &H0A )
```

sends the hexadecimal number 0A to the printer, which causes the printer to print the contents of its print buffer. Previously sent commands tell the printer exactly how this data should appear on the paper. For example,

```
LPRINT CHR$( &H12 ) ; "ABC" ; CHR$( &H0A )
```

sends the Hex numbers 12 41 42 43 0A to the printer. This causes the printer to set itself to double wide mode (12), load the print buffer with "ABC" (41 42 43), and finally, print (0A). Again, the communication link that the BASIC program outputs to must be matched to that of the printer.

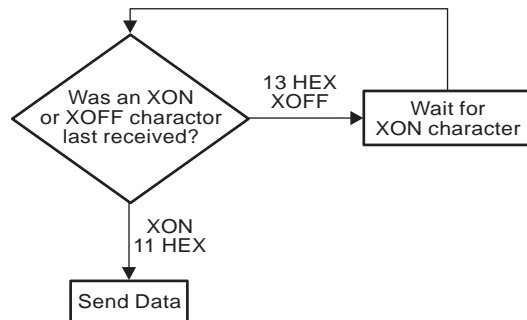
RS-232C Interface

The RS-232C interface uses either XON/XOFF or DTR/DSR protocol. For XON/XOFF, a particular character is sent back and forth between the host and the printer to regulate the communication. For DTR/DSR, changes in the DTR/DSR signal coordinate the information flow.

The RS-232C version of the 7193 offers the standard options which are selected with the DIP switches. The switch settings are shown on page 50.

XON/XOFF Protocol

The XON/XOFF characters coordinate the information transfer between the printer and the host system. The printer sends an XON character when it is ready to receive data and it sends an XOFF character when it cannot accept any more data. The software on the host system must monitor the communication link as shown in the following flowchart in order to send data at the appropriate times.

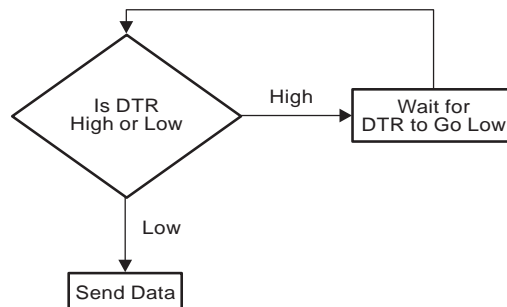


XON character = Hex 11.

XOFF character = Hex 13.

DTR/DSR Protocol

The DTR signal is used to control data transmission to the printer. It is driven low when the printer is ready to receive data and driven high when it cannot accept any more data. Data is transmitted from the printer after it confirms that the DSR signal is low.



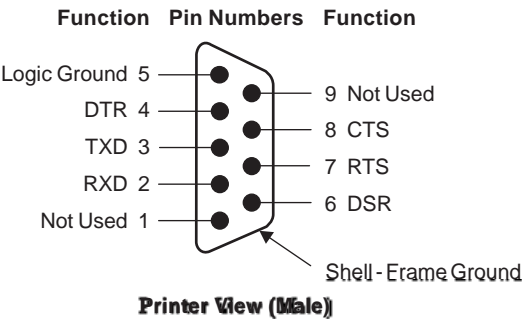
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RS-232C Technical Specifications

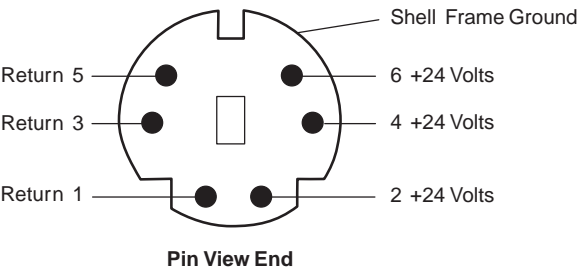
This section describes the pin settings for the connectors and the RS-232C interface parameters.

Connectors

The following illustration shows the RS-232C communication connector and pin assignments. The connector is a 9-pin male D-shell connector and is located in the hollow cavity under the printer.

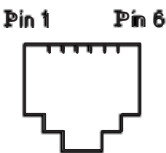


With RS-232C, the 7193 is always remotely powered. The following illustration shows the power cable connector and pin assignments. The power cable connector is 6-pin mini DIN plug and is located in the small cavity under the printer at the front.



Cash Drawer Connectors

The following illustration shows the pinouts for the cash drawer connector.



The following table shows the pinouts for cash drawers 1 and 2. The cash drawer connectors are located at the rear of the printer.

RS-232C Printers		
Pin Number	Cash Drawer 1 Connector	Cash Drawer 2 Connector
1	Frame Ground	Frame Ground
2	Drawer 1 Solenoid	Drawer 2 Solenoid
3	Drawer 1 Status Switch	Drawer 2 Status Switch
4	+24 Volts (to Solenoid +)	+24 Volts (to Solenoid +)
5	Drawer 2 Solenoid	Drawer 1 Solenoid
6	Ground (Status Switch Return)	Ground (Status Switch Return)

Switch Settings

The DIP switches are located on the printed circuit board and are accessed from the bottom of the printer. You do not need to remove any covers to change the DIP switches.

The DIP switches are used to set the RS-232C parameters and the Data Error and Data Buffer options as shown. These parameters must match those of the host system in order for the host system and the printer to communicate. See "Level 1 Diagnostics" in the "Diagnostics" chapter for more information.

Caution: The switches can also be used for setting other functions and tests. Be careful when setting the switches for the RS-232C settings that you do not accidentally change the settings for the other functions and tests.

Use a paper clip or other pointed object to set the switches.

1. Press the On Line button to take the printer off-line.
2. Turn the printer over and set the switches to the desired settings shown in the table on the next page.

Switch 1 must be set to Off when setting switches for the RS-232C settings. This puts the printer in the on-line mode to communicate with the host system.

Caution: Do not set DIP switch 1 to On. Setting switch 1 to On puts the printer in level 1 diagnostics (setup) mode where other functions and tests can be changed.

DIP Switch Settings for RS-232C Parameters

Switch	Settings	Description
1	OFF ON	RS-232C Communication: On-line Mode (Default) Level 1 Diagnostics: Setup Mode
2	OFF ON	DTR/DSR Protocol (Default) XON/XOFF Protocol
3	OFF ON	Parity Disabled (Default) Parity Enabled
4	OFF ON	Odd Parity Even Parity
5, 6	5 OFF ON OFF ON	6 OFF OFF ON ON 19,200 Baud 9600 Baud (Default) 4800 Baud 1200 Baud

Note: The following options are set with the printer in the setup mode. See “Level 1 Diagnostics” in the “Diagnostics” chapter for more information.

DIP Switch Settings for Data Error and Data Buffer Options (Choose one from each option)

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Option
On	Off	On	Off	Off	Off	“?” for Data Errors*
On	Off	On	Off	Off	On	Ignore Data Errors
On	Off	On	Off	On	Off	4K Byte Data Buffer*
On	Off	On	Off	On	On	One Line Data Buffer

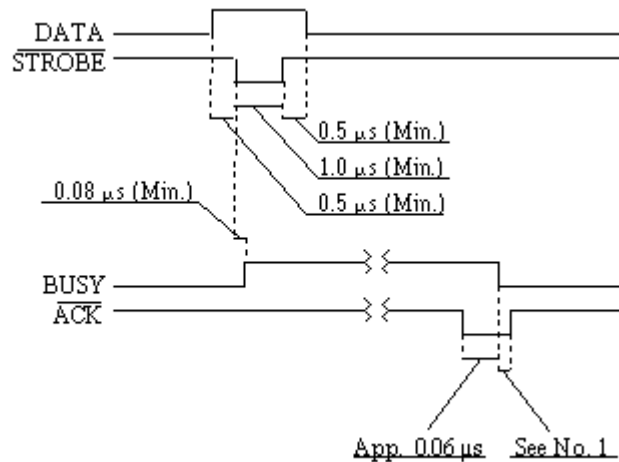
*Default

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Parallel Interface

Parallel Protocol

The 7193 uses a standard PC-compatible parallel interface. The following illustration shows the timing diagram for the interface protocol.

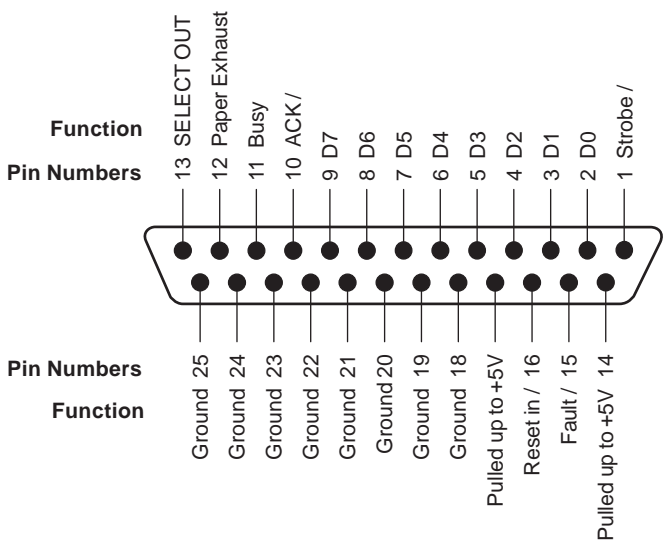


1. ACK/ will not go high until STROBE/ goes high.
2. When the printer is not ready to receive more data, ACK/ will be sent, but BUSY will remain high.
3. When the power is turned on or the printer is reset, an ACK/ will be sent during initialization.
4. Typical time from STROBE/ to ACK/ is approximately 44 μ seconds.

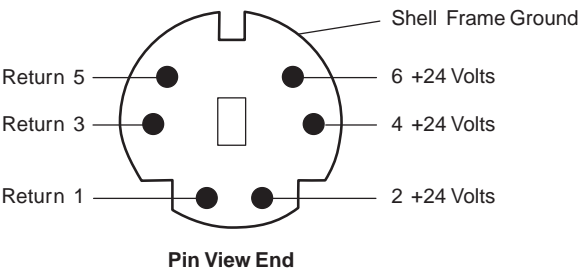
Parallel Technical Specifications

Parallel Connectors

The following illustration shows the Parallel communication connector and pin assignments. The connector is at the rear of the printer.

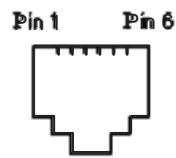


The connector for the power supply cable has the following pin assignments. The power cable connector is in the small cavity under the printer at the front.



Cash Drawer Connectors

The following illustration shows the pinouts for the cash drawer connector.



The following table shows the pinouts for cash drawers 1 and 2. The cash drawer connectors are located at the rear of the printer.

Parallel Printers		
Pin Number	Cash Drawer 1 Connector	Cash Drawer 2 Connector
1	Frame Ground	Frame Ground
2	Drawer 1 Solenoid	Drawer 2 Solenoid (Optional by jumper: JPR4)
3	Drawer 1 Status Switch	Drawer 2 Status Switch
4	+24 Volts (to Solenoid +)	+24 Volts (to Solenoid +)
5	Drawer 2 Solenoid (Optional by jumper: JPR3)	Drawer 2 Solenoid
6	Ground (Status Switch Return)	Ground (Status Switch Return)

Parallel Switch Settings

The DIP switches are not used by the Parallel interface except for selecting the size of the data buffer and for running diagnostic tests, which must be done while the printer is in level 1 diagnostics (setup mode) with switch 1 set to On. See “Level 1 Diagnostics” in the “Diagnostics” chapter for more information.

When switch 1 is set to Off, the printer is on-line and ready to communicate with the host system. Switches 2-6 are not used at any time the printer is on-line, and they are set to Off at the factory.

Caution: The switches can also be used for setting other functions and tests. Be careful when setting the switches for the Data Buffer settings that you do not accidentally change the settings for the other functions and tests.

Note: The Data Buffer option is set with the printer in the setup mode. See “Level 1 Diagnostics” in the “Diagnostics” chapter for more information.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Option
Off	Off	Off	Off	Off	Off	On-line
On ¹	Off	On	Off	On	Off	4K Byte Data Buffer ²
On ¹	Off	On	Off	On	On	One Line Data Buffer

¹Printer is off-line
²Default
Choose one of the Data Buffer options.

Commands

The commands control all operations and functions of the 7193 printer, from selecting the size and placement of characters and graphics on the receipt to feeding and cutting the paper.

Note: All versions of the 7193 use the same commands as listed in this section unless otherwise noted. For example, the Parallel interface does require unique commands for controlling the cash drawer.

The 7193 commands emulate two printers: the NCR 7150™ Multifunction printer and the Epson TM-T80™ Thermal printer. Any of the commands from either set may be used in any combination to program a host system to communicate with the 7193 (unless otherwise noted).

Some commands listed and described here are not implemented in the 7193 (they are identified as not implemented). If received, they are ignored and not sent to the print buffer as data. Non-legal commands are sent to the print buffer as data.

Command List

This section groups the commands according to the following categories:

- Printer Function Commands
- Print Characteristics Commands
- Graphics Commands
- Printer Status Commands
- Real Time Commands
- Bar Code Commands

Within each group, the commands are listed in numerical order of their Hex codes. The page number refers to where a complete description of each command is given in the “Command Descriptions” section which begins on page 63.

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Printer Function Commands

These commands control the following basic printer functions and are listed in numerical order of their Hex codes:

- Printing
- Feeding the paper
- Resetting the printer
- Cutting the paper
- Opening the cash drawers

Printer Function Commands

Hex Code	Command	Page
09	Horizontal Tab	63
0A	Line Feed	63
0D	Carriage Return	64
10	Clear Printer	64
14 <i>n</i>	Feed <i>n</i> Print Lines	64
15 <i>n</i>	Feed <i>n</i> Dot Rows	65
16 <i>n</i>	Add <i>n</i> Extra Dot Rows	65
17	Print	65
19	Full Knife Cut	66
1B 69	Partial Knife Cut	66
1A		
1B 6D	Generate Tone	66
1B 07		
1B 14 <i>n</i>	Set Column	66
1B 20 <i>n</i>	Set Character Right Side Spacing (Not Implemented)	67
1B 24 etc.	Set Absolute Starting Position	67
1B 32	Set Line Spacing to 1/6 Inch	68
1B 33 <i>n</i>	Set Line Spacing to <i>n</i> Minimum Units	68

Printer Function Commands

Hex Code	Command	Page
1B 3D <i>n</i>	Select Printer	68
1B 40	Initialize Printer	68
1B 44 etc.	Set Horizontal Tab Positions	69
1B 4A <i>n</i>	Print and Feed <i>n</i> Minimum Units	69
1B 5C etc.	Set Relative Starting Position	70
1B 61 <i>n</i>	Align Character Positions	71
1B 63 34 <i>n</i>	Select Sensors to Stop Printing (Not Implemented)	71
1B 63 35 <i>n</i>	Enable or Disable Panel Switch	71
1B 64 <i>n</i>	Print and Feed <i>n</i> Lines	71
1B 6A <i>k</i>	Read from Non-Volatile Memory	72
1B 70 <i>n</i> etc.	Generate Pulse to Open Cash Drawer	72
1B 73 <i>n</i> etc.	Write to Non-Volatile Memory	72

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Print Characteristics Commands

These commands control what the printed information looks like and are listed in numerical order of their Hex codes.

Print Characteristics Commands

Hex Code	Command	Page
12	Select Double-Wide Characters	73
13	Select Single-Wide Characters	73
1B 12	Rotate Characters Counter-Clockwise	73
1B 16 <i>n</i>	Select Pitch (Column Width)	74
1B 21 <i>m</i>	Set Print Mode	74
1B 25 <i>n</i>	Select Character Set	75
1B 26 etc.	Define User-Defined Character Set	75
1B 3A 0 0 0	Copy Character Set From ROM to RAM	76
1B 52 <i>n</i>	Select Character Code Table	76
1B 74 <i>n</i>		
1B 56 <i>n</i>	Set or Cancel Rotated Characters Clockwise	77
1B 7B <i>n</i>	Set or Cancel Upside-Down Characters	77

Graphics Commands

These commands print graphics data and are listed in numerical order of their Hex codes.

Graphics Commands

Hex Code	Command	Page
1B 24 etc.	Set Absolute Starting Position ¹	79
1B 2A <i>m</i> etc.	Set Bit Image Mode	79
1B 4B etc.	Single-Density Graphics	81
1B 4C etc. 1B 59 etc.	Double-Density Graphics	81
1D 2A etc.	Define Downloaded Bit Image	82
1D 2F <i>m</i>	Print Downloaded Bit Image	83

¹This printer function command is also used in graphics to emulate an Epson LQ-950™ printer to handle graphics output from word processing programs.

Printer Status Commands

These commands send printer status information to the host system and are listed in numerical order of their Hex codes.

Printer Status Commands

Hex Code	Command	Page
1B 75 0	Transmit Cash Drawer Status (RS-232C Only)	84
1B 75 <i>n</i>	Request Alternate Status (Parallel Only)	85
1B 76	Transmit Printer Status (Not Implemented for Parallel)	86

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Real Time Commands

These commands correct difficulties with the original version of the 7193 RS-232C communication interface.

Real Time Commands

Hex Code	Command	Page
1D 04 <i>n</i>	Real Time Status Transmission, GS Sequence	91
10 04 <i>n</i>	Real Time Status Transmission, DLE Sequence	92
1D 03 <i>n</i>	Real Time Request to Printer, GS Sequence	94
10 05 <i>n</i>	Real Time Request to Printer, DLE Sequence	95
1D 05	Real Time Printer Status Transmission	96

Bar Code Commands

These commands print bar codes. HRI means Human Readable Interface and are listed in numerical order of their Hex codes.

Bar Code Commands

Hex Code	Command	Page
1D 48 <i>n</i>	Select Printing Position of HRI Characters	98
1D 66 <i>n</i>	Select Pitch for HRI Characters (Not Implemented)	98
1D 68 <i>n</i>	Select Height of Bar Code	98
1D 6B <i>n</i> etc.	Print Bar Code	99
1D 6B 49 <i>n</i>	Print Code 128 Bar Code	100
1D 77 <i>n</i>	Select Width of Bar Code	100

Command Descriptions

This section lists the commands with their Hex, Decimal, and ASCII codes. The commands are grouped in the following categories:

- Printer Function Commands
- Print Characteristics Commands
- Graphics Commands
- Printer Status Commands
- Real Time Commands
- Bar Code Commands

Printer Function Commands

The printer function commands control the following basic printer functions and are described in order of their Hex codes:

- Printing and feeding paper
- Cutting paper
- Resetting printer
- Performing miscellaneous functions

Horizontal Tab

Moves the print position to the next tab position set by the **Set Horizontal Tab Positions (1B 44 n1 ... n32 00)** command. The print position is set to column one after each line.

Hex	Decimal	ASCII
09	9	HT

Line Feed

Prints one line from the buffer and feeds paper one line.

Hex	Decimal	ASCII
0A	10	LF

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Carriage Return

Prints one line from the buffer and feeds paper one line. The printer can be set through the DIP switches to ignore or use this command. Some applications expect the command to be ignored while others use it as print command. See "Ignoring/Using the Carriage Return" in the "Diagnostics" chapter for more information.

Hex	Decimal	ASCII
0D	13	CR

Clear Printer

Clears the print line buffer without printing and sets the printer to the following condition:

- **Double-Wide (12)** command is cancelled
- Line Spacing, Pitch, and User-Defined Character Sets are maintained at current selections (RAM is not affected)
- Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
- Printer is restarted and error status is cleared in a fault condition
- Returns paper exhaust to the paper status line if an alternate status has been requested (Parallel interface only)

Hex	Decimal	ASCII
10	16	DLE

Feed *n* Print Lines

Feeds the paper *n* lines at the current line height without printing.

Hex	Decimal	ASCII	Value of <i>n</i>
14 <i>n</i>	20 <i>n</i>	DC4 <i>n</i>	0-255

Feed n Dot Rows

Feeds the paper n dot rows ($n/152$ inch, $n/6$ mm), without printing.

Hex	Decimal	ASCII	Value of n	Receipt	Slip
15 n	21 n	NAK n	0-255	$n/152$ inch	$n/72$ inch

Add n Extra Dot Rows

Adds n extra dot rows ($n/152$ inch, $n/6$ mm) to the character height to increase space between print lines or decrease the number of lines per inch.

Hex	Decimal	ASCII	Value of n	Default
16 n	22 n	SYN n	0-12	2

The following table shows the relationship between the number of lines per inch and each extra dot row added:

Extra Rows	Lines Per Inch	Dot Rows	Extra Rows	Lines Per Inch	Dot Rows
0	8.5	18	7	6.1	25
1	8.0	19	8	5.9	26
2	7.6	20	9	5.6	27
3	7.2	21	10	5.4	28
4	7.0	22	11	5.2	29
5	6.6	23	12	5.1	30
6	6.3	24			

Print

Prints one line from the buffer and feeds paper one line.

Hex	Decimal	ASCII
17	23	ETB

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Full Knife Cut

This command is implemented the same as **Partial Knife Cut (1A/1B 6D)**.

Hex	Decimal	ASCII
19	25	EM
1B 69	27 105	ESC i

Partial Knife Cut

Partially cuts the receipt, leaving .20 inch (5 mm) of paper. The length of the cut can be changed through the DIP switches. See "Setting Partial Cut Distance" in the "Diagnostics" chapter. The cut edge is 108 dot rows or .71 inch (18 mm) above the print station. It is valid only at the beginning of a line.

Hex	Decimal	ASCII
1A	26	SUB
1B 6D	27 109	ESC m

Generate Tone

Generates an audible tone.

Hex	Decimal	ASCII
1B 07	27 7	ESC BEL

Set Column

Prints the first character of the next print line in column *n*. It must be sent for each line not printed at column one. The value of *n* is set to one after each line. It cannot be used with Single- or Double-Density graphics.

Hex	Decimal	ASCII	Value of <i>n</i>
1B 14 <i>n</i>	27 20 <i>n</i>	ESC DC4 <i>n</i>	1-44 (Standard Pitch) 1-56 (Compressed pitch)

Set Character Right-Side Spacing

This command is not implemented and is ignored if received.

Hex	Decimal	ASCII
1B 20 <i>n</i>	27 32 <i>n</i>	ESC (SPACE) <i>n</i>

Set Absolute Starting Position

Sets the print starting position to the specified number of dots (up to the right margin) from the beginning of the line. The print starting position is reset to the first column after each line.

Hex	Decimal	ASCII
1B 24 <i>n1 n2</i>	27 36 <i>n1 n2</i>	ESC \$ <i>n1 n2</i>
<i>n</i> = Number of dots to be moved from the beginning of the line		
<i>n1</i> = Remainder after dividing <i>n</i> by 256		
<i>n2</i> = Integer after dividing <i>n</i> by 256		

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

Determine the value of *n* by multiplying the column for the absolute starting position by 10 (standard pitch) or 8 (compressed pitch). The example shows how to calculate column 29 (10 dots per column) as the absolute starting position.

$$\begin{aligned}
 28 \times 10 &= 280 \text{ dots (beginning of column 29)} \\
 280 / 256 &= 1, \text{ remainder of } 24 \\
 n1 &= 24 & n2 &= 1
 \end{aligned}$$

Note: This command is also used in the graphics mode to emulate the Epson LQ-950™ dot matrix printer. See “Graphics Commands” later in this chapter for more information.

Set Line Spacing to 1/6 Inch

Sets the line spacing to 1/6 of an inch (4.25 mm). It is not affected by the **Print (17)** command.

Hex	Decimal	ASCII	Default
1B 32	27 50	ESC 2	0.13 Inch (3.33 mm)

Set Line Spacing to n Minimum Units

Sets the line spacing to $n/360$ of an inch. The minimum line spacing is 8.5 lines per inch. The line spacing equals the character height when n is too small.

Hex	Decimal	ASCII	Value of n	Default
1B 33 n	27 51 n	ESC 3 n	0-255	0.13 Inch (3.33 mm)

Select Printer

This command is not implemented and is ignored if received.

Hex	Decimal	ASCII	Value of n	Default
1B 3D n	27 61 n	ESC = n	0 (bit 0), printer not selected 1 (bit 0), printer selected	1

Initialize Printer

Clears the print line buffer and resets the printer to the following default selections (startup configuration):

- Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
- Extra Dot Rows are set to two
- User-defined characters or logo graphics (from RAM) are cleared
- Character Set is set to Code Page 437 (default)
- Character Pitch is reset to 15.2 CPI and column width to 44 (default)
- Returns paper exhaust to the paper status line if an alternate status has been requested (Parallel interface only)

Hex	Decimal	ASCII
1B 40	27 64	ESC @

Set Horizontal Tab Positions

Sets up to 32 horizontal tab positions in ascending order *n* columns from column one, but does not move the print position. See the **Horizontal Tab (09)** command. The command ends with Hex 00; Hex 1B 44 00 clears all tabs. The tabs cannot be set higher than the column width of the current pitch: standard pitch = 44 columns; compressed pitch = 56 columns.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 44 <i>n</i> 1 ... <i>n</i> 32 00	27 68 <i>n</i> 1 ... <i>n</i> 32 00	ESC D <i>n</i> 1 ... <i>n</i> 32 00	Column for Tab Minus 1	Every 8 chars. from col. 1 (9, 17, 25, etc.)

Print and Feed *n* Minimum Units

Prints one line from the buffer and feeds the paper *n*/360 inch. The line height equals the character height when *n* is too small.

Hex	Decimal	ASCII	Value of <i>n</i>
1B 4A <i>n</i>	27 74 <i>n</i>	ESC J <i>n</i>	0-255

Set Relative Starting Position

Moves the print starting position the specified number of dots either right (up to the right margin) or left (up to the left margin) of the current position.

The print starting position is reset to the first column after each line.

Hex	Decimal	ASCII	Value of <i>n</i>
1B 5C <i>n1 n2</i>	27 92 <i>n1 n2</i>	ESC \ <i>n1 n2</i>	See Examples Below

To Move the Relative Starting Position Right of the Current Position

- n* = Number of dots to be moved right of the current position
- n1* = Remainder after dividing *n* by 256
- n2* = Integer after dividing *n* by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

Determine the value of *n* by multiplying the number of columns to move right of the current position by 10 (standard pitch) or 8 (compressed pitch). The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the right of the current position.

$2 \times 10 = 20$ dots (two columns to be moved right of the current position)
 $20 / 256 = 0$, remainder of 20
n1 = 20 *n2* = 0

To Move the Relative Starting Position Left of the Current Position

- n* = Number of dots to be moved left of the current position
- n1* = Remainder after dividing (65,536-*n*) by 256
- n2* = Integer after dividing (65,536-*n*) by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

Determine the value of *n* by multiplying the number of columns to move left of the current position by 10 (standard pitch) or 8 (compressed pitch). The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the left of the current position.

$2 \times 10 = 20$ dots (two columns to be moved left of the current position)
 $65,536 - 20 = 65516$
 $65,516 / 256 = 255$, remainder of 236
n1 = 236 *n2* = 255

Align Character Positions

Specifies the alignment of characters, graphics, logos, and bar codes (see table). It is valid only at the beginning of a line.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 61 <i>n</i>	27 97 <i>n</i>	ESC a <i>n</i>	0 (Left Aligned) 1 (Center Aligned) 2 (Right Aligned)	0

Select Sensors to Stop Printing

This command is not implemented and is ignored if received.

Hex	Decimal	ASCII
1B 63 34 <i>n</i>	27 99 52 <i>n</i>	ESC c 4 <i>n</i>

Enable or Disable Panel Switch

Toggles the panel switches on and off. Functions that require the panel switches cannot be used when the panel switches are disabled with this command.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 63 35 <i>n</i>	27 99 53 <i>n</i>	ESC c 5 <i>n</i>	0 = Enable 1 = Disable	0

Print and Feed *n* Lines

Prints one line from the buffer and feeds paper *n* lines at the current line height.

Hex	Decimal	ASCII	Value of <i>n</i>
1B 64 <i>n</i>	27 100 <i>n</i>	ESC d <i>n</i>	1-255 (0 interpreted as 1)

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Read from Non-Volatile Memory

Reads a two-byte word from location *k* in history EEROM. The printer will return the word at the next available opportunity.

This command is not available on Parallel printers.

Hex	Decimal	ASCII	Value of <i>k</i>
1B 6A <i>k</i>	27 106 <i>k</i>	ESC j <i>k</i>	0-63 (Hex)

Generate Pulse to Open Cash Drawer

Outputs a pulse to open the cash drawer.

The value for either *p1* or *p2* is the Hex number multiplied by 2 msec. to equal the total time. The off-time is the delay before the printer performs the next operation.

Hex	Decimal	ASCII	Value of <i>n</i>	Value of <i>p</i>
1B 70	27 112	ESC p	00 = Drawer 1	<i>p1</i> (Hex) x 2 msec. = On-time
<i>n p1 p2</i>	<i>n p1 p2</i>	<i>n p1 p2</i>	01 = Drawer 2	<i>p2</i> (Hex) x 2 msec. = Off-time

Write to Non-Volatile Memory

Writes two-byte word *n1:n2* to location *k* in history EEROM.

Hex	Decimal	ASCII	Value of <i>n</i>	Value of <i>k</i>
1B 73	27 115	ESC s	<i>n1</i> = 1st Byte	16-63 (Hex Locations 00-15 are Reserved)
<i>n1 n2 k</i>	<i>n1 n2 k</i>	<i>n1 n2 k</i>	<i>n2</i> = 2nd Byte	

Print Characteristics Commands

These commands control what the printed information looks like: selection of character sets, definition of custom-defined characters, and setting of margins. The commands are described in order of their Hex codes

Select Double-Wide Characters

Prints double-wide characters. The printer is reset to single-wide mode after a line has been printed or a **Clear Printer (10)** command is received. It may be used with single-wide characters on the same line, but not with Single and Double Density Graphics modes.

Hex	Decimal	ASCII
12	18	DC2

Select Single-Wide Characters

Prints single-wide characters. It may be used with double-wide characters on the same line, but not with Single and Double Density Graphics modes.

Hex	Decimal	ASCII
13	19	DC3

Rotate Characters Counter-Clockwise

Rotates characters 90 degrees counter-clockwise. It remains in effect until the printer is reset or until a **Clear Printer (10)**, **Set/Cancel Upside-Down Print (1B 7B)**, or **Set/Cancel Rotated Print (1B 56)** command is received. It is valid only at the beginning of a line. It cannot be used with non-rotated print on the same line. See "Summary of Rotated Printing" on page 78.

Hex	Decimal	ASCII
1B 12	27 18	ESC DC2

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Select Pitch (Column Width)

Selects the character pitch for a print line. It is valid only at the beginning of a line. Standard and compressed pitches cannot be used together on the same line. See "Appendix B" for a description of both pitches.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 16 <i>n</i>	27 22 <i>n</i>	ESC SYN <i>n</i>	0 = Standard Pitch 1 = Compressed Pitch	0

Set Print Mode

Selects the print mode: standard, compressed, double high, or double wide. See "Appendix B" for a description of standard and compressed character pitches.

Hex	Decimal	ASCII	Value of <i>m</i>	Default
1B 21 <i>m</i>	27 33 <i>m</i>	ESC ! <i>m</i>	See Next Table	0

Value of <i>m</i>				
Bit	Function	0	1	
Bit 0 ¹	Pitch	Standard Pitch ² 44 Col/Line, 15 CPI (Rec) 66 Col/Line, 13.9 CPI (Slip)	Compressed Pitch 56 Col/Line, 19 CPI (Rec) 80 Col/Line, 17.1 CPI (Slip)	
Bit 4	Double High ³	Canceled	Set	
Bit 5	Double Wide	Canceled	Set	

¹Bit 0 is ignored unless it is at beginning of line. Bits 1, 2, 3, 6, 7 are not used.

²Standard and compressed pitch cannot be used together in the same line.

³Cannot be used together with normal height in same line.

Select Character Set

Selects the character set. The character sets cannot be used together on the same line. When an undefined RAM character is selected, the Code Page 437 character is used. See "Appendix B" for the character sets.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 25 <i>n</i>	27 37 <i>n</i>	ESC % <i>n</i>	0 = Code Page 437 1 = User Defined (RAM) 2 = Code Page 850	0

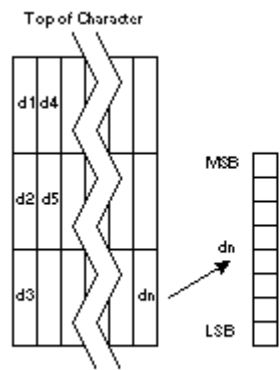
Define User-Defined Character Set

Defines and enters downloaded characters into RAM. It may be used to overwrite single characters. The user-defined characters are available until power is turned off, the **Initialize Printer (1B 40)** command is received, or a downloaded bit image (1D 2A) is defined. User-defined characters and a downloaded bit image cannot be used at the same time. The command clears bit image logo data from RAM. Any invalid byte (*s*, *c1*, *c2*, *n1*, *n2*) aborts the command.

Hex	Decimal	ASCII
1B 26 <i>s c1 c2 n1 d1</i> ... <i>mn dn</i>	27 38 <i>s c1 c2 n1 d1</i> ... <i>mn dn</i>	ESC & <i>s c1 c2 n1 d1</i> ... <i>mn dn</i>

- s* = 3, the number of bytes (vertically) in the character cell
- c* = the ASCII codes of the first (*c1*) and last (*c2*) characters respectively
 - c1* = Hex 20-FE (20 is always printed as a space)
 - c2* = Hex 20-FE (20 is always printed as a space)
 - To define only one character, use the same code for both *c1* and *c2*
- n* = the number of dot columns for the *n*th character as specified by *n1* . . . *mn*
 - n* = 0-10 (standard pitch), 12 and less accepted but ignored
 - n* = 0-8 (compressed pitch), 12 and less accepted but ignored
- d* = the column data for the *n*th character as specified by *d1* . . . *dn*
 - The number of bytes for a character cell is *s* x *n1*
 - The bytes are printed down and across each cell

See the illustration on the facing page.



Copy Character Set from ROM to RAM

Copies characters in the active ROM set to RAM. Use it to modify characters in one of the character set variations, such as Rotated Print. Select one of the Rotated Print commands, copy to RAM, then use the command, **Define User-Defined Character Set (1B 26)**.

Hex	Decimal	ASCII
1B 3A 0 0 0	27 58 0 0 0	ESC : 0 0 0

Select Character Code Table

Selects the character set. The character sets cannot be used together on the same line. See “Appendix B” for the character sets.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 52 <i>n</i>	27 82 <i>n</i>	ESC R <i>n</i>	0 = Code Page 437	0
1B 74 <i>n</i> *	27 116 <i>n</i> *	ESC t <i>n</i> *	1 = Code Page 850	

Set or Cancel Rotated Characters Clockwise

Rotates characters 90 degrees clockwise. It remains in effect until the printer is reset or until a **Clear Printer (10)** or **Rotated Print (1B 12)** command is received. It is valid only at the beginning of a line. It cannot be used with non-rotated print on the same line. See "Summary of Rotated Printing" on the next page.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 56 <i>n</i>	27 86 <i>n</i>	ESC V <i>n</i>	0 = Cancel 1 = Set	0

Set or Cancel Upside-Down Characters

Prints upside-down characters. It is valid only at the beginning of a line. The character order is inverted in the buffer so text is readable. It cannot be used with right-side up characters on the same line. The **Rotated Print (1B 12)** command cancels this command. Only bit 0 is used. Bits 1-7 are not used. See "Summary of Rotated Printing" on the next page.

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1B 7B <i>n</i>	27 123 <i>n</i>	ESC { <i>n</i>	0 = Cancel 1 = Set	0

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Summary of Rotated Printing

The table shows the combinations of Set/Cancel Upside-Down Print, Set/Cancel Rotated Print (clockwise), and Rotated Print (counterclockwise). Rotated CCW is mutually exclusive with the other two commands.

The samples of the print show only the normal size characters. Double-wide and double-high characters are printed in the same orientation. They may also be mixed on the same line.

Upside Down 1B 7B n	Rotated CW 1B 56 n	Rotated CCW 1B 12	Resulting Output
Canceled	Canceled	Cleared	1 (See Below)
Canceled	Set	X	2 (See Below)
Set	Canceled	X	3 (See Below)
Set	Set	X	4 (See Below)
X	X	Set	5 (See Below)

1. ABC
2. 𐀀𐀁𐀂
3. 𐀃𐀄𐀅
4. 𐀆𐀇𐀈
5. 𐀉𐀊𐀋

Note: The following print modes cannot be mixed on the same line:

- Standard and compressed pitch
- Vertical (normal) and rotated
- Right-side up and upside down
- Single high (normal) and double high

Graphics Commands

These commands are used to enter and print graphics data and are described in order of their Hex codes:

Set Absolute Starting Position

Sets the print starting position for graphics at the specified number of dots from the beginning of the line as expressed in the following formula: $n = ((n1 + (256 \times n2)) \times 2)$. The resulting dot column must be less than 448. The print starting position is reset to column one after each line.

This command emulates the Epson LQ-950™ dot matrix printer. This allows the 7193 to accept graphics that are normally output from word processing programs to a half-dot matrix printer.

Hex	Decimal	ASCII
1B 24 n1 n2	27 36 n1 n2	ESC \$ n1 n2

n = Number of half dots to be moved from the beginning of the line

Note: The 7193 converts two half-dots to one full dot
n1 = Remainder after dividing n by 256
n2 = Integer after dividing n by 256

Set Bit Image Mode

Sets the print resolution and enters one line of graphics data into the print buffer. Any print command is required to print the data, after which the printer returns to normal processing mode. See the illustrations for graphic representations of the bit image.

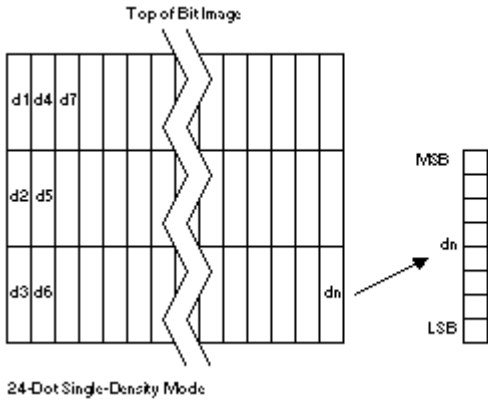
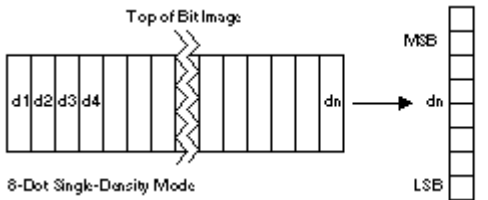
Hex	Decimal	ASCII
1B 2A m n1 n2 d1 ... dn	27 42 m n1 n2 d1 ... dn	ESC * m n1 n2 d1 ... dn

Value of <i>m</i>	Mode	No. of Dots (Vertical)	No. of Dots (Horizontal)	Number of Dots/Line
0	8 Dot Single Density	8 (51 DPI)	0-224 (76 DPI)	8 x 224
1	8 Dot Double Density	8 (51 DPI)	0-448 (152 DPI)	8 x 448
32	24 Dot Single Density	24 (152 DPI)	0-224 (76 DPI)	24 x 224
33	24 Dot Double Density	24 (152 DPI)	0-448 (152 DPI)	24 x 448

Value of *n* (8-Dot Single Density Mode)
 $n1 + (256 \times n2)$

Value of *n* (24-Dot Single Density Mode)
 $3 \times [n1 + (256 \times n2)]$

Value of *d*
Number of Bytes of Data
(Printed Down, Then Across)



Single-Density Graphics

Enters one line of 8-dot single-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. When the print buffer is full, incoming data will be accepted but not printed. Single-density mode allows 0-224 dot columns. The number of bytes sent is represented by the formulas in the second table. Each bit corresponds to two horizontal dots. Compare to Set Bit Image Mode on page 79.

Hex	Decimal	ASCII
1B 4B $n1$ $n2$ $d1$... dn	27 75 $n1$ $n2$ $d1$... dn	ESC K $n1$ $n2$ $d1$... dn
Value of n (8-Dot Single Density Mode)	Value of n (24-Dot Single Density Mode)	Value of d
$n1 + (256 \times n2)$	$3 \times [n1 + (256 \times n2)]$	Number of Bytes of Data (Printed Down, Then Across)

Double-Density Graphics

Enters one line of 8-dot double-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. When the print buffer is full, incoming data will be accepted but not printed. Double-density mode allows 0-448 dot columns. The number of bytes sent is represented by the formulas in the second table. Each bit corresponds to one horizontal dot. Compare to Set Bit Image Mode on page 79.

Hex	Decimal	ASCII
1B 59 $n1$ $n2$ $d1$... dn	27 89 $n1$ $n2$ $d1$... dn	ESC Y $n1$ $n2$ $d1$... dn
1B 4C $n1$ $n2$ $d1$... dn	27 76 $n1$ $n2$ $d1$... dn	ESC L $n1$ $n2$ $d1$... dn
Value of n (8-Dot Double Density Mode)	Value of n (24-Dot Double Density Mode)	Value of d
$n1 + (256 \times n2)$	$3 \times [n1 + (256 \times n2)]$	Number of Bytes of Data (Printed Down, Then Across)

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Define Downloaded Bit Image

Enters a downloaded bit image (such as a logo) into RAM with the number of dots specified by *n1* and *n2*. It is available until power is turned off, another bit image is defined, or either **Initialize Printer (1B 40)**, or **Define User-Defined Character Set (1B 26)**, command is received.

A downloaded bit image and user-defined characters cannot be defined at the same time. Any user-defined characters will be cleared from RAM when this command is used. See the illustration on the next page for a representation of the bit image.

Hex	Decimal	ASCII
1D 2A <i>n1 n2 d1 ... dn</i>	29 42 <i>n1 n2 d1 ... dn</i>	GS * <i>n1 n2 d1 ... dn</i>

Value of <i>n1</i> 1-56 (8 x <i>n1</i> = Number of Horizontal Dot Columns)	Value of <i>n2</i> 1-48 (Number of Vertical Bytes) ¹	Value of <i>d</i> Bytes of Data (Printed Down, Then Across)
--	---	---

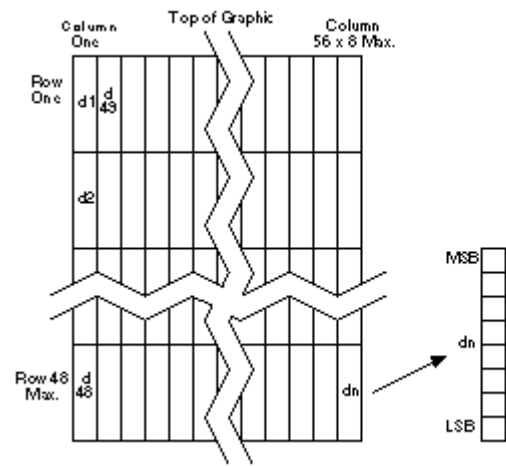
¹The number of bytes sent is represented by the following formula:
n = 8 x *n1* x *n2* (*n1* x *n2* must be less than or equal to 1344).

Print Downloaded Bit Image

Prints the downloaded bit image in RAM at a density specified by *m*. It is ignored if any data is available in the print buffer, if the downloaded bit image is undefined, or if the data defined exceeds one line. A downloaded bit image and user-defined characters cannot be used at the same time. See the illustration for a representation of the bit image.

Hex	Decimal	ASCII	Value of <i>m</i>	Print Mode	Vertical DPI ¹	Horizontal DPI*
1D 2F <i>m</i>	29 47 <i>m</i>	GS / <i>m</i>	0	Normal	152	152
			1	Double Wide	152	76
			2	Double High	76	152
			3	Quadruple	76	76

¹Dot density measured in dots per inch.



Printer Status Commands

For RS-232C printers, these commands enable the printer to communicate with the host system following the selected handshaking protocol, either DTR/DSR or XON/XOFF. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they were received.

When a fault occurs, the printer will go busy at the RS-232C interface and not respond to either of the Printer Status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal printhead cool down, the printer will resume processing the data in its receive buffer.

Printers manufactured after mid 1996 include Real Time commands which are handled when the printer is busy at the RS-232C interface. See the following section, "Real Time Commands," for details about these commands.

Transmit Cash Drawer Status

Transmits current status of the cash drawers. One byte is sent to the host system. This command is available only on RS-232 printers.

In DTR/DSR protocol the printer waits for DSR = SPACE. If a drawer is not connected, the status will indicate closed.

Hex	Decimal	ASCII	Bit	1 Signifies	0 Signifies
1B 75 0	27 117 0	ESC u 0	0	Drawer 1 Closed	Drawer 1 Open
			1	Drawer 2 Closed	Drawer 2 Open

Request Alternate Status

This command is available only on Parallel printers. It allows the printer to inform the host when the data in the buffer has been processed, compensating for the lack of bi-directional communication. Status information is limited to what can be sent by the dedicated lines: BUSY, ACK, PAPER EXHAUST, and FAULT.

Hex	Decimal	ASCII	Value of <i>n</i>
1B 75 <i>n</i>	27 117 <i>n</i>	ESC u <i>n</i>	See Table Below

When this command is sent to the printer, the printer goes "Busy" until all data which has been sent to the printer has been processed. The PAPER EXHAUST line shows the status for the cash drawer or receipt paper as follows:

Value of <i>n</i>	Function	Description
00	Drawer 1	High = Open Low = Closed or Not Present
01	Drawer 2	High = Open Low = Closed or Not Present
02	Paper Low (Not Implemented)	High = Paper Low Low = Not Used
03	Paper Out	High = Paper Out (Default) Low = Not Used
>03	Ignored, No Change	Printer Does Not Stay BUSY ¹

¹PAPER EXHAUST LINE is valid to indicate previously requested status.

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Transmit Printer Status

Sends status data to the host system.

This command is available only on RS-232C printers.

Hex	Decimal	ASCII
1B 76	27 118	ESC v

The printer sends one byte to the host system when it is not busy or in a fault condition. See “Busy Line and Fault Conditions” in the following section, “Real Time Commands,” for details about fault condition reporting.

See the table below. In DTR/DSR protocol, the printer waits for DSR = SPACE.

Status Byte (RS-232)

Bit	Function	0 Signifies	1 Signifies
0	Receipt Paper	Present	Out
1	Receipt Cover	Closed	Open
2	Receipt Paper	Present	Out
3	Not Used	Fixed to Zero	Fixed to Zero
4	Not Used	Fixed to Zero	Fixed to Zero
5	Not Used	Fixed to Zero	Fixed to Zero
6	Not Used	Fixed to Zero	Fixed to Zero
7	Not Used	Fixed to Zero	Fixed to Zero

Real Time Commands

The Real Time commands correct difficulties with the original version of the 7193 RS-232C communication interface:

- Real Time Status Transmission: GS (Hex 1D) Sequence and DLE (Hex 10) Sequence
- Real Time Request to Printer: GS (Hex 1D) Sequence and DLE (Hex 10) Sequence
- Real Time Printer Status Transmission

The original Printer Status commands, **Transmit Printer Status (Hex 1B 76, ASCII ESC v)** and **Transmit Cash Drawer Status (Hex 1B 75 0, ASCII ESC u 0)** are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data which was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal printhead overheat, etc. In addition, there is no way to restart the printer after a paper jam or other error.

The Real Time commands are implemented in two ways to correct these problems. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

First Implementation

For a new application the GS (Hex 1D) sequences of the first implementation are recommended to avoid possible misinterpretation of a DLE (Hex 10) sequence as a **Clear Printer (Hex 10 0, ASCII DLE NUL)** command.

The first implementation builds upon the GS ENQ sequence as implemented on Epson's TM-930II™, TM-950™ and TM-U950™ by defining two new GS (Hex 1D) sequences to provide the same functions as the DLE (Hex 10) sequences above, and to provide complete backward compatibility to the original 7193 Clear Printer command.

An application using these GS (Hex 1D) sequences does not need to distinguish for the printer between the new Real Time commands and the old Clear Printer command. This implementation is ideal for an existing 7193 application which already uses the Clear Printer command or for a new application being developed.

This implementation also provides the original GS ENQ Real Time sequence in addition to the newer Real Time sequences.

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Alternate Implementation

The alternate implementation uses the DLE (Hex 10) sequences as implemented on Epson's TM-T85™ and TM-U950™. An application using these DLE (Hex 10) sequences and the original 7193 Clear Printer command must distinguish for the printer between the new Real Time commands and the old Clear Printer command by adding a NUL (Hex 00) to the Clear Printer command.

An application using these DLE (Hex 10) sequences must also send the second byte of the sequence within 100 milliseconds of the first, to prevent the first byte being mistaken for a Clear Printer command. This implementation is useful for an existing TM-T85™ or TM-U950™ application which is being migrated to a 7193. This application would not be using the 7193 Clear Printer command at all since it is not recognized by the Epson printers.

Note: The DLE (Hex 10) sequences as implemented on Epson's TM-T85™ and TM-U950™ are not exactly the same as those implemented on Epson's TM-950™.

This implementation also provides the original GS ENQ Real Time sequence in addition to the newer Real Time sequences.

Rules for Using Real Time Commands

Three situations must be understood when using Real Time commands.

1. First, the printer executes the Real Time command upon receiving it and will transmit status regardless of the condition of the DSR signal.
2. Second, the printer transmits status whenever it receives the Real Time status transmission command sequence, even if that sequence happens to occur within the data of another command, such as graphics data.

In this case the sequence will also be handled correctly as the graphics data it is intended to be, when the graphics command is executed from the buffer.

3. Care must be taken not to send a Real Time command within the data sequence of another command that consists of two or more bytes.

In this case the printer will use the Real Time command sequence bytes instead of the other command's bytes when finally executing that other command from the buffer or the other command will not be executed correctly.

These three situations generally preclude use of standard DOS drivers for the serial communication ports when using Real Time commands.

Moving Data Through the Buffer

Applications should not let the buffer fill up with Real Time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to GS ENQ or GS EOT 1 or DLE EOT 1. The reason for a particular busy condition can be determined by other responses to GS EOT n or DLE EOT n.

Although the printer responds to Real Time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the Real Time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed of the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with Real Time commands.

When the DLE sequences are being used, the last byte stored when the buffer fills up could be the DLE code, with no room for the subsequent EOT or ENQ. When this lone DLE byte is finally processed out of the buffer it will be interpreted as a Clear Printer command.

Similarly, when the GS sequences are being used, the last byte stored when the buffer fills up could be the GS code, with no room for the subsequent EOT or ETX or ENQ. When this lone GS byte is finally processed out of the buffer it will use the next byte, whatever it is, as the second byte in its GS sequence.

To guard against this situation, the application must determine the cause of a busy condition and take appropriate action or pace the Real Time commands to avoid filling the buffer. There are a minimum of 256 bytes available in the printer's buffer when it goes busy.

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Busy Line and Fault Conditions

An additional improvement is made in the way the 7193 RS-232C handles the busy line (or busy condition when using XON/XOFF) during a fault condition.

Before this improvement, the printer would go busy at the RS-232C interface when the receipt door was opened or the paper was exhausted as soon as it received the next input byte. Bytes would continue to be accepted until the buffer was full or the condition was cleared, but would stop processing data out of the receive buffer. This resulted in the printer being unable to respond to the batch mode status commands (ESC v and ESC u), or handle the cash drawer commands even when it was not printing.

The improvement overcomes this limitation by not going busy at the RS-232C interface until it attempts to process a command out of the receive buffer which it can't do: for example, print on the receipt when it's out of paper. It will stay busy and stop processing data out of the receive buffer until the condition clears.

Now if the cover is open or the paper is exhausted, the 7193 printer will still accept data, respond to the batch mode status commands (ESC v and ESC u), handle the cash drawer commands, and not go busy until it actually tries to execute a print command. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the Real Time commands as described below.

The only potential backward compatibility issue is if some application expects the 7193 to go busy when it processes a batch mode status command, which it now won't. To handle this case, there is now a parameter setup in NVRAM to have the printer handle the busy line the old way. The default will be the new way, but the printer can be programmed in the field if it proves to be a problem.

To program the printer to handle the busy line the old way do the following steps:

1. Record the current switch settings for their RS-232C parameters.
2. Set switches 2 and 3 to OFF, and set switches 1, 4, 5, and 6 to ON.
3. Power cycle the printer.
4. Wait until the printer beeps to store the parameter change in NVRAM.
5. Restore the switches to their RS-232C parameters.
6. Power cycle the printer.
7. Print out the diagnostics to be sure that the busy line parameter changed.

If you have programmed the printer to handle the busy line the old way, but wish to re-program it to the new way, do the following steps:

- 1. Record the current switch settings for their RS-232C parameters.
- 2. Set switches 2, 3, and 6 to OFF, and set switches 1, 4, and 5 to ON.
- 3. Power cycle the printer.
- 4. Wait until the printer beeps to store the parameter change in NVRAM.
- 5. Restore the switches to their RS-232C parameters.
- 6. Power cycle the printer.
- 7. Print out the diagnostics to be sure that the busy line parameter changed.

Real Time Status Transmission

Transmits the selected one byte printer status specified by *n* in Real Time according to the following parameters.

GS Sequence

Hex	Decimal	ASCII	Value of <i>n</i>
1D 04 <i>n</i>	29 4 <i>n</i>	GS EOT <i>n</i>	1 = Transmit printer status
			2 = Transmit RS-232C busy status
			3 = Transmit error status
			4 = Transmit receipt paper status

The command is ignored if *n* is out of range.
n=2:

Hex	Decimal	ASCII	Value of <i>n</i>
10 04 <i>n</i>	16 4 <i>n</i>	DLE EOT <i>n</i>	1 = Transmit printer status
			2 = Transmit RS-232C busy status
			3 = Transmit error status
			4 = Transmit receipt paper status
			5 = Transmit slip paper status

The command is ignored if *n* is out of range.

Note: An application using the DLE sequence must send EOT within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the GS EOT *n* sequence which is handled exactly the same as DLE EOT *n*.

1 = Transmit Printer Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	One or both cash drawers open
	On	04	4	Both cash drawers closed
3	Off	00	0	Not busy at the RS-232C interface
	On	08	8	Printer is Busy at the RS-232C interface
4	On	10	16	Fixed to On
5				Undefined
6				Undefined
7	Off	00	0	Fixed to On

2 = Transmit RS-232C Busy Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Both receipt and cassette doors closed
	On	04	4	Receipt or cassette door open
3	Off	00	0	Paper feed button is not pressed
	On	08	8	Paper feed button is pressed
4	On	10	16	Fixed to On
5	Off	00	0	Printing not stopped due to paper condition
	On	20	32	Printing stopped due to paper condition
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	Off	00	0	Fixed to Off

3 = Transmit Error Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	No slip motor jam
	On	04	4	Slip motor jam occurred
3	Off	00	0	No knife error
	On	08	8	Knife error occurred
4	On	10	16	Fixed to On
5	Off	00	0	No unrecoverable error
	On	20	32	Unrecoverable error occurred
6	Off	00	0	Thermal printhead temp./power supply voltage are in range
	On	40	64	Thermal printhead temp./power supply voltage are out of range
7	Off	00	0	Fixed to Off

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4 = Transmit Receipt Paper Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Receipt paper adequate
	On	04	4	Receipt paper low
3	Off	00	0	Receipt paper adequate
	On	08	8	Receipt paper low
4	On	10	16	Fixed to On
5	Off	00	0	Receipt paper present
	On	20	32	Receipt paper exhausted
6	Off	00	0	Receipt paper present
	On	40	64	Receipt paper exhausted
7	Off	00	0	Fixed to Off

Real Time Request to Printer

The printer responds to a request from the host specified by *n*. The operations performed depend on the value of *n*, according to the following parameters.

GS Sequence

Hex	Decimal	ASCII	Value of <i>n</i>
1D 03 <i>n</i>	29 3 <i>n</i>	GS ETX <i>n</i>	1 = Recover and restart
			2 = Recover and clear buffers
			3 = Cancel slip waiting

The command is ignored if *n* is out of range.

DLE Sequence

Hex	Decimal	ASCII	Value of <i>n</i>
10 05 <i>n</i>	16 5 <i>n</i>	DLE ENQ <i>n</i>	1 = Recover and restart 2 = Recover and clear buffers 3 = Cancel slip waiting

The command is ignored if *n* is out of range.

Note: An application using the DLE sequence must send ENQ within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the GS ETX *n* sequence which is handled exactly the same as DLE ENQ *n*.

***n* = 1**

Restarts printing from the beginning of the line where an error occurred, after recovering from the error. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

If the receipt is selected, this command will attempt recovery from a knife error. Other errors associated with the receipt, such as paper out or printhead overheating, can be recovered from only by clearing the specific condition, such as loading paper or letting the printhead cool down.

***n* = 2**

Recovers from an error after clearing the receive and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

The same error recovery possibilities exist as for *n* = 1.

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Real Time Printer Status Transmission

Transmits one byte status of the printer in real time.

Hex	Decimal	ASCII
1D 05	29 5	GS ENQ

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low
1	Off	00	0	Receipt paper adequate
	On	02	2	Receipt paper low
2	Off	00	0	Both receipt and cassette doors closed
	On	04	4	Receipt or cassette door open
3	Off	00	0	Not busy at the RS-232C interface
	On	08	8	Printer is busy at the RS-232C interface
4	Off	00	0	One or both cash drawers open
	On	10	16	Both cash drawers closed
5	Off	00	0	Paper present at both slip sensors
	On	20	32	Paper not present at one or both slip sensors
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	On	80	128	Fixed to On

7193 Clear Printer Command

Resets certain parameters and clears the print buffer as originally defined. This is NOT a Real Time command. It only distinguishes the Clear Printer command from other DLE sequences.

Hex	Decimal	ASCII
10 00	16 0	DLE NUL

Recognizing Data from the Printer

An application sending various Real Time and non-Real Time commands to which the printer responds can determine which command a response belongs to by the following table. Responses to ESC u and ESC v are non-Real Time responses and will arrive in the order in which they were solicited.

Note also that although the original intent of the response to ESC v was to provide error information in its one-byte response, the response up to now has always been Hex 00 when transmitted. This is because ESC v was not processed until the error condition was cleared. With the improvement to the busy line handling described earlier in this section, ESC v will be processed as long as there is not an error condition caused by trying to print with no paper or with the cover open.

ESC u 0	0	0	0	0	0	0	x	x	Binary
ESC v	0	0	0	0	0	x	x	x	Binary
GS EOT <i>n</i>	0	x	x	1	x	x	1	0	Binary
DLE EOT <i>n</i>	0	x	x	1	x	x	1	0	Binary
GS ENQ	1	x	x	x	x	x	x	x	Binary
XON	0	0	0	1	0	0	0	1	Binary
XOFF	0	0	0	1	0	0	1	1	Binary

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Bar Code Commands

These commands format and print bar codes and are described in order of their Hex codes.

Select Printing Position of HRI Characters

Prints HRI characters (Human Readable Interface) above or below the bar code.

Hex	Decimal	ASCII	Value of <i>n</i> (Printing Position)	Default
1D 48 <i>n</i>	29 72 <i>n</i>	GS H <i>n</i>	0 = Not Printed 1 = Above the Bar Code 2 = Below the Bar Code 3 = Both Above and Below the Bar Code	0

Select Pitch of HRI Characters

This command is not implemented and is ignored if received.

Hex	Decimal	ASCII	Value of <i>n</i> (Pitch)	Default
1D 66 <i>n</i>	29 102 <i>n</i>	GS f <i>n</i>	0 = Standard Pitch at CPI 1 = Compressed Pitch at 19 CPI	0

Select Height of Bar Code

Sets the bar code height to *n* dots or *n*/152 inch (*n*/6 mm).

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1D 68 <i>n</i>	29 104 <i>n</i>	GS H <i>n</i>	1-255	162

Print Bar Code

Selects the bar code type and prints a bar code for the ASCII characters entered. When data is present in the print buffer, the command is ignored. The required paper feeding is performed, regardless of the current line spacing. If the width exceeds one line, the excess data is not printed. Illegal data cancels the command.

Hex	Decimal	ASCII	Value of <i>n</i>	Value of <i>c</i>
1D 6B	29 107	GS k	0-7	ASCII
<i>n c1 c2...00</i>	<i>n c1 c2...00</i>	<i>n c1 c2...00</i>	(See Table)	Characters

00 = End of command.

<i>n</i>	Bar Code	Length
0	UPC-A	Fixed Length
1	UPC-E	Fixed Length
2	JAN13 (EAN)	Fixed Length
3	JAN8 (EAN)	Fixed Length
4	Code 39	Variable Length
5	Interleaved 2 of 5	Variable Length
6	Codabar	Variable Length

Note: Fixed-length codes can be aligned left, center, or right using the **Align Positions (1B 61)** command. Variable-length codes are always center aligned.

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host system. Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host system according to standard UPC-E rules. Start/Stop characters are added for Code 39 if they are not included.

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Print Code 128 Bar Code

Selects and prints the Code 128 bar code.

This command is available only on RS-232C and Parallel printers.

Hex	Decimal	ASCII	Value of <i>n</i>	Value of <i>dn</i>
1D 6B	29 107	GS k	1-255	0-105
49 <i>n dn</i>	73 <i>n dn</i>	I <i>n dn</i>		

Since the characters encoded via Code 128 include the NUL (Hex 00) character, a NUL cannot be used to terminate the Code 128 bar code sequence as is done with other bar code sequences. The number of characters to be encoded is variable and is specified by *n*.

Following *n* are the data bytes: *dn*. The printer processes *n* bytes from the next character data as bar code data.

- The first data byte must be a Start code: *d1* = 103-105.
- Data bytes past the Start code: *d2* = 0-102.
- The printer provides the Stop code.

If character code *d* cannot be printed, the printer prints the processed bar code data up to that point and the following data is treated as normal data. If the horizontal size exceeds one line, the printer does not print the excess data.

This command is enabled only when no data is in the print buffer. When data is in the printer buffer, the printer processes the data following 'GS k I' as normal data.

Select Width of Bar Code

Sets the bar code width to *n* dots or *n*/152 inch (*n*/6 mm).

Hex	Decimal	ASCII	Value of <i>n</i>	Default
1D 77 <i>n</i>	29 119 <i>n</i>	GS w <i>n</i>	2, 3, 4	3

Appendix A: Specifications

Features

Interfaces:	RS-232C, Parallel
Memory/Firmware:	16K RAM (available for downloadable character sets and bit-mapped graphics) History EEROM 4K Buffer
Resident character sets:	PC Code Page 437 (US) PC Code Page 850 (Multilingual)
Integrated bar codes:	Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 5, Codabar
Options:	Knife Power Supply (separate in-line power supply for models not receiving power from host) Wall-Mount Kit Cash Drawer Drivers

Reliability

Thermal Mechanism:	36 Million Print Lines
Electronics	240,000 Hours of Ontime
Knife:	1 Million Cuts

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Power Requirements

The 7193 printer receives power from a separate in-line power supply which can be purchased separately.

Power from Power Supply (Remote)	
Voltage:	24 Vdc +5 Volt Supply for the Logic Circuits

Environmental Conditions

Operating Temperature	5°C to 35°C (40°F to 95°F), models with no knife
	5°C to 28°C (41°F to 82°F), models with knife
Operating Humidity:	5% to 90%
The printer can operate at higher temperatures if the humidity is lower (5°C to 45°C with humidity of 5% to 35%).	
Condensation:	Condensation may occur when the printer is moved from cold to warm areas after shipment. The printer's design permits operation after drying out and stabilizing at room temperature.

Dimensions and Weight

Height:	119 mm (4.7 in.)
Height with Cover Open:	225 mm (8.85 in.)
Width:	165 mm (6.5 in.)
Depth:	187 mm (7.35 in.)
Weight:	1.3 kg (2.9 lbs.)

Printing Specifications

Speed:	600 Lines per Minute
Noise Level:	50 dBA (ISO 7779)
Printhead:	Direct Thermal, Fixed Head
Print Area:	Host Selectable 44 (Standard) or 56 (Compressed) Columns
Character Pitch:	15.2 Characters per Inch (Standard) 19.0 Characters per Inch (Compressed)
Dot Density:	152 Dots per Inch
Line Spacing:	7.6 Lines per Inch
Character Cell:	10 x 18 Dots (Standard) 8 x 18 Dots (Compressed)
Print Modes:	Standard, Compressed, Double High, Double Wide, Upside Down, Rotated
Paper Diameter:	80 mm Maximum (3.15 inches)
Paper Length:	83 Meters (273 ft.)
Paper Width:	80 mm \pm .5 mm (3.15 Inches \pm .008 Inches)

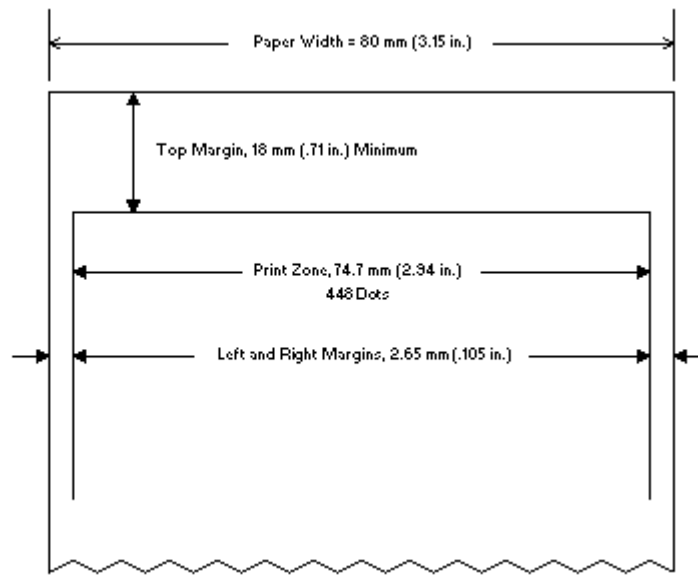
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Print Zones

The printer centers characters (standard pitch and compressed pitch) and graphics on an 80 mm wide (3.15 in.) receipt.

- Standard pitch: 10 x 18 dots in character cell, 44 characters (columns) per line
- Compressed pitch: 8 x 18 dots in character cell, 56 characters (columns) per line
- Graphics: 448 addressable bits

The minimum print line height is 18 dots for characters and 24 dots for graphics. The standard print line height is 20 dots (3.33 mm, .131 in.) for characters (with two extra dot rows).



Density of Receipt Print Lines

When the 7193 prints high density print lines (text or graphics), it automatically slows down to a rate slower than 600 lines per minute. High density print lines are defined as lines with over 57% of the dots printing on the line (there are 448 total dot columns on the print station).

Duty Cycle Restrictions (Printing Solid Blocks)

There are restrictions on the duty cycle because of the heat generated by the receipt thermal printhead when printing solid blocks (regardless of the length of the block in relation to the print line). The restrictions are ambient temperature, the percentage of time (measured against one minute) of continuous solid printing, and the amount of coverage.

Caution: When the duty cycle approaches the limits shown in the table, the receipt printhead will heat up and shut down. This may damage the printhead.

To avoid this problem, do one or a combination of the following:

1. Reduce the amount of coverage.
2. Reduce the time of continuous solid printing.
3. Reduce the ambient temperature.

Amount of Solid Coverage	Ambient Temperature		
	25° C	35° C	50° C
20%	100% of 1 min. continuous printing	50% of 1 min. continuous printing	20% of 1 min. continuous printing
40%	50% of 1 min. continuous printing	25% of 1 min. continuous printing	10% of 1 min. continuous printing
100%	20% of 1 min. continuous printing	10% of 1 min. continuous printing	3% of 1 min. continuous printing

Appendix B: Print Characteristics

The following two illustrations show the dot patterns of sample characters for standard pitch (15.2 CPI) and compressed pitch (19 CPI). The following pages show the character sets for Code Page 437 and Code Page 850.

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