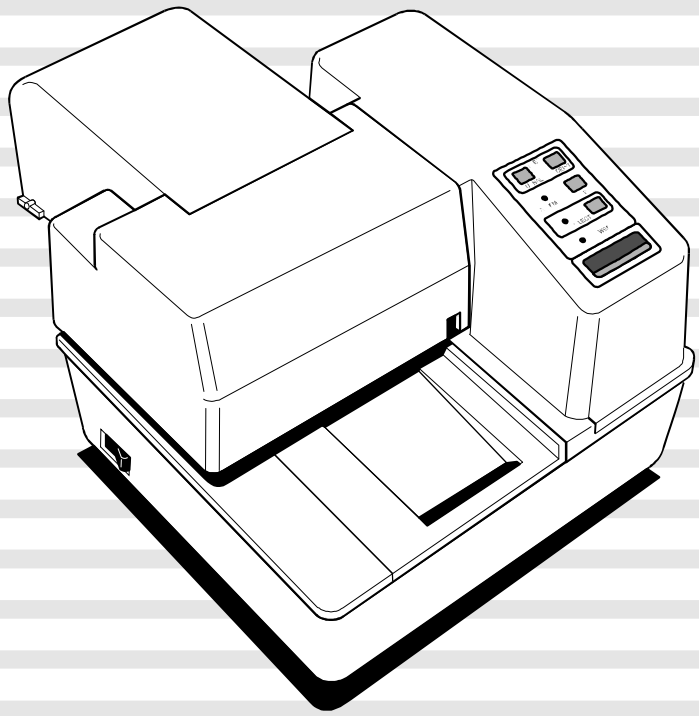
PCOS SERIES 60 **Multi-Station Slip Printers**

PROGRAMMER'S GUIDE

Rev C



Ithaca Peripherals Incorporated
A Subsidiary of Tridex Corporation

PN: 10-2071
Rev. C
06/09/94

Changes for Rev C:

1) [ESC] b and [ESC] B commands have been added to aid handling forms that are to be printed tword the operator.
2) Fine Line feed ([ESC] J <n> has been enabled in journal mode to allow graphics on the journal.
3) Expanded discussion of ENQ commands.
4) Included CFG60 and Demo Edit users guides
5) Referance to Quad Density graphics has been removed. [ESC] Z <n>[1] <n>[2]

Changes for Rev B:

1) [ESC] N and [ESC] M commands have been added to aid handling of small forms.
2) [ESC] Q command has been added to help synchronize the host application with the printer.
3) The command summary sheets have been updated with all new commands.
4) The command summaries have been corrected.
5) The parallel port timing specification has been updated
6) A self test diagnostics flow chart has been added.
7) A vertical alignment procedure has been added to diagnostics.

Disclaimer

Information in this publication is subject to change without notice and does not represent a commitment on the part of Ithaca Peripherals Incorporated. However, as product improvements become available, Ithaca Peripherals Incorporated will make every effort to provide updated information for the products described in this publication.

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20 Bomax Drive
Ithaca, New York

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Federal Communications Commission Radio Frequency Interference Statement

This equipment complies with the limits for Class A computing device in accordance with the specifications in Part 15 of FCC rules which are designed to minimize radio frequency interference in the installation; however, there is no guarantee that radio or television interference will not occur in any particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on while the radio or television is on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the radio or television receiving antenna
- Relocate the printer with respect to the receiver
- Move the printer away from the receiver
- Plug the printer into a different outlet so that the printer and receiver are on different outlets.

If necessary the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio/TV Interference Problems.*

This booklet is available from the US Government Printing Office, Washington, DC 20402. Order stock number 004-000-00345-4.

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Overview of the Series 60 Printer

Warranty Information

Options

All Ithaca Peripherals Incorporated (Ithaca) PcOS Series 60 Printers come with a standard 12 month warranty covering both parts and labor.

An optional warranty, covering both parts and labor for 24 months, may be purchased separately.

For more information concerning the warranty options, please contact your dealer or the Sales department at Ithaca Peripherals:

Sales:
Ithaca Peripherals Incorporated

20 Bomax Drive
Ithaca, NY 14850

(607) 257-8901

Service Information

The printer may be serviced by a dealer, an independent service contractor, or by Ithaca Peripherals. If the printer is to be serviced by Ithaca Peripherals, a return authorization is required. Call Field Engineering at (607)257-8901 and ask for a return authorization.

The printer will need to be packed in the original packing material and box and sent to Ithaca Peripherals. Information on shipping the printer will be provided with the return authorization.

What is in this book?

Who is it For?

This book is intended for system engineers or system integrators. It contains the information you need to integrate the Series 60 printer with a point-of-sale terminal and to program the terminal to communicate with the printer.

What Does it Cover?

This programmer's guide provides the following information:

- Start up information including diagnostics and fault conditions.
- Command descriptions.
- Character Fonts.
- How to use the printer features.
- Parallel and RS-232 interface information.
- Communications and buffers.
- Command code reference tables.

Where Can You Find More Information?

An Operator's Guide is available that describes setting up the printer and all the operating procedures such as changing journal and receipt paper, printing on a slip or form, and changing the ribbon cassette.

A Service Guide is available[1]. It's intended for trained technicians who will be servicing the printer.

For information about ordering these books, refer to the next section.

Contacting Ithaca Peripherals

The Sales department and Field Engineering department will be able to help you with most of your questions.

Contact the Sales Department for technical support, to order documentation or receive additional information about the Series 60 Printer, to order supplies, or to receive information about other products by Ithaca Peripherals.

Contact the Field Engineering department if you would like information about your warranty, or if you need to send a printer in for service.

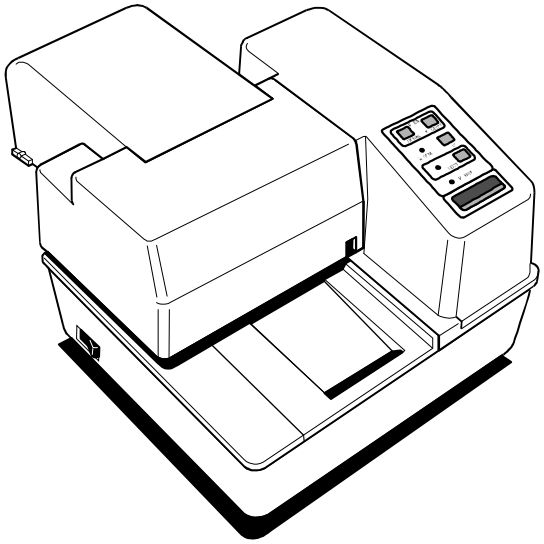
You can contact both the Sales department and the Field Engineering department at the following address and phone or fax numbers:

Ithaca Peripherals Incorporated
20 Bomax Drive
Ithaca, NY 14850

Main phone: (607)257-8901
Main fax: (607)257-8922
Sales/Field Engineering fax: (607)257-3868

[1]The Service Guide will be available in 1993.

Description of the Series 60 Printer



The Ithaca PcOS (personal computer, point-of-sale) Series 60 Printer can be ordered in several configurations to perform a variety of functions in any point-of-sale operation. The standard model (Model 63) is equipped with all three print stations: slip, receipt, and journal.

Other models come as either slip, slip and receipt, or slip and journal.

The slip station prints (or validates) on receipts, credit slips, and multi-part forms. The receipt station prints on standard receipt paper to provide your customers with a record of their purchases. The journal station prints a permanent record of all your business transactions on standard journal paper.

The unique modular design of the Series 60 Printer allows it to be upgraded or downgraded to perform the same functions as any other model in the series.

Series 60 Models

There are four models in the Series 60 line of printers, all with the slip station and their own unique set of features. Models 62, 63, and 64 are multi-station printers.

- Ithaca PcOS Model 61 Slip Printer
- Ithaca PcOS Model 62 Slip and Receipt Printer
- Ithaca PcOS Model 63 Slip, Receipt, and Journal Printer
- Ithaca PcOS Model 64 Slip and Journal Printer

PcOS Model 61 Slip Printer

- Prints (or validates) on a variety of forms, such as receipts, credit slips, and multi-part forms (up to four forms in a multi-part form)
- Prints up to 60 characters at 17 characters per inch
- Prints up to 80 characters at 24 characters per inch on single- or multi-part forms
- Prints rotated characters in 90 degree increments
- Senses the top and bottom of forms
- Ejects forms from either the front or rear of the printer

PcOS Model 62 Slip and Receipt Printer

- Adds receipt station to Model 61 Slip Printer
- Prints receipts at 10, 12, 17, or 24 characters per inch
- Prints receipts up to 48 columns at 17 characters per inch
- Cuts receipt automatically
- Prints rotated characters in 90 degree increments

PcOS Model 63 Slip, Receipt, and Journal Printer

- Adds receipt and journal stations to Model 61 Slip Printer
- Prints receipts at 10, 12, 17, or 24 characters per inch
- Prints receipts up to 48 columns at 17 characters per inch
- Cuts receipts automatically
- Prints journal up to 40 columns at 17 characters per inch
- Prints rotated characters in 90 degree increments
- Includes standard automatic journal take-up

PcOS Model 64 Slip and Journal Printer

- Adds journal function to Model 61 Slip Printer
- Prints journal up to 40 columns at 17 characters per inch
- Prints rotated characters in 90 degree increments
- Includes standard automatic journal take-up

Standard Features

- Interfaces
  - Centronics Parallel Interface, 2K buffer
  - RS-232 Serial Interface, 19.2K Baud, 2K buffer
- Up to 7 lines printed per second
- Dual cash drawer drivers with drawer OPEN/CLOSED status
- Snap-on ribbon cassette
- All points addressable graphics
- IBM/Epson compatible
- Self test
- IBM character sets I and II

Optional Features

- Custom PROMS to allow operation in various computer or simulation environments
- Most common languages (number of resident languages depends on language mix

Reliability

- Mean time between failure: 25,000 hours (except printhead)
- Printhead life: 200 million characters
- Auto cutter life: 1 million cuts
- Auto cutter mean time between failure: 300,000 cuts
- Mean time to repair: 15 minutes

Print Characteristics

Character Information

The Ithaca PcOS Series 60 Printers prints characters in a variety of pitches as shown in the following table and print samples. Each pitch can also be printed in a variety of styles affecting the appearance of the characters and the speed of the printer.

For information about programming the printer to print a particular pitch or style, please refer to the "Programming" section on page 29.

Print Pitch Capability	Maximum Characters per Line		
Pitch (Characters per inch)	Slip Station	Receipt Station	Journal Station
10 CPI	34	28	24
12 CPI	42	32	28
17 (Condensed)	60	48	40
24 (Super Condensed)	84	66	56
5 (Double Wide)	17	14	12
6 (Double Wide)	21	16	14
8.5 (Condensed Double Wide)	30	24	20
12 (Super Condensed Double Wide)	42	33	28

Note: 10 Characters per inch is sometimes referred to a Pica, 12 CPI is sometimes referred to as Elite

Rotated Print: The printer can be programmed to rotate characters in 90 degree increments. All rotated print is in the 12 CPI format. For information about programming the printer to rotate characters, please refer to the "Control Codes and Features sections"

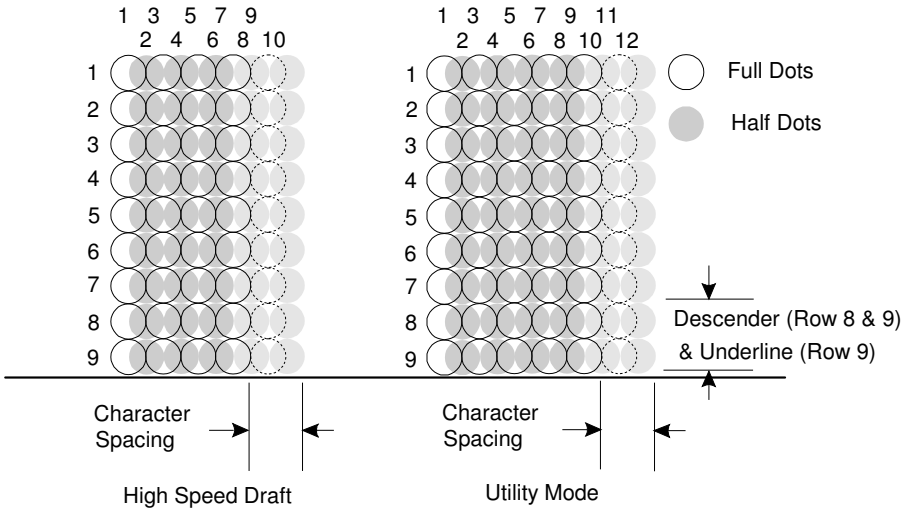
Character Generation

All the character sets and modes are based on one of two character cells, 10 wide by 9 high or 12 wide by 9 high. Double wide mode, is twice the width of the normal mode or 20 wide by 9 high or 24 wide by 9 high.

In utility print mode he character cell consists of five full dots and five half dots horizontally by nine full dots vertically, the character is a 9 by 9 character I High Speed Draft mode the character cell is shortened by one half and one full dot column. This yields a 7 by 9 character.

Each character is justified to the left of the cell. The first four columns of the full dots and the first three columns of half dots are used to generate the character in high speed draft, while the first five columns of the full dots and the first four columns of the half dots are used in utility mode. The last full dot and the last two half dots are used for character spacing in both modes.

The following illustration shows a single wide character cell:

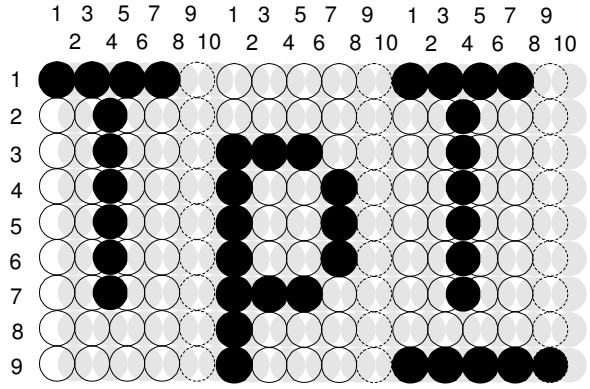


Single Wide Character

The example above shows the full dots as adjacent to each other in the character cell. This is true for the 12 CPI mode only. The 10 CPI mode allows a gap between adjacent full rows, 17 and 24 CPI allow an overlap of full rows.

The printer can not print adjacent full and half dots in any single row. Some graphics (Double Density Half Speed) allow adjacent rows to be printed by slowing the print speed by half. This allows time between half and full columns to be the same as between full columns in full speed operation.

The following illustration shows the use of full and half dots as well as descenders to form characters:



Control Codes Overview

This programmer's guide is designed to help users of Ithaca Peripherals Series 60 Slip Printer develop applications. The Series 60 printers are specialized Point Of Sale POS printers that have several features not normally found on general purpose printers. Because of these special features, the Series 60 printers have some specialized codes that control these features. This programmer's guide documents all the control codes with emphases on those codes that are unique to the Series 60 printer.

All Ithaca Peripherals Series 60 printers have both a serial and parallel interface. Both interfaces provide the same printer control[2] and use the same codes.

Nomenclature

Whenever describing control codes there is confusion as to whether the description is decimal, hex, or ASCII. To minimize this problem, this users guide will use the following nomenclature when describing control code sequences:

[ ]	Enclose a control character. This is a single 8 bit value as defined in the standard ASCII tables. The ASCII chart in Appendix A lists all the control codes. An example would be **[ESC]** which would represent a 1BH or 26 Decimal
< >	Enclose an 8 bit value in decimal format. This value will be from 0 to 255 An example would be **<2>** which would represent 02H or 2 decimal
<n>	This indicates a variable parameter. In this case a variable parameter "n" that can have a value of from 0 to 255. The meaning of "n" is described and defined in the description of the command.
<n>^{1} <n>^{2}	This indicates that there are 2 parameters, n^1 and n^2 where both can have values from 0 to 255.
x	All other characters in control strings represent ASCII characters. For example " **[ESC] 1** " Would represent 1BH followed by 31H.

The CFG60 Configuration and demonstration program[3] uses the same nomenclature. All print examples shown in this manual are available for CFG60.

In many cases, applications require that control sequences be specified in Hex or Decimal codes. In most cases all commands are specified in ASCII, Hex and Decimal. There is an ASCII chart in the Appendix that lists ASCII, Decimal, and Hex Equivalents.

IPCL Codes

IPCL (Ithaca Printer Control Language) codes are designed to control a printer without using control characters. Not all commands are supported by IPCL codes. For those commands that are the IPCL code is listed.

Occasionally an IPCL code will interfere with the text that are to be printed, the IPCL translator can be disabled with an [ESC]y<4> command.

---

[2]The Serial Interface does provide a few additional interface capabilities because of the ability of the serial interface to be bi-directional.

[3]CFG60 is available from Ithaca Peripherals at no cost. This program runs on IBM PC or compatible.

Application Development

To aid in application development there two sections in this manual that are designed to help the programmer understand the series 60 printer.

The first is a **how to** section that explains ways to use the special features and get the most out of the printer.

The second section is an explanation of how the printer, it's print buffer, the communications link, and the host computer interact.

Tables and Charts

Throughout this programmer's guide there are charts and tables that list commands and features. In most cases these charts cross reference the page that describes the command. Commands are grouped by function and can at times be hard to find. To minimize the time it takes to find commands, there are two code summary charts in the following section, one ordered by code and one ordered by function.

Printer Control Codes

Print / Paper Motion

Low Level Paper Motion Control

Function: **Carriage Return**

ASCII: [CR]
Hexadecimal: 0DH
Decimal: <13>
IPCL: &%CR

Description: Print contents of print buffer (if any) and reset the next character print position to the left margin. A line feed is NOT performed. The left margin is defined by the current print station, the print rotation direction and the left margin command.

Function: **Line Feed**

ASCII: [LF]
Hexadecimal: 0AH
Decimal: <10>
IPCL: &%LF

Description: Print contents of buffer (if any) and advance paper one line at the current default line spacing. The next character print position is reset to the left margin. The direction moved is defined by the current print station, the rotated print command, and the paper motion set by the **[ESC] r**, **[ESC] n** or **[ESC] o** commands.

NOTE: The journal feeds only from back to front.

Special Paper Motion

Function: **Fine Line Feed**

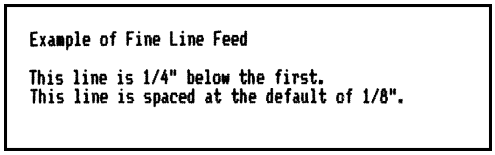
ASCII: [ESC] J <n>
Hexadecimal: 1BH 4AH <n>
Decimal: <27> <74><n>
IPCL: (None)

Description: Print contents of buffer (if any) perform line feed of n/216" . This command does not change the default line spacing value. The next character print position is reset to the left margin.

NOTE: The journal feeds only from back to front.

```
Example of Fine Line Feed[CR]
[ESC]J<54>
This line is 1/4" below the first.[CR][LF]
This line is spaced at the default of
1/8".[CR][LF]
```

Data Sent to printer



Resulting Print

Function: **Feed 2 Inches**

ASCII: [ESC] e
Hexadecimal: 1BH 65H
Decimal: <27><101>
IPCL: &%LC

Description: Feed receipt tape 2.0". This command will feed the Receipt out after a cut until there are 3 print lines left. Typically this command is issued to feed the receipt after the receipt is complete.

This command will also work for the slip station in either front to back or back to front direction. It will feed the slip 2.0".

Function: **Feed 7 Inches**

ASCII: [ESC] d
Hexadecimal: 1BH 64H
Decimal: <27><100>
IPCL: &%LC

Description: Feed form 7". This command will feed the Receipt or Slip 7 inches in the last direction selected. Typically this command is issued to feed the receipt after the receipt is complete, or to eject a form from the printer

This command does not function in journal mode

Function: **Feed to Mark**

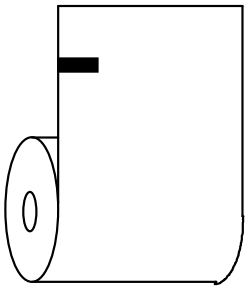
ASCII: [ESC] k
Hexadecimal: 1BH 6BH
Decimal: <27><107>
IPCL: &%LK

Description: Feed receipt tape 7" or to mark.". This command will feed the Receipt out until a black mark is found on the right side of the receipt tape. Typically this command is issued to feed the receipt to locate a marker on a pre printed tape.

When the mark is found it will be about 1.75" from the print line. There will be about 14 lines of print (at 1/8" spacing) to the mark.

NOTE: The knife will not operate if the mark is under the rear slip sensor. The knife safety logic thinks that the receipt is not loaded and will not cycle. Feed the paper past the mark before cutting. Use an [ESC] q command before the [ESC] v to force the knife safety logic to wait for the line feeds before checking the sensors.

The Mark must be at least 0.1875" long and 0.75" from the left side of the Receipt. The mark must not reflect IR. light.



Note: This command does not function in journal mode.

Function: **Feed to End of Slip**

ASCII: [ESC] m
Hexadecimal: 1BH 6DH

Decimal: <27><109>
IPCL: &%LE

Description: Feed the slip to the edge. This command feeds the slip until either the front or the rear slip sensor no longer sees the slip. The slip will be fed in the direction last specified. The feed will be a maximum of 7" and then stop. The **ENQ <5>** and **<6>** commands can be used to verify the operation of this command. A second [ESC] m command can be issued to feed more than 7". If the second command is issued after the end is found it will not cause any paper motion.

When the form is fed from front to back the print line will be about 0.375" from the edge. When the form is fed from back to front the print line will be about 1.75" from the edge.

NOTE: This command does not function in journal mode

Function: **Set Variable Line Space n/216"**

ASCII: [ESC] 3 <n>
Hexadecimal: 1BH 33H <n>
Decimal: <27><51><n>
IPCL: &%SV <n>

Description: Set default line spacing to n/216". Set n =1 to 255. This command sets the line feed spacing used by [LF] to values other than 1/8 or 7/72 inch. This command takes effect immediately as opposed to the set variable line spacing.

NOTE: This command does not affect journal spacing. The journal is always 8 lines per inch. This command is accepted and will affect receipt and slip mode.

Example of Setting Fine Line Feed

This line is 1/4" below the first.

This line is also 1/4" below the last.

Resulted in this print

```
[ESC]3<54>
Example of Setting Fine Line Feed[CR][LF]
This line is 1/4" below the first.[CR][LF]
This line is also 1/4" below the
last.[CR][LF]
```

Data Sent to the printer

Function: **Set Line Space 27/216"**

ASCII: [ESC] 0
Hexadecimal: 1BH 30H
Decimal: <27><48>
IPCL: &%ST

Description: Set default line spacing to 27/216". This is a standard 8 lines per inch line spacing. This is the default text line spacing at power up.

NOTE: The journal is always printed at 8 lines per inch. This command is accepted and will affect receipt and slip mode.

Function: **Set Line Space 21/216" or (7/72")**

ASCII: [ESC] 1
Hexadecimal: 1BH 31H
Decimal: <27><49>
IPCL: &%SG

Description: Set default line spacing to 21/216". This line spacing is for APA (All Points Addressable) Graphics printing.

NOTE: This command will not affect the journal station. This command is accepted in journal mode and will affect receipt and slip mode when selected.

Function: **Set Variable Line Space n/72"**

ASCII: [ESC] A <n>[1]
Hexadecimal: 1BH 41H <n>[1]
Decimal: <27><65><n>
IPCL: (None)

Description: Set default line spacing to $n^1/72$. Set n^1 =1 to 85. This line spacing does not take effect until enabled by the **[ESC] 2** command. This command is provided to maintain backward compatibility with Series 50 and OKIDATA IBM compatible printers. It can be used to print on pre-printed forms.

NOTE: This command will not affect the journal station. This command is accepted and will affect receipt and slip mode.

Function: **Enable [ESC] A <n> line spacing.**

ASCII: [ESC] 2
Hexadecimal: 1BH 32H
Decimal: <27><50>
IPCL: (None)

Description: Enable **[ESC] A <n>** line spacing. This is a companion to the **[ESC] A <n>** command and puts to specified line spacing into effect. It will remain in effect until another line spacing command is issued.

NOTE: This command will not affect the journal station. This command is accepted and will affect receipt and slip mode.

```
[ESC]A<18>
Example of Setting Variable Line
Spacing[CR][LF]
This line is 1/8" below the first.[CR]
[ESC]2[LF]
This line is 1/4" below the last.[CR]
[ESC]0[LF]
```
This line is back at 1/8"[CR][LF]

Data Sent to printer

Example of Setting Variable Line Spacing

This line is 1/8" below the first.

This line is 1/4" below the last.
This line is back at 1/8"

Resulting Print

Function: **Set Line Feed Direction Back to Front**

ASCII: [ESC] n
Hexadecimal: 1BH 6EH
Decimal: <27><110>
IPCL: &%LR

Description: Set slip spacing direction from the back to the front of printer. This command sets the feed direction and will operate in Slip and Receipt mode. This and its companion command **[ESC] o** can be used to move a slip into any print position.

NOTE: This command is overridden by a station select command. Selecting the slip station defines the feed direction to be from front to back. Selecting the receipt station defines feed direction to be from back to front. Once the station is selected the **[ESC] n** command can be used to change the direction.

NOTE: This command will not affect the journal station. This command is excepted and will affect receipt and slip mode.

NOTE: Whenever the slip is moved in the opposite direction of the intended print direction, the feed in the non-print direction should be moved one unit too far. The form should then be repositioned in the intended print direction. This will minimize positioning errors caused by any mechanical backlash.

Function: **Set Line Feed Direction Front to Back**

ASCII: [ESC] o
Hexadecimal: 1BH 6FH
Decimal: <27><111>
IPCL: &%LB

Description: Set slip spacing direction from front to back of printer. This command sets the feed direction and will operate in Slip and Receipt mode. This and its companion command **[ESC] n** can be used to move a slip into any print position.

NOTE: This command is overridden by a station select command. Selecting the slip station defines the feed direction to be from front to back. Selecting the Receipt station defines feed direction to be from back to front. Once the station is selected the **[ESC] o** command can be used to change the direction.

NOTE: Although this command will work on the receipt station, no more than 1/8 inch should be fed, in the front to back direction. It is possible to cut the receipt, feed the receipt to cut with the **[ESC] e** command, and then reverse feed. this will in effect make a slip out of a receipt.

NOTE: This command will not affect the journal station. This command is excepted and will affect receipt and slip mode.

NOTE: Whenever the slip is moved in the opposite direction of the intended print, the feed in the non-print direction should be moved one unit too far. The form should then be repositioned in the intended print direction. This will minimize positioning errors caused by mechanical backlash.

Horizontal Motion Control

There are two commands that can control the horizontal position of characters. Many applications use space control to positions fields, however, there is the ability to control character position with horizontal tab stops and using the horizontal tab [HT] to move to those tab stops.

Function: **Horizontal Tab**

ASCII: [HT]
Hexadecimal: 9H
Decimal: <9>
IPCL: NONE

Description: Inserts spaces in the print buffer up to the next tab stop. The default tab locations are every 8 spaces.

Function: **Set Horizontal Tab Stops**

ASCII: [ESC] D <n>^{1} <n>^{2} <n>^{3} ... <n>^{i} 0
Hexadecimal: 1BH 75H <n>^{1} <n>^{2} <n>^{3} ... <n>^{i} 00H
Decimal: <27><117><n>^{1} <n>^{2} <n>^{3} ... <n>^{i} <0>
IPCL: NONE

Description: Set tab stops at the character columns specified by <n>. The end of the settings is specified by a <0>. All previously set tabs will be cleared by this command. There is no restore defaults procedure other than to re specify the tabs.

Column sizes are in accordance with the current character pitch.

Setting tabs that are beyond the station width is possible. A [CR] will be inserted if the tab is used. Printing will begin at the home position.

The power up default is every 8 spaces, i.e. 9, 17, 25 and so on.

Pitch	Print Station		
CPI[4]	Slip	Receipt	Journal
24	1≤n≤84	1≤n≤66	1≤n≤56
17.1	1≤n≤60	1≤n≤48	1≤n≤40
12	1≤n≤42	1≤n≤32	1≤n≤28
10	1≤n≤34	1≤n≤28	1≤n≤24

Valid tab stops

[4]CPI - Characters Per Inch

Character Pitch

There are a number of Character pitch and print mode operations that are possible and a few that are not. The following table lists the operations that are possible in matrix form.

Operation	10 cpi	12 cpi	17 cpi	24 cpi	Line Graphics	Super / Sub	Util	NLQ	HSD	Emphasize	Enhanced	Double wide	Underline	Rotate 180	Rotate 90°/270°
10 cpi					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	③
12 cpi					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	③
17 cpi					✓	✓	✓	✓	✓	①	✓	✓	✓	✓	③
24 cpi					✓	✓	✓	☹	✓	①	✓	✓	✓	✓	③
Line Graphics	✓	✓	✓	✓		☹	✓	☹	☹	☹	☹	✓	☹	☹	☹
Super / Sub	✓	✓	✓	✓	☹		✓	②	☹	✓	☹	✓	✓	✓	☹
Util	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	☹
NLQ	✓	✓	✓	☹	☹	②				☹	☹	✓	✓	✓	☹
HSD	✓	✓	✓	✓	☹	☹				☹	☹	✓	☹	✓	③
Emphasize	✓	✓	①	①	☹	✓	✓	☹	☹		✓	✓	✓	✓	☹
Enhanced	✓	✓	✓	✓	☹	☹	✓	☹	☹	✓		✓	✓	✓	☹
Double wide	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	☹
Underline	✓	✓	✓	✓	☹	✓	✓	✓	☹	✓	✓	✓		✓	☹
Rotate 180°	✓	✓	✓	✓	☹	✓	✓	✓	✓	✓	✓	✓	✓		
Rotate 90°/270°	③	③	③	③	☹	☹	☹	☹	③	☹	☹	☹	☹		

NOTE: ✓ Feature Available

☹ Feature NOT Available

① Switches to 10 CPI Emphasize. If 17 or 24 CPI was set previously to the emphasize command, the characters will be printed at 10 CPI with Emphasize. When Emphasize is terminated, the print will revert to 17 or 24 CPI.

② Prints half high full width utility script.

③ In rotated 90° or 270° mode the print is done in APA Graphics. The print is in 12 CPI character cell size. The inter-character spacing can be adjusted with the normal line spacing commands.

Function: **Begin 10 CPI character pitch**

ASCII: [DC2]
Hexadecimal: 12H
Decimal: <18>
IPCL: &%F3

Description: Set 10 character per inch print pitch.

Function: **Begin 12 CPI character pitch**

ASCII: [ESC] :
Hexadecimal: 1BH 3AH
Decimal: <27><58>
IPCL: &%F2

Description: Set 12 character per inch print pitch

Function: **Begin 17 CPI character pitch**

Mode: Global
ASCII: [SI]
Hexadecimal: 0FH
Decimal: <15>
IPCL: &%F1

Description: Set 17 character per inch print pitch

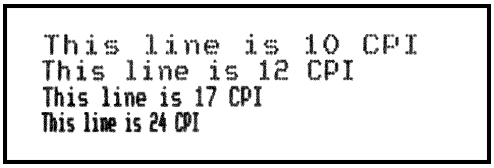
Function: **Begin 24 CPI character pitch**

Mode: Global
ASCII: [ESC] [SI]
Hexadecimal: 1BH 0FH
Decimal: <27><15>
IPCL: &%F4

Description: Set 24 character per inch print pitch

```
[DC2]
This line is 10 CPI[CR][LF]
[ESC]:
This line is 12 CPI[CR][LF]
[SI]
This line is 17 CPI[CR][LF]
[ESC][SI]
This line is 24 CPI[CR][LF]
```

Data sent to the printer



Resulting print

Function: **Begin one line double wide print**

ASCII: [SO]
Hexadecimal: 0EH
Decimal: <14>
IPCL: &%MW

Description: This command causes subsequent characters to be printed at twice the currently selected character width. For example 10 cpi becomes 5 cpi, 17 cpi becomes 8.5 cpi etc. This command remains in effect until :

a. - a valid line terminator is received (**CR**, **LF**, or Fine Line Feed)

b. - The command is canceled

c. - The maximum number of characters per line is reached and the printer performs an auto print

```
Example of one line Double Wide[CR][LF]
This is normal 12 CPI Print[CR][LF]
[SO]
Double Wide[CR][LF]
This is back to normal[CR][LF]
```

Data Sent To Printer

```
Example of one line Double Wide
This is normal 12 CPI Print
Double Wide
This is back to normal
```

Resulting Print

Function: **Cancel one line double wide print**

ASCII: [DC4]
Hexadecimal: 14H
Decimal: <20>
IPCL: &%MN

Description: Cancel one line double wide mode set by **[SO]** command. This command allows single and double wide characters to be printer on the same line.

Function: **Begin Multi line double wide print**

ASCII: [ESC] W <1>
Hexadecimal: 1BH 57H 01H
Decimal: <27><87><1>
IPCL: &%FD

Description: Begin Multi-line line double wide mode. This command is similar to the **[SO]** command except that the printer will remain in double wide mode until the **Cancel Multi Line double wide** command is received.

Function: **Cancel Multi-line line double wide print**

ASCII: [ESC] W <0>
Hexadecimal: 1BH 57H 00H
Decimal: <27><87><0>
IPCL: &%FE

Description: Cancel Multi-line line double wide mode set by **[ESC] W <1>** command

Character Font

Function: **Begin High Speed Draft Mode (HSD) (Power on Default)**

ASCII: [ESC] # <0>
Hexadecimal: 1BH 23H 00H
Decimal: <27><35><0>
IPCL: &%QT

Description: Begin Draft print mode (1 pass 7x7 font). **Enhanced, Emphasized, Subscript, Superscript,** and **Underline** character attributes are not available in this mode.

To maintain optimum print speed the printer should be returned to High Speed Draft mode when enhanced print is not required.

Function: **Begin Utility Print**

ASCII: [ESC] I <1>
Hexadecimal: 1BH 49H 01H
Decimal: <27><73><1>
IPCL: &%QU

Description: Begin Utility print mode (1 pass 9x7 font). Utility print mode enables **Enhanced, Emphasized, Subscript, Superscript,** and **Underline** character attributes. Print speed is reduced approximately 20% over the High speed Mode (HSD).

Function: **Begin Enhanced Print**

ASCII: [ESC] I <2>
Hexadecimal: 1BH 49H 02H
Decimal: <27><73><2>
IPCL: &%QE

Description: Begin Enhanced print mode (2 pass 9x7 font). Print speed is reduced approximately 40% over the High speed Mode (HSD). The effect is to darken the resulting print

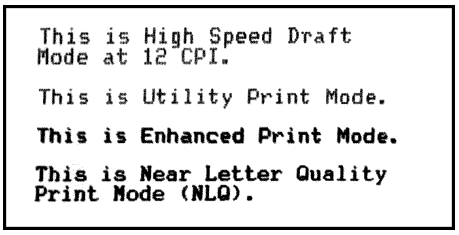
Function: **Begin NLQ Print**

ASCII: [ESC] I <3>
Hexadecimal: 1BH 49H 03H
Decimal: <27><73><3>
IPCL: (None)

Description: Begin NLQ print mode (2 pass 9x7 font). This is generally regarded as a Near Letter Quality print node. The print speed is reduced and character features are added to the font to enhance the appearance.

```
[ESC]f[ESC]:
{rpt:5}[LF]
[ESC]v
[ESC]#<0>
This is High Speed Draft [CR][LF]
Mode at 12 CPI.[CR][LF][LF]
[ESC]I<1>
This is Utility Print Mode.[CR][LF][LF]
[ESC]I<2>
This is Enhanced Print Mode.[CR][LF][LF]
[ESC]I<3>
This is Near Letter Quality[CR][LF]
Print Mode (NLQ).[CR][LF][LF]
[ESC]z
```

Data sent to the printer



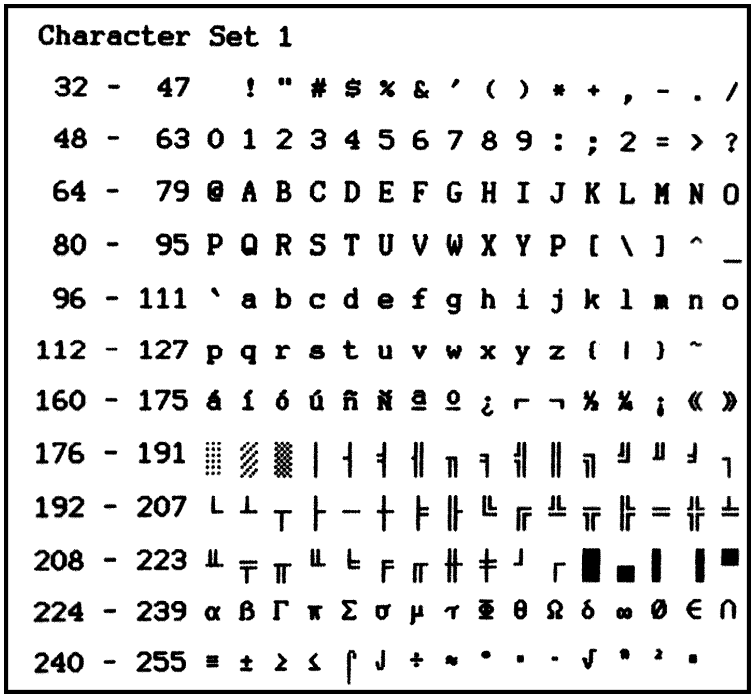
Resulting Print

Function: **Select Character Set 1 (Default Character set)**

ASCII: [ESC] 7
Hexadecimal: 1BH 37H
Decimal: <27><55>
IPCL: &%C1

Description: Select character set 1. This character set consists of characters 32 through 127 and 160 through 255 in the character chart below. Characters 128 through 159[5] are not implemented and should not be sent to the printer.

NOTE: Characters 176 through 228 (Block Graphics) and 244 should not be used in journal mode as they are multiple pass fonts that will not print well on the journal.



[5]Because of limited code space the validity of characters between 128 and 159 are not checked in character set 1. In most cases sending these values to the printer will have unexpected effects.

Function: **Select Character Set 2**

ASCII: [ESC] 6
Hexadecimal: 1BH 36H
Decimal: <27><54>
IPCL: &%C2

Description: Select character set 2. This is a full character set. It includes characters between 32 and 255 from the chart below.

NOTE: Characters 176 through 228 (Block Graphics) and 244 should not be used in journal mode as they are multiple pass fonts that will not print well on the journal.

Character Set 2

32 - 47		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
48 - 63	0	1	2	3	4	5	6	7	8	9	:	;	2	=	>	?
64 - 79	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80 - 95	P	Q	R	S	T	U	V	W	X	Y	P	[	\	]	^	_
96 - 111	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
112 - 127	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
128 - 143	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	Ï	î	ì	Ä	Å
144 - 159	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	Ü	¢	£	¥	R	ƒ
160 - 175	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
176 - 191	▒	▒	▒	|	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
192 - 207	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
208 - 223	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	▒	▒	▒	▒	▒
224 - 239	α	ß	Γ	π	Σ	σ	µ	τ	Φ	θ	Ω	δ	∞	Ø	∈	∩
240 - 255	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	∎	

Print Rotation Commands

To provide flexibility in printing on preprinted and various size forms, rotated print capability is provided in slip and receipt mode. This mode will rotate the print in any of three 90 degree orientations.

In 90° and 270° rotated mode, the print data is first buffered by the printer, processed (rotated) and then printed. This causes the print process to be delayed slightly as it takes some time to process the data before it is printed. In 180° mode, the print is simply inverted.

Because the rotated 90° and 270° print buffer is limited to 1024 characters, the amount of rotated print is limited. The technique used by the Series 60 printer is to receive all the print to be rotated and convert it into graphics. This requires buffer space for all possible characters in each print line. Each line has a fixed length buffer regardless of how much data is actually sent to the printer. The printer will space fill the buffer for each line to the maximum size. This means that a short line of two characters will take as much buffer space as a long line.

To make the most efficient use of buffer space the line length is pre defined. The default line length is 48 characters which leaves room for 21 lines. To allow longer lines to be printed the line length can be changed, however no more than 25 lines are allowed and no more than 80 characters per line are allowed. For example if the line length is expanded to 80 there is buffer space for 1024/80 or 12 lines.

The spacing between lines is controlled by a line spacing table. This table is defined by the rotated print line spacing (**[ESC] u ...)** command. This command specifies the number of dots between each printed line. Each line has an entry in the table. There is room for 25 lines in the table. The default and minimum is one dot or 1/60 of an inch between lines or 6 2/3 lines per inch.

The character cell is a 5x8 with one dot of white space min. If the spacing between lines is set to 1 the character cell will be 5x9. If the spacing is set to 2 dots the cell will be 5 x 10 and so on. The following table specifies lines per inch for various numbers of inserted dots.

Number of dots added	1	2	3	4	5	6	7
Cell Size	5x9	5x10	5x11	5x12	5x13	5x14	5x15
Line spacing (inches)	0.15"	0.167	0.183	0.20	0.22	0.23	0.25
Number Lines/inch	6.667	6	5.45	5	4.62	4.29	4

In rotated 90° or 270° mode the print is done in APA[6] Graphics. The print is in a modified 12 CPI character cell size. The inter-character spacing is adjusted with the normal line spacing commands. The **[ESC]3<n>** command is the most effective command for adjusting inter character spacing. Because the character is close to a 12 CPI cell, much less than 12 CPI will force the characters to overlap. (Spacing of 12 CPI is obtained with an **[ESC] 3 <18>.**)

When rotate 90° or 270° is selected only normal text can be printed. Underline, Enhanced, Emphasized and other attributes will not function. See chart on page 21 for a list of available features.

In rotated 180° mode the 10, 12, 17, and 24 CPI spacing commands are effective. This mode of operation simply inverts and mirrors the print operation. All line spacing and print features are available. It should be noted that the feed direction is not affected by any of the rotate commands.

[6]APA - All Points Addressable

Function: **Begin 90 Degree Rotated Print**

ASCII: [ESC] r <1>
Hexadecimal: 1BH 72H 01H
Decimal: <27><114><1>
IPCL: &%R1

Description: Print data is entered in normal left to right, top to bottom format. When an **End Rotated Print ([ESC] r <0>)** command is received, the printer will format and print the data. The print will be rotated 90 degrees according to the current stored format parameters. In slip mode, the rotated pattern will be 180 degrees different than in receipt mode. However, the resulting print will be the same provided the feed direction is correct.

NOTE: Do not use this command in journal mode. It will not function correctly.

Function: **Begin 270 Degree Rotated Print**

ASCII: [ESC] r <3>
Hexadecimal: 1BH 72H 03H
Decimal: <27><114><3>
IPCL: &%R3

Description: Print data is entered in normal left to right, top to bottom format. When an **End Rotated Print ([ESC] r <0>)** command is received, the printer will format and print the data. The print will be rotated 270 degrees according to the current stored format parameters.

NOTE: In receipt mode this rotation requires that the text be sent to the printer in reverse. The feed direction in receipt mode must always be from back to front. It is recommended that only rotate 90° be used on the receipt.

NOTE: Do not use this command in journal mode. It will not function correctly.

Function: **Begin 180 Degree Rotated Print**

ASCII: [ESC] r <2>
Hexadecimal: 1BH 72H 02H
Decimal: <27><114><2>
IPCL: &%R2

Description: All subsequent lines will be rotated 180 degrees and positioned at the opposite margin. This command is effective on all stations including the journal. This command will remain in effect until rotation is canceled with an **End Rotated Print ([ESC] r <0>)** command, or a station select command is issued.

NOTE: The last line of print must be terminated with a line terminator before the END rotated command is issued. Any characters in the print buffer that have not been printed will not be printed. They will be printed un-rotated when a line terminator is received.

NOTE: The definition of normal is rotated 180° on the slip station.

Function: **End Rotated Print**

ASCII: [ESC] r <0>
Hexadecimal: 1BH 72H 00H
Decimal: <27><114><0>
IPCL: &%R0

Description: Print contents of rotated print buffer (if 90 or 270 degree mode) and return to normal print orientation.

In 180 degree mode the printer will return to normal mode. Characters in the print buffer that have not been printed will **NOT** be printed.

NOTE: The definition of normal is rotated 180 on the slip station.

Function: **Set Rotated Print Line Length**

ASCII: [ESC] s <n>
Hexadecimal: 1BH 73H <n>
Decimal: <27><115><n>
IPCL: &%RL <n>

Description: Sets the print line length to be used in Auto Format rotated print mode. The maximum number of characters is 80 per line. The power on default line length is 48 characters.

The number of available print lines is found by dividing 1024 by the number of characters per line and rounding down to the nearest whole number. The minimum number is 40 characters. Any value less than 40 will not allow any additional print lines to be printed.

Function: **Set Rotated Print Line spacing**

ASCII: [ESC] u $<n>^1$ $<m>^1$ $<n>^2$ $<m>^2$... $<n>^i$ $<m>^i$ 0
Hexadecimal: 1BH 75H $<n>^1$ $<m>^1$ $<n>^2$ $<m>^2$ ... $<n>^i$ $<m>^i$ 00H
Decimal: <27><117>$<n>^1$ $<m>^1$ $<n>^2$ $<m>^2$ ... $<n>^i$ $<m>^i$ <0>
IPCL: &%RP $<n>^1$$<m>^1$ $<n>^2$ $<m>^2$ ... $<n>^i$ $<m>^i$ 0

Description: Adjust line spacing for each rotated print line. Where n^i is the line number, m^i is the spacing in dot columns (1/60") from the previous line.

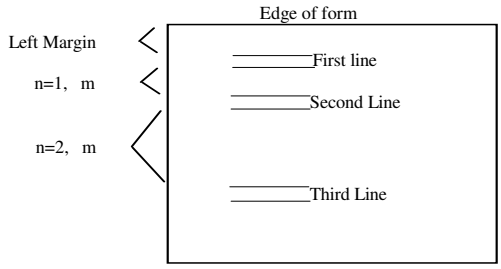
For the first print line the distance is calculated from the margin. An n^i value of 0 is used to terminate the command. Any unspecified spacing will be set to 1. This allows data to be accurately positioned on an inserted form. These values will be used as a template for all subsequent rotated print. On power up, all spacings are preset to 1/60" (n=1, 6.667 Lines per inch) for all lines. This command is only effective in 90° and 270° degree rotation. It will remain in effect until a new table is received or until the printer is power cycled. An [ESC] u <0> will have the effect of setting all lines to 1.

The value of m can be from 1 to 127, n can be from 1 to 25.

NOTE: When this command is used ENQ processing must be disabled. This will prevent unwanted ENQ responses.

Number of dots added	1	2	3	4	5	6	7
Cell Size	5x9	5x10	5x11	5x12	5x13	5x14	5x15
Line spacing (inches)	0.15"	0.167	0.183	0.20	0.22	0.23	0.25
Number Lines/inch	6.667	6	5.45	5	4.62	4.29	4

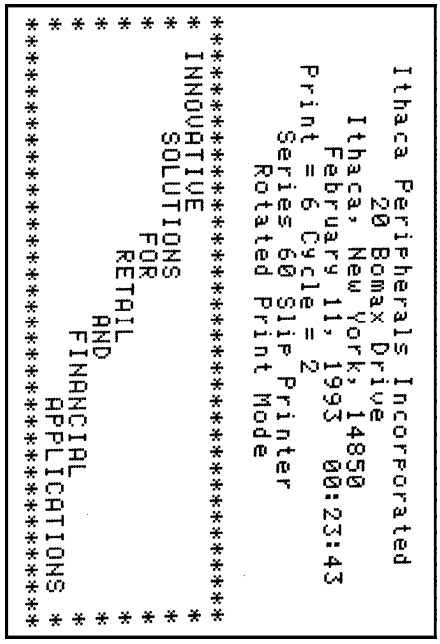
The following chart illustrates the line spacing command.



The print example on the right is an example of rotated print. It was obtained with the following print codes:

```
[ESC]h
[ESC]m[ESC]m[ESC]n[ESC]e[ESC]h
[ESC]1
[ESC]r<1>
   Ithaca Peripherals Incorporated   [CR][LF]
            20 Bomax Drive           [CR][LF]
      Ithaca, New York, 14850        [CR][LF]
                                     [CR][LF]
        {date:0}  {time:1}[CR][LF]
       Series 60 Slip Printer        [CR][LF]
         Rotated Print Mode          [CR][LF]
                                     [CR][LF]
************************************[CR][LF]
* INNOVATIVE                       *[CR][LF]
*       SOLUTIONS                  *[CR][LF]
*             FOR                  *[CR][LF]
*              RETAIL              *[CR][LF]
*                  AND             *[CR][LF]
*                   FINANCIAL      *[CR][LF]
*                       APPLICATIONS *[CR][LF]
************************************[CR][LF]
[ESC]r<0>[ESC]0[ESC]n
{rpt:32}[LF]
[ESC]z
```

Data Sent to the printer



Resulting Print

Character Attribute Commands

Function: **Begin Underline**
ASCII: [ESC] - <1>
Hexadecimal: 1BH 2DH 01H
Decimal: <27><45><1>
IPCL: &%MU
Description: Begin Underline print mode. All subsequent text and leading spaces will be underlined. Trailing spaces are also underlined.

NOTE: Underline is not available in Enhanced Print Modes. See page 21 for available modes.

Function: **End Underline**
ASCII: [ESC] - <0>
Hexadecimal: 1BH 2DH 00H
Decimal: <27><45><0>
IPCL: &%CU
Description: Ends Underline print mode.

Function: **Begin Enhanced Print**
ASCII: [ESC] G
Hexadecimal: 1BH 47H
Decimal: <27><71>
IPCL: &%ME
Description: All subsequent text will be printed in enhanced print mode (2 pass w/ vertical offset). Enhanced printing provides a deeper resolution of each character and may enhance multiple part form printing.

NOTE: This mode is not available on the journal.

Function: **End Enhanced Print Mode**
ASCII: [ESC] H
Hexadecimal: 1BH 48H
Decimal: <27><72>
IPCL: &%CE
Description: Cancel Enhanced print mode and return to currently selected font.

Function: **Begin Emphasized Print**
ASCII: [ESC] E
Hexadecimal: 1BH 45H
Decimal: <27><69>
IPCL: &%MM
Description: Begin Emphasized print mode (1 pass w/ horizontal offset). This print is bolder than normal print.

Function: **End Emphasized Print**
ASCII: [ESC] F
Hexadecimal: 1BH 46H
Decimal: <27><70>
IPCL: &%CM
Description: Cancel Emphasized print mode

Function: **Select Superscript**
ASCII: [ESC] S <0>
Hexadecimal: 1BH 53H 00H
Decimal: <27><83><0>
IPCL: &%SP

Description: Selects Superscript. All following characters will be printed half size on the upper side of the print line.

NOTE: This feature is not available in all print modes. See page 21 for available modes.

Function: **Select Subscript**
ASCII: [ESC] S <1>
Hexadecimal: 1BH 53H 01H
Decimal: <27><83><1>
IPCL: &%SB

Description: Selects Subscript. All following characters will be printed half size on the bottom side of the print line.

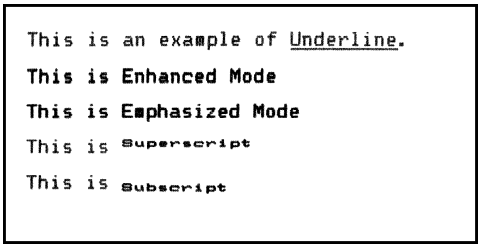
NOTE: This feature is not available in all print modes. See page 21 for available modes.

Function: **End Superscript or Subscript**
ASCII: [ESC] T
Hexadecimal: 1BH 53H
Decimal: <27><84>
IPCL: &%SE

Description: Ends Superscript or Subscript.

```
[ESC]f
[ESC]:
[ESC]I<1>
[ESC]v
{RPT:5}[LF]
This is an example of [ESC]-<1>Underline[ESC]-
<0>.[CR][LF][LF]
[ESC]G
This is Enhanced Mode[CR][LF][LF]
[ESC]H
[ESC]E
This is Emphasized Mode[CR][LF][LF]
[ESC]F
This is [ESC]S<0>Superscript[ESC]T[CR][LF][LF]
This is [ESC]S<1>Subscript[ESC]T[CR][LF][LF]
[ESC]z
```

Data Sent to the printer



Resulting Print

Graphics Mode

NOTE: Be sure to **disable ENQ commands** before sending graphics data.

NOTE: The journal feeds only from back to front.

Function: **Begin Unidirectional Print**

ASCII: [ESC] U <1>
Hexadecimal: 1BH 55H 01H
Decimal: <27><85><1>
IPCL: &%GU

Description: Print all data in unidirectional print mode to improve line to line registration for graphics data.

NOTE: This command should be canceled before normal text is printed. It will slow print if it is not canceled.

Function: **Begin Bi-directional Print**

ASCII: [ESC] U <0>
Hexadecimal: 1BH 55H 00H
Decimal: <27><85><0>
IPCL: &%GB

Description: Print all data in bi-directional, logic seeking print mode.

Function: **Print Single Density Graphics (60 72dpi)**

ASCII: [ESC] K <n>^{1} <n>^{2}
Hexadecimal: 1BH 4BH <n>^{1} <n>^{2}
Decimal: <27><75><n>^{1} <n>^{2}
IPCL: &%GS <n>^{1} <n>^{2}

Description: Print n1 + 256*n2 bytes of single density graphics (60 dpi).

Function: **Print Double Density Graphics (120 x 72dpi)**

ASCII: [ESC] L <n>^{1} <n>^{2}
Hexadecimal: 1BH 4CH <n>^{1} <n>^{2}
Decimal: <27><76><n>^{1} <n>^{2}
IPCL: &%GD <n>^{1} <n>^{2}

Description: Print n1 + 256*n2 bytes of double density graphics (120 dpi)

Function: **Print Double Density Graphics (120 x 72 dpi)**

ASCII: [ESC] Y <n>^{1} <n>^{2}
Hexadecimal: 1BH 59H <n>^{1} <n>^{2}
Decimal: <27><89><n>^{1} <n>^{2}
IPCL: &%GF <n>^{1} <n>^{2}

Description: Print n1 + 256*n2 bytes of double density graphics (120 dpi) full speed, no consecutive dots.

Station Control

The Series 60 printer differs from a normal computer type printer in that it is meant for retail point of sale applications. This requires that the printer have control sequences that are not normally found in data processing and general purpose printers. These commands fall into two categories; Station Control and Miscellaneous control.

Function: **Load Receipt Paper**

ASCII: [ESC] f
Hexadecimal: 1BH 66H
Decimal: <27><102>
IPCL: &%SR

Description: Enter receipt mode. This command reset margins, homes the print head and positions receipt tape under print head. The paper feed direction is set from back to front. All subsequent data will be printed on the receipt.

While the receipt tape in still in the receipt paper path, the feed direction should not be reversed.

Function: **Activate Receipt Cutter**

ASCII: [ESC] v
Hexadecimal: 1BH 76H
Decimal: <27><118>
IPCL: &%FC

Description:. Cut receipt tape. This command is only active in receipt mode when both sensors are covered. It will cut the receipt tape 3.0" from the current print line. Printing can continue to 0.5" from the end of the receipt.

Function: **Select Journal Station**

ASCII: [ESC] g
Hexadecimal: 1BH 67H
Decimal: <27><103>
IPCL: &%SJ

Description: Enter journal mode. Reset margins and home the print head. All subsequent data will be printed on the journal tape.

Under normal operation, if the journal is selected while there is a slip or receipt in the printer an alarm will be displayed. To optimize the printing of journal entries after slip and receipt operations, there is a way to issue a journal select command and have the printer wait for the slip or receipt to be removed.

If the slip clamp is closed and only the front sensor is covered the printer will accept a "select journal" command and wait for the front sensor to be cleared. The printer will then start automatically start the journal operation.

To leave the slip clamp closed after a slip or receipt operation, feed the receipt or slip from back to front until it is out from under the feed rollers. Leave the slip clamp closed and start the journal operation. When the slip or receipt is removed the journal print will start after a short delay.

Function: **Open Slip Clamp**

ASCII: [ESC] z
Hexadecimal: 1BH 7AH
Decimal: <27><122>
IPCL: &%SO

Description: Open Forms Compensation Assembly for insertion/removal of slip. This command can also be used to release the receipt.

Function: **Clamp on Slip**

ASCII: [ESC] j
Hexadecimal: 1BH 6AH
Decimal: <27><106>
IPCL: &%SN

Description: Enter slip mode. This command resets the margins, homes the print head and clamps on the inserted form.

If there is no form present or it is not fully inserted the command will **NOT** generate an error.

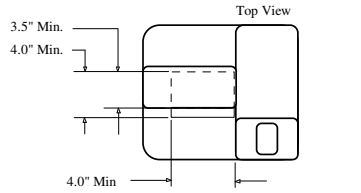
If the application program in the host computer is to control the slip insertion before the command is issued the ENQ 5 and 6 status request codes can be sent to the printer to query the sensor status.

Function: **Load Slip , Position to first print line**

ASCII: [ESC] i
Hexadecimal: 1BH 69H
Decimal: <27><105>
IPCL: &%SF

Description: Enter slip mode and position slip to first print line. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the first available print line. The first line is 0.75 inches from the top of form[7].

Form Requirements for [ESC] i and [ESC] h



Note: Model 61 and 62 printers will accept forms less than 4.0".

If there is no form present or it is not fully inserted, the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly and reselecting the printer.

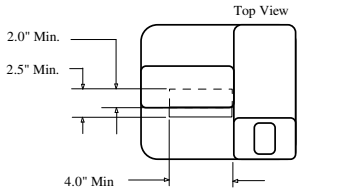
If the application program in the host computer is to control the slip insertion, the ENQ 5 and 6 status request commands can be sent to the printer to query the sensor status before the Load Slip command is issued.

[7] It is possible to print closer than 0.75 inches of the top of the form. Byusing the [ESC] b or [ESC]B commands. However, you will not be able to print within 0.75 Inches of the bottom of the form.

Function: **Load Slip , Position to first print line**

ASCII: [ESC] M
Hexadecimal: 1BH 4DH
Decimal: <27><77>
IPCL: &%SF

Form Requirements for [ESC] M and [ESC] N



Note: Model 61 and 62 printers will accept forms less than 4.0".

Description: Enter slip mode and position slip to first print line. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the first available print line. The first line is 0.75 inches from the top of form.

If there is no form present, the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly and reselecting the printer.

Unlike the [ESC] i command this command requires that only the front Slip Sensor be covered and the form be under the feed rolls. The printer will load the form to the rear sensor to check for alignment. If the form is not found an error is generated. The form must be at least 2.5 Inches long and 4.0 Inches wide for proper operation.

If the application program in the host computer is to control the slip insertion, the ENQ 5 status request command can be sent to the printer to query the sensor status before the Load Slip command is issued.

Function: **Load Slip, Position to Top of Form**

ASCII: [ESC] h
Hexadecimal: 1BH 68H
Decimal: <27><104>
IPCL: &%SL

Description: Enter slip mode and position the slip to the top of the form. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the edge of the rear slip sensor. This is 1.75 inches from the top of form.

If there is no form present or it is not fully inserted the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly, and reselecting the printer.

If the application program in the host computer is to control the slip insertion, the ENQ 5 and 6 status request commands can be sent to the printer to query the sensor status before the Load Slip command is issued.

Function: **Load Slip, Position to Top of Form**

ASCII: [ESC] N
Hexadecimal: 1BH 4EH
Decimal: <27><78>
IPCL: &%SQ

Description: Enter slip mode and position the slip to the top of the form. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the edge of the rear slip sensor. This is 1.75 inches from the top of form.

If there is no form present the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly, and reselecting the printer.

Unlike the [ESC] h command this command requires that only the front Slip Sensor be covered. The printer will load the form to the rear sensor to check for alignment. If the form is not found an error is generated. The form must be at least 2.5 Inches long and 4.0 Inches wide for proper operation.

If the application program in the host computer is to control the slip insertion, the ENQ 5 status request command can be sent to the printer to query the sensor status before the Load Slip command is issued.

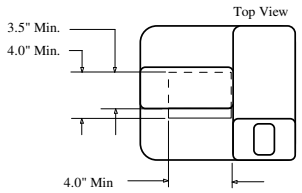
Function: **Load Slip, Position to Top of Form (rotated 180°)**

ASCII: [ESC] b
Hexadecimal: 1BH 62H
Decimal: <27><98>
IPCL: &%SW

Comment [RSQ1]:

Description: Enter slip mode and position the slip to the top of the form. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the first print line of the form 0.35 inches from the top of the form.

Form Requirements for [ESC] b



Note: Model 61 and 62 printers will accept forms less than 4.0".

Unlike previous slip load commands, this command prints upside down and as the form moves out of the printer. That is the top of the form is toward the operator.

If there is no form present the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly, and reselecting the printer.

Unlike the [ESC] B command this command requires that both the front and the rear Slip Sensor be covered. If the edge of the form is not found an error is generated. The form must be at least 3.5 Inches long and 4.0 Inches wide for proper operation.

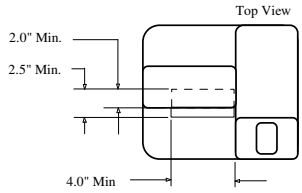
If the application program in the host computer is to control the slip insertion, the ENQ 5 status request command can be sent to the printer to query the sensor status before the Load Slip command is issued.

Function: **Load Slip, Position to Top of Form (rotated 180°)**

ASCII: [ESC] B
Hexadecimal: 1BH 42H
Decimal: <27><66>
IPCL: &%SX

Description: Enter slip mode and position the slip to the top of the form. This command resets the margins, homes the print head and clamps on the inserted form. It then positions the form to the first print line of the form 0.35 inches from the top of the form.

Form Requirements for [ESC] B



Note: Model 61 and 62 printers will accept forms less than 4.0".

Unlike previous slip load commands, this command prints upside down and as the form moves out of the printer. That is the top of the form is toward the operator.

If there is no form present the command will generate an error. The error can be cleared by pressing the Select key, inserting the form correctly, and reselecting the printer.

Unlike the [ESC] b command this command requires that only the front Slip Sensor be covered. If the edge of the form is not found an error is generated. The form must be at least 2.5 Inches long and 4.0 Inches wide for proper operation.

If the application program in the host computer is to control the slip insertion, the ENQ 5 status request command can be sent to the printer to query the sensor status before the Load Slip command is issued.

Function: **Set Slip Left Print Margin**

ASCII: [ESC] p <n>
Hexadecimal: 1BH 70H <n>
Decimal: <27><112>
IPCL: &%LM <n>

Description: Set left print margin in 1/60" increments where 0< n < 127. This is the left as you look at the printer from the front or view the resulting print. If in rotated 180 Degree print mode the left margin is on the right of the printer but still on the left of the printed form.

NOTE: This command works only in slip mode.

Function: **Enable or Disable Dual Station Operation**

ASCII: [ESC] l <n>

Hexadecimal: 1BH 6CH <n>
Decimal: <27><108><n>
IPCL: &%SD (Enable Dual Station)
IPCL: &%SS (Single Station)

Description: If n = 1 Dual Station is enabled. In this mode both the Receipt and Journal (or the Slip and Journal) will feed. This allows the journal to record the information printed on the receipt or inserted form. If n = 0 the printer will revert back to single station operation. The effect of this command is to enable journal feed in Slip and Receipt modes.

This mode requires that the journal paper be self-printing and the print to be recorded on the journal be centered on the journal print zone.

Note: The journal will feed back to front with fixed feed only. This should be taken into consideration when this mode is used.

When any station select commands are issued, the printer will revert to single station operation.

Miscellaneous Control

Function: **Clear Print Buffer**

ASCII: [CAN]
Hexadecimal: 18H
Decimal: <24>
IPCL: &%RD

Description: Clears print buffer. This command clears any unprinted information in the printer received before the [CAN].

If the input buffer is not being processed (because the printer is out of paper or the form is not inserted) the CAN command will not be processed until after the error is cleared.

If the serial interface is being used an [ENQ] <10> will reset the printer and clear any clearable errors. In parallel mode toggling the INIT signal will reset the printer. Both of these "Reset" operations will reset the printer to the power on defaults.

The CAN command does **NOT** restore default conditions. It only clears the print buffers.

Function: **Wait in Print Que.**

ASCII: [ESC] q
Hexadecimal: 1BH 71H
Decimal: <27><113>
IPCL: NONE

Description: This command waits at the output of the print buffer Que. until the printer has completed all previous tasks. This command is used to allow ENQ <3> commands to return buffer not empty until the printer has completed all operations. This has no effect on print data or print mode.

Function: **Wait for Print Que.**

ASCII: [ESC] Q
Hexadecimal: 1BH 51H
Decimal: <27><81>
IPCL: NONE

Description: This command waits at the output of the print buffer Que. until the printer has completed all previous tasks. This command will respond to the host with an acknowledge when all previous commands have been completed. This has no effect on print data or print mode.

In serial mode this command will return an [ETX] to the host. In parallel mode a busy/acknowledge sequence will be issued. A detailed description of this response is described in the Parallel & Serial Port Acknowledge sections.

Function: **Open Cash Drawer**

ASCII: [ESC] x <n>
Hexadecimal: 1BH 78H <n>
Decimal: <27><120><n>
IPCL: &%D1 For Cash Drawer 1
IPCL: &%D2 For Cash Drawer 2

Description: Energize cash drawer n for 150 msec.

Note: The open cash drawer commands are processed as part of print data. They are not processed until they are found in the input buffer by the print processor. They are not immediate commands.

Note: Cash drawer 1 is the connector nearest the communications cable.

Note: Cash drawer 2 is configurable in one of two modes. Either pin 2 or 3 is active depending on an internal jumper setting. The factory default is pin 3. Cash drawer 1 is always on pin 2.

Printer Status Set/Inquire

The Series 60 printer is designed to be used as part of an automated system where the host computer will make every attempt to correct problems with the printer. In addition, the host application requires that it be able to obtain more information from the printer than is typical of normal computer printers. The normal computer printer interfaces do not have cash drawers and slip stations to deal with. This requires that the standard printer protocol be extended to deal with the added features of a POS printer.

The Series 60 printer has defined a set of status inquiry commands that will allow a host to obtain information about the printer and devices connected to it. The method chosen to interact with the computer is designed to allow a reasonable approach to the host application. It will not always be possible for an existing application to use the ENQ commands unless the communications drivers are available to the programmer.

There are 7 status inquiry commands and 2 ENQ status set commands. The ENQ character is treated differently from all other characters received by the printer. In normal operation all information that is sent to the printer is received and placed in a holding buffer. The information stays in the holding buffer until the printer prints or interprets it. The ENQ commands are intercepted and acted on before they are placed in the input buffer. This presents a few problems for the printer. To allow the printer to operate as fast as possible, the normal commands are not interpreted by the ENQ preprocessor. It is possible for an ENQ sequence to be found by the pre-processor that is really part of a different command or part of graphics. For this reason a command is provided to disable the pre-processor. (See [ESC] y <n> below).

Another **IMPORTANT** effect on the printer by ENQ commands is performance. The priority of communications in the printer is very high. ENQ commands are processed at the high priority of the input ISR[8]. It is possible for the host computer to send ENQ commands so fast that the printer does not have any time for printing (or do any thing else). ENQ commands must be paced to allow the printer time to get to its idle task. The pacing of ENQ's should average no more than 100 per second.

In serial mode it is very **IMPORTANT** that the response to an ENQ be received by the host before another command is issued to the printer. When an ENQ is received by the printer, the printer may do some complicated processing at a very high priority. During this time the printer disables it's interrupts. This means that any data sent to the printer during this time may be lost. In parallel mode this is not a problem because the printer remains busy until the processing is complete.

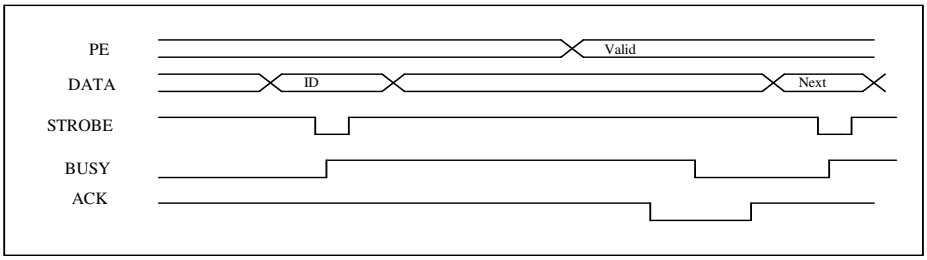
All ENQ commands require a response from the printer. For this reason the parallel and serial operation of ENQ commands are different. In serial operation all ENQ commands are responded to by ACK or NAK and then the command ID. In parallel operation the PE (Paper Error) signal is driven as a response to an ENQ.

The serial ACK or NAK responses are always uniform and followed with a command ID. This makes the design of the host application easier because the response can be identified and always follows the same format.

In parallel operation there is no easy way to return complex information to the host. For this reason the PE (Paper Error) signal is driven in response to ENQ's. If a true PE is being signaled the fault line will also be driven. It is, therefore, possible to distinguish between a paper error and an ENQ response.

In parallel mode the printer will respond to the ENQ before the parallel sequence is complete. That is when the parallel port acknowledges the ID part of the ENQ sequence, the PE signal will be valid. The host must, however, remember what status was requested as the printer has no way of signaling that information. In addition the host must not interpret the PE signal as an error but as a response to an ENQ. The PE signal will remain set until a next ENQ is issued or until a true paper exhaust is found. A true paper exhaust will only be reported after a line feed. If the PE signal is to be returned to the valid paper error state, an **[ENQ] <4>** should be issued.

[8]ISR - Interrupt Service Routine.



PE to ENQ request timing

ENQ commands are as follows:

Function: **Inquire Printer Status**

ASCII: **[ENQ]** <n>
Hexadecimal: 05H <n>
Decimal: <5><n>
IPCL: (None) IPCL commands are not pre-processed.

Description:. Inquire printer status and return result. The following ENQ's are defined:

NOTE: In serial mode, if the printer is off line, it will still accept ENQ commands and respond. The modem control lines are ignored by the printer in serial mode.

NOTE: In parallel mode, if the printer is off line, ENQ's will not be accepted.

Function: **Inquire Cash Drawer 1 Status**

ASCII: [ENQ] <1>
Hexadecimal: 05H 01H
Decimal: <5><1>
Function: Cash Drawer 1 Status

	Serial	Parallel
Response:	ACK <1> (06H 01H)	PE High:
	Cash Drawer 1 is Closed	
	NAK <1> (15H 01H)	PE Low
	Cash Drawer 1 is Open	

Function: **Inquire Cash Drawer 2 Status**

ASCII: [ENQ] <2>
Hexadecimal: 05H 02H
Decimal: <5><2>
Function: Cash Drawer 2 Status

	Serial	Parallel
Response:	ACK <2> (06H 02H)	PE High:
	Cash Drawer 2 is Closed	
	NAK <2> (15H 02H)	PE Low
	Cash Drawer 2 is Open	

Function: **Inquire Printer Buffer Status**

ASCII: [ENQ] <3>
Hexadecimal: 05H 03H
Decimal: <5><3>
Function: Is Buffer Empty

	Serial	Parallel
Response:	ACK <3> (06H 03H)	PE High:
	Buffer is Empty	
	NAK <3> (15H 03H)	PE Low
	Buffer is not Empty	

Description: This command can also be used to detect printer IDLE by sending an [ESC] q (Wait printer Que.) to the printer and waiting for printer buffer empty.

Function: **Inquire Journal Paper Status**

ASCII: [ENQ] <4>
Hexadecimal: 05H 04H
Decimal: <5><4>
Function: Is Journal Paper exhausted

	Serial	Parallel
Response:	ACK <4> (06H 04H)	PE Low:
	There is journal paper	
	NAK <4> (15H 04H)	PE High
	There is no journal paper	

Function: **Inquire Front Slip Sensor Status**

ASCII: [ENQ] <5>
Hexadecimal: 05H 05H
Decimal: <5><5>
Function: Is the Front Slip sensor sensing paper?

	Serial	Parallel
Response:	ACK <5> (06H 05H)	PE High:
	Front sensor is clear (no paper).	
	NAK <5> (15H 05H)	PE Low
	Front Sensor is blocked. (there is paper)	

Function: **Inquire Rear Slip Sensor Status**

ASCII: [ENQ] <6>
Hexadecimal: 05H 06H
Decimal: <5><6>
Function: Is the Rear Slip Sensor Clear.

	Serial	Parallel
Response:	ACK <6> (06H 06H)	PE High
	The rear Sensor is clear (no paper)	
	NAK <6> (15H 06H)	PE Low
	The rear sensor is blocked (there is paper)	

Function: **Inquire Printer Ready Status**

ASCII: [ENQ] <7>
Hexadecimal: 05H 07H
Decimal: <5><7>
Function: Is the printer ready?
Serial Not available in parallel mode
Response: ACK <7> (06H 07H)
The printer is ready.
NAK <7> (15H 07H)
The printer is not ready.

Function: **Set Input OFF Request**

ASCII: [ENQ] <8>
Hexadecimal: 05H 08H
Decimal: <5><8>
Function: Ignore all data except ENQ's
Serial Not available in parallel mode
Response: ACK <8> (06H 08H)
The command was accepted.
NAK <8> (15H 08H)
The command was rejected.

Description: This command prevents serial information from being placed in the printers input buffer. This command could be used to allow a second device to receive data on the same serial port as the printer. NOTE: The Serial transmitter is not disabled. This means that the printers transmitter can not be paralleled with other devices.

Function: **Set Input ON Request**

ASCII: [ENQ] <9>
Hexadecimal: 05H 09H
Decimal: <5><9>
Function: Re-enable data input (Reverses ENQ <8>)
Serial Not available in parallel mode
Response: ACK <9> (06H 09H)
The command was accepted.
NAK <9> (15H 09H)
The command was rejected.

Function: **Request Printer Reset**

ASCII: [ENQ] <10>
Hexadecimal: 05H 0AH
Decimal: <5><10>
Function: Reset Printer.
Serial Not available in parallel mode
Response: ACK <10> (06H 0AH)
The command was accepted.
NAK <10>(15H 0AH)
The command was rejected.

Description: This command is similar to asking for a power on reset except no internal diagnostics are run. The internal print buffer will be flushed, all displayed alarms will be cleared, the slip clamp will be opened, and the printer will go on line. The printer will be ready to except new information as soon as the ACK response is sent. If an NAK is received (or no response was received) by the host, the command was blocked by a [ESC] y <n> control command.

Note: This also resets a [ENQ] <8> buffer block.

Function: **Inquire Power Cycle Status**

ASCII: [ENQ] <11>
Hexadecimal: 05H 0BH
Decimal: <5><11>
Function: Is the Front Slip sensor sensing paper?

Serial	Parallel
Response: ACK <11> (06H 0BH)	PE High:
Printer power has been cycled since last [ENQ]<11>	
NAK <5> (15H 0BH)	PE Low
Printer has not power cycled since last [ENQ]<11>	

Description: The first time after a reset this command will return [ACK] <11>, after that the command will return [NAK] <11>. This command allows the application to determine if the printer has been power cycled and needs to be set up. The [ENQ] <10> command and the INIT signal on the parallel port will both cause the printer to return power up status.

Function: **Control Feature Commands**

ASCII: [ESC] y <n>
Hexadecimal: 1BH 79H <n>
Decimal: <27><121><n>
IPCL: &%Y0 through 8

Where n: 0 Disable All ENQ commands
1 Enable All ENQ commands
2 Strip ENQ commands from input buffer[9]
3 Disable ENQ 8 - 10 commands (Required if graphics are used)
4 Disable IPCL Commands
5 Enable IPCL Commands
Note: Once disabled, this command will not be a valid IPCL code
6 Disable Slip Clamp Check
7 Enable Slip Clamp Checks
8 Enable Extended Diagnostics

Description: Enable and disable command set features. This command allows graphic and other binary data to be sent to the printer without an ENQ response. If the ENQ <8> or <10> command is recognized in graphic or format data the printer will ignore the rest of the data or will reset. If an unwanted ENQ response is tolerable, only ENQ <8> and <10> need be disabled.

It is possible that the IPCL commands will interfere with print data. If this is the case they can be disabled with and [ESC] y <4>

Some applications can not control the line formatting features of their print drivers. In some cases when a control string is formed the print driver will append a [CR] and/or a [LF] to the end. For some commands this is a problem for the Series 60 printer. The printer tries to prevent printing with the slip clamp open. The print head is not designed to allow the print wires to bottom. The printer tries to detect this by detecting print commands that might cause print and generates an error indication. If a command like [ESC]z (Slip Clamp Open) is followed by a [CR] and error will be indicated. Because the application can not control the [CR] the printer has a way to disable the slip clamp checks. By sending a [ESC]y<6> before every transaction (as the first command) the [CR] will not generate an error. The printer will however, now print with the slip clamp open. Under no circumstances should this be allowed to occur. The printer may be damaged by printing with the slip clamp open.

[9]This allows ENQ's to be used in polling sequences without filling the input buffer.

Extended Diagnostics Commands

Function: **Adjust Vertical Alignment**
ASCII: [ESC] | <n>
Hexadecimal: 1BH 7CH <n>
Decimal: <27><124><n>
IPCL: None
Where n: 0 to 15
Description: This command allows the vertical alignment between bi-directional print passes to be adjusted. This commands only effects rotated 90° and 180° print. It is active only after an [ESC] y <8> command to enable extended diagnostics. A typical value of 7 is generally a good place to start. [ESC] ^ 4 will print an alignment chart.
(Note: this value is stored in EEPROM and need only be set once. As it is factory adjusted this adjustment need not be performed unless the printer is disassembled.)
In addition to this command the diagnostics adjustment procedure is also available.

Function: **Extended Diagnostics.**
ASCII: [ESC] ^ <n>
Hexadecimal: 1BH 5EH
Decimal: <27><94>
IPCL: NONE
Where n: 0 Reads and prints all sensor readings, model number and serial number.
1 Set vertical alignment to 4
2 Decrease Vertical alignment adjustment
3 Increase Vertical alignment adjustment
4 Print a vertical adjustment alignment chart.
5 Print the serial number and the model number
6 Read adjust and reread all sensor adjustments. (works on journal only)
7 Cycle Receipt knife
8 Force sensor adjustment
9 Force Journal exhaust to Magnetic.
A Force Journal exhaust to Optical.
Z Places the printer in configuration mode.
C Closes the slip clamp.
O Opens the slip clamp.
R Moves print head to right home.
H Moves head Home (Last selected home)
L Moves print head to left home.
Description: These commands are designed to be used by Ithaca Peripherals to help adjust and test the printer. There is no guarantee that these commands are valid and /or stable. They are not intended for use by the end user. To prevent accidental use of these commands they must be enabled by an [ESC]y<8> command.

Control Codes Summary (by Code)

Normal ASCII	Second ASCII field	IPCL Equivalent code	Description	Page
[NUL]			Null	
[ENQ][10]	<n>		Inquire Status (n=1 Cash Dwr 1, n=2 Cash Dwr 2, n=3 Buffer Empty, n=4 Journal Paper, n=5 Front Slip Sensor, n=6 Rear Slip Sensor, n=7 Printer Ready, n=8 Ignore All Input, n=9 Enable Input.[11],n=10 Reset Printer, n=11 Power Cycle Status	42
[HT]			Horizontal Tab	20
[LF]		&%LF	Line Feed	xv
[CR]		&%CR	Carriage Return	xv
[SO]4		&%MW	One Line Double Wide	23
[SI]		&%F1	Set 17 CPI	22
[DC2]		&%F3	Set 10 CPI	22
[DC4]		&%MN	Cancel One Line Double Wide	23
[CAN]		&%RD	Clear Print Buffer	47
[ESC]		&%	Begin Escape Sequence	
[SP]2			Space Character	
<32> ... <255>			Printable Characters	
[ESC]	[SI]	&%F4	Set 24 CPI	22
[ESC]	# 0	&%QT	Set Normal Print Mode (HSD is Normal)	24
[ESC]	- <n>	&%CU{n=0} &%MU{n=1}	Underline (n=0 End, n=1 Begin)	31
[ESC]	0	&%ST	Set 1/8" Line Space	xvii
[ESC]	1	&%SG	Set 7/72" Line Space	xviii
[ESC]	2		Begin Variable Line Spacing (Enable [ESC] A n)	xviii
[ESC]	3 <n>	&%SV <n>	Set Fine Line Space n/216" (n=1..255) (defines feed used by LF)	xvii
[ESC]	6	&%C2	Select IBM Character Set 2	26
[ESC]	7	&%C1	Select IBM Character Set 1	25
[ESC]	:	&%F2	Set 12 CPI	22
[ESC]	A <n>		Set Variable Line Spacing n/72 (n=1..85) (Enabled by [ESC] 2)	xviii
[ESC]	B	&%SX	Load Slip and Position to First Print Line in 180° mode.(Ck Front Sensor only)	37
[ESC]	D <n>^{1}<n>^{2} <n>^{3}...<n>^{k} <0>		Horizontal tab set (Sets tabs at columns n^1 n^2 ... n^k 0) The maximum value of n depends on the station selected.	20
[ESC]	E	&%MM	Begin Emphasized Print (Half Speed)	31
[ESC]	F	&%CM	End Emphasized Print	32
[ESC]	G	&%ME	Begin Enhanced Print (Double Pass)	31
[ESC]	H	&%CE	End Enhanced Print	31
[ESC]	I <n>	&%QU{n=1} &%QE{n=2} &%QL{n=3}	Select Print Mode (n=1 Feat Util; n=2 Enhanced; n=3 NLQ)	24
[ESC]	J <n>	&%LV <n>	Do a Fine Line Feed n/216" (n=0 no line feed; n=1..255)	xv

[10]ENQ Returns ACK n or NAK n. ENQ's Are preprocessed and return immediate responses.

[11]ENQ 7, 8, 9 and 10 are not valid in parallel mode.

[ESC]	K <n>^{1} <n>^{2}	&%GS <n>^{1} <n>^{2}	Single Density Graphics (n1=0..255, n2=0..3, len=n1 +256*n2)	33
[ESC]	L <n>^{1} <n>^{2}	&%GD <n>^{1} <n>^{2}	DD Half-Speed Graphics (n1=0..255, n2=0..3,Len=n1 + 256*n2)	33
[ESC]	M	&%SM	Load Slip and Position to First Print Line(Ck Front Sensor only)	36
[ESC]	N	&%SQ	Load Slip and Position to Slip Sensor (Ck Front Sensor only)	36
[ESC]	Q	NONE	Wait in input Que. until previous commands are complete and then return a response. (CFG60 will automatically wait for this command	39
[ESC]	S <n>	&%SB{n=1} &%SP{n=0}	Select Superscript / Subscript (n=0 Super, n=1 Sub)	31
[ESC]	T	&%SE	End Superscript / Subscript	32
[ESC]	U <n>	&%GU{n=1} &%GB{n=0}	Select Bi-directional / Unidirectional (n=0 Bi, n=1 Uni)	33
[ESC]	W <n>	&%FD{n=1} &%FE{n=2}	Multi-line Double-Wide Sequence (n=0 End, n=1 Begin)	23
[ESC]	Y <n>^{1} <n>^{2}	&%GF <n>^{1} <n>^{2}	DD Full-Speed Graphics (n1=0..255,n2=0..3,Len=n1 +256 * n2)	33
[ESC]	b	&%SW	Load Slip and Position to First Print Line in 180° mode.	37
[ESC]	d	NONE	Continuous Feed 7"	xvi
[ESC]	e	&%LC	Continuous Feed 2"	xvi
[ESC]	f	&%SR	Receipt Load	34
[ESC]	g	&%SJ	Select Journal	34
[ESC]	h	&%SL	Load Slip and Position to Slip Sensor	36
[ESC]	i	&%SF	Load Slip and Position to First Print Line	35
[ESC]	j	&%SN	Load Slip (no auto position and no sensors checked)	35
[ESC]	k	&%LK	Feed Receipt 2.0" or to mark (monitors rear sensor only)	xvi
[ESC]	l <n>	&%SD {n = 1} &%SS {n = 0}	Dual station operation. (n = 1 Dual station, n = 0 single station) (Enable journal feed in Slip or Receipt mode)	37
[ESC]	m	&%LE	Feed to end of slip.	xvi
[ESC]	n	&%LR	Set Feed Direction Back to Front	xix
[ESC]	o	&%LB	Set Feed Direction Front to Back	xix
[ESC]	p <n>	&%LM <n>	Set Slip Left Margin (n dot col at 60 dots per inch)	37
[ESC]	q	NONE	Wait for operation complete;	47
[ESC]	r <n>	&%R0{n=0} &%R1{n=1} &%R2{n=2} &%R3{n=3}	Rotated Print (n: 0-End, 1-Rot B 90, 2 Rot-L 180, 3-Rot B 270)	28
[ESC]	s <n>	&%RL <n>	Set Rotated Print Line Length (n = 1..80) Default 48	29
[ESC]	u <n>^{1} <m>^{1} <n>^{2} <m>^{2} ... <n>^{k} <0>	&%RP <n>^{1} <m>^{1} <n>^{2}<m>^{2} ... <n>^{k}<0>	Set Rotated Print Line Spacing (nk=0 End) Where n = line and m = Dots from last line. NOTE: All lines not specified are set to 1 dot.	29
[ESC]	v	&%FC	Cycle Receipt Cutter	34
[ESC]	x <n>	&%D1{n=1} &%D2{n=2}	Open Cash Drawer n (n=1 or 2)	40
[ESC]*	y <n>	&%Y0 - 7	Control ENQ's, Control IPCL, Disable Clamp Checks. Where: n=0 Disable, n=1 Enable, n=2 Strip ENQs, n=3 Disable ENQ 8 - 10 (n=1 Will enable all ENQ's), n=4 Disable IPCL translation, n=5 Enable IPCL translation, n=6 Disable Slip Clamp Checks, n=7 Enable Slip Clamp Checks n=8 Enable Extended Diagnostics	47
[ESC]	z	&%SO	Open Slip Clamp	35

[ESC]	| <n>	NONE	Set vertical alignment. (enabled by [ESC]y<8> Alignment may be set from 0 to 15	47
[ESC]	^ <n>	NONE	Diagnostics Commands (enabled by [ESC]y<8> Where: ..n = '0' Print Sensor readings and model number n = '1' Set Alignment to default value. n = '2' Decrease Alignment value. n = '3' Increase Alignment value. n = '4' Print an internal alignment test. n = '5' Print the units model and serial no. n = '6' Read, Print, Adjust, Read and Print sensors info. n = '7' Cycle the receipt cutter (No Checks) n = '8' Adjust sensor thresholds (No Reports) n = '9' Force Journal exhaust to Magnetic. n = 'A' Force Journal exhaust to Optical. n = 'Z' Places the printer in configuration mode. n = 'C' Closes the slip clamp. n = 'O' Opens the slip clamp. n = 'R' Moves print head to right home. n = 'H' Moves head Home (Last selected home) n = 'L' Moves print head to left home.	47

Control Codes Summary (by Function)

Normal ASCII	Second ASCII field	IPCL Equivalent code	Description	Page
<32> ... <255>			Printable Characters	
			Line Control	
[LF]		&%LF	Line Feed	xv
[ESC]	3 <n>	&%SV <n>	Set Fine Line Space n/216" (n=1..255) Defines feed done by [LF]	xvii
[ESC]	J <n>	&%LV <n>	Do a Fine Line Feed n/216" (n=0 no Line Feed; n=1..255)	xv
[CR]		&%CR	Carriage Return	xv
[ESC]	e	&%LC	Continuous Feed 2"	xvi
[ESC]	k	&%LK	Feed Receipt 2.0" or to mark	xvi
[ESC]	d	NONE	Continuous Feed 7"	xvi
[ESC]	m	&%LE	Feed to end of slip (7" Max).	xvi
[ESC]	0	&%ST	Set 1/8" Line Space	xvii
[ESC]	1	&%SG	Set 7/72" Line Space	xviii
[ESC]	A <n>		Set Variable Line Spacing n/72 (n=1..85) (Enabled by [ESC] 2)	xviii
[ESC]	2		Begin Variable Line Spacing (Enable [ESC] A n)	xviii
[ESC]	n	&%LR	Set Feed Direction Back to Front	xix
[ESC]	o	&%LB	Set Feed Direction Front to Back	xix
			Horizontal Motion Control	
[SP]			Space Character	
[HT]			Horizontal tab	20
[ESC]	D <n>^{1}<n>^{2} <n>^{3}···<n>^{k} <0>		Horizontal tab set (Sets tabs at columns n^1 n^2 ... n^k 0) The maximum value of n depends on the station selected.	20
			Character Control	
[DC2]		&%F3	Set 10 CPI	22
[ESC]	:	&%F2	Set 12 CPI	22
[SI]		&%F1	Set 17 CPI	22
[ESC]	[SI]	&%F4	Set 24 CPI	22
[ESC]	6	&%C2	Select IBM Character Set 2	26
[ESC]	7	&%C1	Select IBM Character Set 1	25
[ESC]	# 0	&%QT	Set Normal Print Mode (HSD is Normal)	24
[ESC]	I <n>	&%QU{n=1} &%QE{n=2} &%QL{n=3}	Select Print Mode (n=1 Feat Util; n=2 Enhanced; n=3 NLQ)	24
[SO]		&%MW	One Line Double Wide	23
[DC4]		&%MN	Cancel One Line Double Wide	23
[ESC]	W <n>	&%FD{n=1} &%FE{n=2}	Multi-line Double-Wide Sequence (n=0 End, n=1 Begin)	23
[ESC]	- <n>	&%CU{n=0} &%MU{n=1}	Underline (n=0 End, n=1 Begin)	31
[ESC]	S <n>	&%SB{n=1} &%SP{n=0}	Select Superscript / Subscript (n=0 Super, n=1 Sub)	31
[ESC]	T	&%SE	End Superscript / Subscript	32
[ESC]	E	&%MM	Begin Emphasized Print (Half Speed)	31
[ESC]	F	&%CM	End Emphasized Print	32
[ESC]	G	&%ME	Begin Enhanced Print (Double Pass)	31
[ESC]	H	&%CE	End Enhanced Print	31
			Graphics	

[ESC]	Y <n>[1] <n>[2]	&%GF <n>[1] <n>[2]	DD Full-Speed Graphics (n1=0..255,n2=0..3,Len=n1 +256 * n2)	33
[ESC]	K <n>[1] <n>[2]	&%GS <n>[1] <n>[2]	Single Density Graphics (n1=0..255, n2=0..3, len=n1 +256*n2)	33
[ESC]	U <n>	&%GU{n=1} &%GB{n=0}	Select Bi-directional / Unidirectional (n=0 Bi, n=1 Uni)	33
			Rotated Print Control	
[ESC]	r <n>	&%R0{n=0} &%R1{n=1} &%R2{n=2} &%R3{n=3}	Rotated Print (n: 0-End, 1-Rot B 90, 2 Rot-L 180, 3-Rot B 270)	28
[ESC]	s <n>	&%RL <n>	Set Rotated Print Line Length (n = 1..80) Default 48	29
[ESC]	u <n>[1] <m>[1] <n>[2] <m>[2] ...<n>[k]	&%RP <n>[1] <m>[1] <n>[2] <m>[2] ... <n>[k]	Set Rotated Print Line Spacing (nk=0 End) Where n = line and m = Dots from last line. NOTE: All lines not specified are set to 1 dot.	29
			Station Control	
[ESC]	f	&%SR	Receipt Load	34
[ESC]	v	&%FC	Cycle Receipt Cutter	34
[ESC]	g	&%SJ	Select Journal	34
[ESC]	h	&%SL	Load Slip and Position to Slip Sensor	36
[ESC]	N	&%SQ	Load Slip and Position to Slip Sensor (Ck Front Sensor only)	36
[ESC]	i	&%SF	Load Slip and Position to First Print Line	35
[ESC]	M	&%SM	Load Slip and Position to First Print Line(Ck Front Sensor only)	36
[ESC]	b	&%SW	Load Slip and Position to First Print Line in 180° mode.	37
[ESC]	B	&%SX	Load Slip and Position to First Print Line in 180° mode.(Ck Front Sensor only)	37
[ESC]	j	&%SN	Load Slip (no auto position and no sensors checked)	35
[ESC]	p <n>	&%LM <n>	Set Slip Left Margin (n dot col at 60 dots per inch)	37
[ESC]	l <n>	&%SD {n = 1} &%SS {n = 0}	Dual station operation. (n = 1 Dual station, n = 0 single station) (Enable journal feed in Slip or Receipt mode)	37
[ESC]	z	&%SO	Open Slip Clamp	35
			Cash Drawer Control	
[ESC]	x <n>	&%D1{n=1} &%D2{n=2}	Open Cash Drawer n (n=1 or 2)	40
			Printer Status and Control	
[CAN]		&%RD	Clear Print Buffer	47
[ESC]	q	NONE	Wait for operation complete;	47
[ESC]	Q	NONE	Wait in input Que. until previous commands are complete and then return a response. (CFG60 will automatically wait for this command	39
[ENQ][12]	<n>		Inquire Status (n=1 Cash Dwr 1, n=2 Cash Dwr 2, n=3 Buffer Empty, n=4 Journal Paper, n=5 Front Slip Sensor, n=6 Rear Slip Sensor, n=7 Printer Ready, n=8 Ignore all input, n=9 Enable Input.[13],n=10 Reset Printer,n=11 Power Cycle Status	42

[12]ENQ Returns ACK n or NAK n. ENQ's Are preprocessed and return immediate responses.

[13]ENQ 7, 8, 9,and 10 are not valid in parallel mode.

[ESC]	y <n>	&%Y0 - 8	Control ENQ's, Control IPCL, Disable Clamp Checks. Where: n=0 Disable, n=1 Enable, n=2 Strip ENQs, n=3 Disable ENQ 8 - 10 (n=1 Will enable all ENQ's), n=4 Disable IPCL translation, n=5 Enable IPCL translation, n=6 Disable Slip Clamp Checks, n=7 Enable Slip Clamp Checks n=8 Enable Extended Diagnostics	47
			Extended Diagnostics	
[ESC]	| <n>	NONE	Set vertical alignment. (enabled by [ESC]y<8> Alignment may be set from 0 to 15	47
[ESC]	^ <n>	NONE	Diagnostics Commands (enabled by [ESC]y<8> Where: n = '0' Print Sensor readings and model number n = '1' Set Alignment to default value. n = '2' Decrease Alignment value. n = '3' Increase Alignment value. n = '4' Print an internal alignment test. n = '5' Print the units model and serial no. n = '6' Read, Print, Adjust, Read and Print sensors info. n = '7' Cycle the receipt cutter (No Checks) n = '8' Adjust sensor thresholds (No Reports) n = '9' Force Journal exhaust to Magnetic. n = 'A' Force Journal exhaust to Optical. n = 'Z' Places the printer in configuration mode. n = 'C' Closes the slip clamp. n = 'O' Opens the slip clamp. n = 'R' Moves print head to right home. n = 'H' Moves head Home (Last selected home) n = 'L' Moves print head to left home.	47

How to use the Series 60 Features

How to use the Slip Station

Printing on forms.

One of the most common Slip printing operations is printing on a pre-printed form. The Series 60 printer is well suited for this operation. It has enough forms sensing features to find the top and bottom of the form as well as the ability of printing in any of 4 directions.

When printing on preprinted forms, the text and line spacing setup must be consistent at the start of the operation.. In addition the printer should be returned to a consistent setup at the end of all printing operations. If a consistent starting place is not defined the second slip may not be printed the same as the first.

When setting up the printer to a defined state, there are a number of features that must be considered..

Print Font:	What Character set and what print pitch. For example character set 1 and 17 CPI are the power on defaults.
Print Features:	What print mode is active. This includes sub-script, super-script, underline and Double wide. At power up the printer has no features active.
Line Spacing:	What is the current line spacing and what is the variable spacing set to. At power up the spacing is set to 1/8 Inch (8 lines per inch).

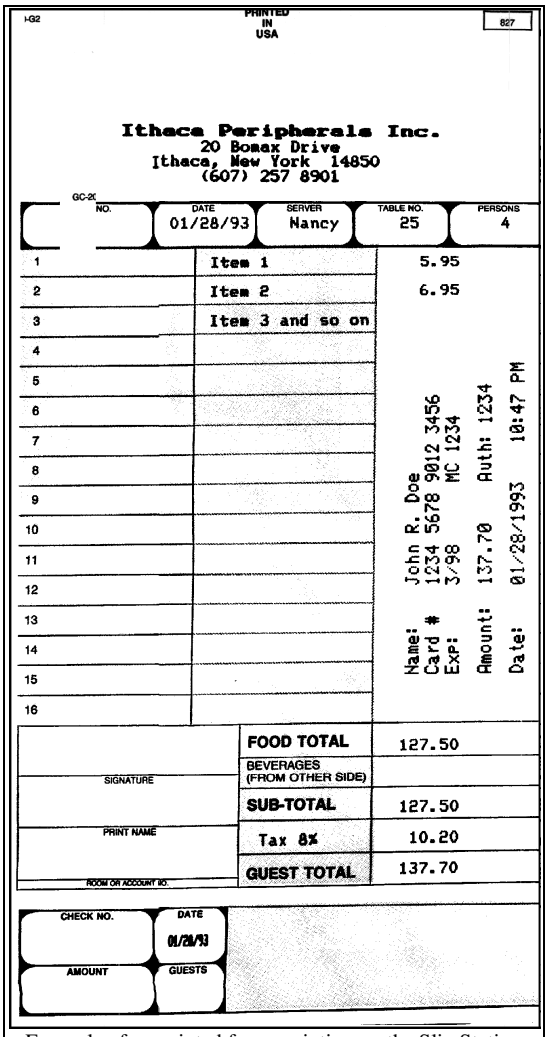
When the Slip station is selected, the print head is moved to the left and the printer prepares itself to print from left to right. The slip will be printed from the top down, and from left to right as the slip is fed into the printer (front to back feed). The rotated print processor is configured such that this mode is the unrotated format. Selecting the slip station does not define the print font, print features, or line spacing.

To demonstrate printing on a pre-printed form, the form shown on the previous page will be filled out.

To increase printer performance the initial settings should be sent to the printer before the slip station is selected. The following sequence might be used to define an initial setting.

`[ESC]#0`	Set High Speed Print Mode.
`[ESC]:`	Set 12 CPI.
`[ESC]6`	Set Character Set II.
`[ESC]0`	Set 1/8 Inch Line Spacing.
`[ESC]A<18>`	Set Variable Line Spacing to 1/4 Inch.
`[ESC]p<0>`	Set Slip Left margin to 0.

After this is sent to the printer ask the operator to insert the slip. The ENQ <5> and ENQ <6> commands are used to find out if the operator has inserted the slip correctly. The printer will check the sensors if [ESC] h or [ESC] I is issued. If [ESC] j is used no sensor checking is done by the printer.



Example of preprinted forms printing on the Slip Station

When the Slip has been positioned by the operator, disable the ENQ commands and issue the slip station select command. The ENQ preprocess should be disabled as soon as possible after the sensor checks are performed. The disable command must be processed by the printer before the rotated print format is sent to the printer.

Then position the slip to the initial print location (in this case the date field).

```
[ESC]y<0>     Turn off ENQ operations as early as possible.
[ESC]h        Clamp on the slip and move to 1.75 inch from the top of the slip.
[ESC]J<2>     Fine position the slip to the first field.
              Note: if the first position is above 1.75 inch use the [ESC] i command.
```

Now fill in the print fields using positioning commands and spaces to make the print align with the form.

```
      01/28/93     Nancy       25          4[CR][LF]
                                           Fill in first line, use spaces for alignment.
[ESC]J<44>                                 Position to second line.
[ESC]2                                     Enable the variable line spacing specified above.
[ESC]p<90>                                 Set the left margin.
Item 1                 5.95[CR][LF]        Print the items.
Item 2                 6.95[CR][LF]
Item 3 and so on[CR][LF]
{rpt:13}[LF]                               Line feed over unused lines[14].
                     127.50[CR][LF]        Print total.
[ESC]J<61>                                 Position the form to the next field.
                     127.50[CR][LF]        Print the subtotal field.
      Tax 8%          10.20[CR][LF]        Print the tax field.
                     137.70[CR][LF]        Print the total field.
```

At this point the form is complete. However to make this example more interesting we will get a little fancy. There is a date field that is too small for most printers, we will fill it in with 24 CPI print.

```
[ESC]0                                     Set line spacing to 1/8 inch.
[ESC]p<0>                                  Set left margin to 0.
[ESC][SI]                                  Select 24 CPI.
[ESC]J<70>                                 Position to the form field.
           01/28/93[CR][LF]                Fill in the date.
```

To illustrate rotated print, lets print some credit card information on the blank area on the right side of the form. This is probably not a real operation for this form but will demonstrate the positioning of rotated print on a pre printed form.

```
[ESC]n                                     Reverse the feed direction to front to back.
{rpt:19}[LF]                               Position the form to the blank field.[15]
[ESC]p<127>                                Set the left margin in as far as possible.
[ESC]s<50>                                 Set the max. line length to 50 characters.
[ESC]u<1><80><2><2><3><2><4><8><5><8><0>   Set the line position spacing.
[ESC]3<18>                                 Set the inter character spacing.
[ESC]r<3>                                  Start the rotated print field and rotate 270 Degrees.
Name:     John R. Doe[CR]                  Load the Print the information.
Card #    1234 5678 9012 3456[CR]          (Notice that the [LF] is not required.)
Exp:      3/98       MC 1234[CR]
Amount:   137.70     Auth: 1234[CR]
Date:     01/28/1993     10:47 PM[CR]
[ESC]r<0>                                  End the rotated field and print.
```

Now lets print a title on the top of the form. This will be done on the way out of the printer. This means that we will print from the bottom up.

```
[ESC]n                                     Set the feed direction.
{rpt:18}[LF]                               Position to the bottom of the print field.
[ESC]p<0>                                  Set the left margin to 0.
[ESC]:                                     Set printer to 12 CPI.
```

---

[14] {rpt:13} is a CFG60 Demo processor command and is NOT sent to the printer. In this case 13 line feeds are sent to the printer

[15] {rpt:19} is a CFG60 Demo processor command and is NOT sent to the printer. In this case 19 line feeds are sent to the printer.

[ESC]0	Set line spacing to 1/8 inch.
[ESC]I<3>	Set NLQ print mode.
(607) 257 8901[CR][LF]	Print heading from
Ithaca, New York 14850[CR][LF]	the bottom up.
20 Bomax Drive[CR][LF]	
[SI]	Set 17 CPI
[SO]	Set double wide
Ithaca Peripherals Inc.	Print top line
[ESC]n	Specify feed direction to eject slip.
[ESC]e	Feed slip 2 inches and out from under the slip clamp.
[ESC]z	Open the slip clamp.

This completes the form, however the defaults should be restored to the printer.. This will make the next transaction more reliable. The reactivating of the ENQ preprocessing is very important

[ESC]u<0>	Reset rotated print line spacing.
[ESC]y<1>	Reactivate the ENQ processing.
[ESC]#0	Set high speed print mode.
[ESC]:	Set 12 CPI.
[ESC]6	Set character set 2.
[ESC]0	Set 1/8 inch line spacing.
[ESC]A<9>	Set variable line spacing to 1/8 inch.
[ESC]p<0>	Set left margin to 0.

The following is the complete CFG60 demo script for the above slip example.

```
{rem} Initial Setup
[ESC]#0
[ESC]:
[ESC]6
[ESC]0
[ESC]A<18>
[ESC]p<0>
{rem} Ask for Slip to be inserted
{Sensor}Guest Check
[ESC]y<0>
[ESC]h
[ESC]J<2>
     01/28/93    Nancy      25
4[CR][LF]
[ESC]J<44>
[ESC]2
[ESC]p<90>
Item 1               5.95[CR][LF]
Item 2               6.95[CR][LF]
Item 3 and so on[CR][LF]
{rpt:13}[LF]
                   127.50[CR][LF]
[ESC]J<61>

                   127.50[CR][LF]
     Tax 8%         10.20[CR][LF]
                   137.70[CR][LF]
[ESC]0
[ESC]p<0>
[ESC][SI]
[ESC]J<70>
          01/28/93[CR][LF]
{rem} Print Credit Card Info Rotated
[ESC]n
{rpt:19}[LF]
[ESC]p<127>
[ESC]s<50>
[ESC]u<1><80><2><2><3><2><4><8><5><8><
0>
[ESC]3<18>
[ESC]r<3>
Name:    John R. Doe[CR]
Card #   1234 5678 9012 3456[CR]
Exp:     3/98      MC 1234[CR]
Amount:  137.70    Auth: 1234[CR]
Date:    01/28/1993    10:47 PM[CR]
[ESC]r<0>
{rem} Print title on the way out
[ESC]n
{rpt:18}[LF]
[ESC]p<0>
[ESC]:
[ESC]0
[ESC]I<3>

        (607) 257 8901[CR][LF]
   Ithaca, New York  14850[CR][LF]
        20 Bomax Drive[CR][LF]
[SI]
[SO]
Ithaca Peripherals Inc.

[ESC]n
[ESC]e
[ESC]z
{rem} Restore a default mode
[ESC]u<0>
[ESC]y<1>
[ESC]#0
[ESC]:
```

[ESC]6	[ESC]A<18>
[ESC]0	[ESC]p<0>

Preprinted CFG60 Demo control script

How to use rotated print on the Slip Station

One of the most unique and powerful features of the Series 60 printer is the ability to rotate the print. The print can be rotated to any 90 degree orientation.

The series 60 printer treats rotated print in one of two ways. The first is to simply invert and mirror the print data. The second is to translate the print data into graphics.

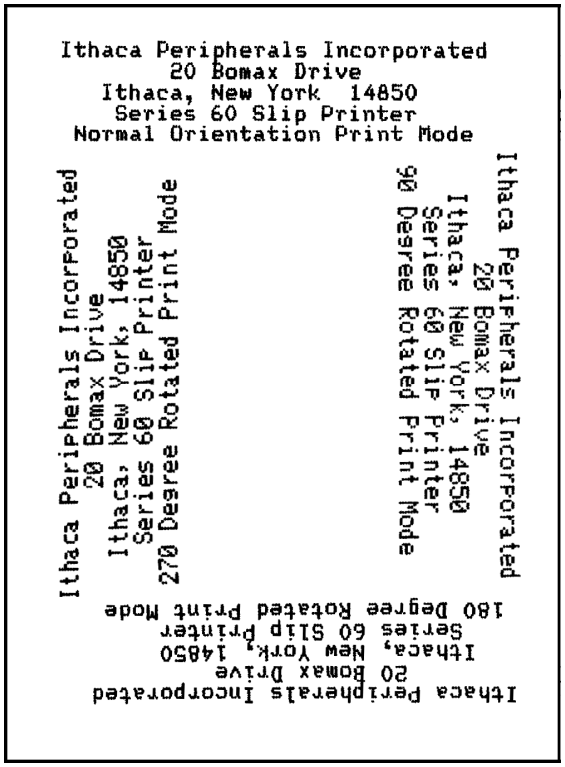
In normal operation, the print on the slip and receipt stations are rotated 180° from one another. The receipt (and journal) station print as the paper moves from the back to the front of the printer. The slip prints on the way into the printer or from front to back. This is accomplished by inverting and mirroring the print image. This operation is easily done by the print controller.

When rotating print 90° or 270° the print controller must convert the print data to graphics. Because the printer always prints the first character of each line first, the paper feed direction must be set correctly to print in the proper orientation. The normal line spacing commands will adjust the character pitch. In addition, all print information must be received before the print can start. As the characters are printed as graphics, the white space between lines is controlled by the graphics generator. The graphics generator must be configured with all line spacing before the print starts.

Because 180 degree rotation is very easy and does not require graphics, it is full featured. Features like underline that are available in normal print are also available in 180° print. Rotate 180° is also printed on a line by line basis.

Because 90° and 270° are generated in graphics the feature set is limited. In addition 90° and 270° are always printed in the 12 CPI font.

To illustrate how to use the rotated print feature, the following print example will be generated. (The pre-printed form example above is also helpful to illustrate rotated print.)



Example of Rotated Print on the Slip Station

This print example will start with printing the rotated pattern on the right side. This is rotated 90°.

`{sensor} Insert the slip`	Ask the operator to insert a slip.
`[ESC]h`	Select the slip station and load the form to the rear sensor.
`[ESC]<48>`	Pre-set rotated print defaults. 48 characters per line maximum.
`[ESC]p<0>`	Set 0 for left margin.
`[ESC]u<0>`	Set rotated line spacing to default values. (2 dots)
`[ESC]0`	Set 1/8 inch spacing.
`[LF][LF][LF]`	Position the form to allow room for the final print pattern.
`[ESC]3<18>`	Set the inter-character spacing to 12 CPI.
`[ESC]r<1>`	Select rotate 90°.
`Ithaca Peripherals Incorporated[CR]`	Send the text to be rotated.
`20 Bomax Drive [CR]`	
`Ithaca, New York, 14850 [CR]`	Note that the [LF] for line feed is not required.
`Series 60 Slip Printer [CR]`	If a [LF] is added it will be ignored but will take
`90 Degree Rotated Print Mode [CR]`	buffer space.
`[ESC]r<0>`	Select Rotate 0°. This will tell the printer to print the buffer.

Now print the bottom text which is rotated 180°. This will print as the form moves from back to front of the printer.

[ESC]0	Adjust the line spacing for 1/8 inch.
[LF][LF][LF][LF]	Move the form further into the printer to make room for the 108°print.
[LF]	Move one too far to allow backlash removal.
[ESC]n	Reverse the feed direction.
[LF]	Move back one line to remove any backlash.
[ESC]:	Set 12 CPI print.
[ESC]r<2>	Request that the following print be rotated 180°.
Ithaca Peripherals Incorporated[CR][LF]	Send the text to the printer.
20 Bomax Drive [CR][LF]	Note: This text is not buffered. It is printed as
Ithaca, New York, 14850 [CR][LF]	soon as the [CR] is received. Also note that unlike
Series 60 Slip Printer [CR][LF]	90° and 270° print, the [LF] is required.
180 Degree Rotated Print Mode [CR][LF]	
[ESC]r<0>	Request that print be returned to normal. Note: This command is not required with this demo because we are going to give the printer another rotate command. However it is a good idea to be consistent.

Next, print the 270° portion. This will also be printed as the paper moves from back to front. Because the last operation has already specified the direction, it is not necessary to specify the direction again.

[ESC]3<18>	Set the inter-character space to 12 CPI.
[ESC]p<90>	Move the left margin in 90 dots or 1.5 inches.
[ESC]r<3>	Request print be rotated 270°.
Ithaca Peripherals Incorporated[CR][LF]	Send the print to the printer.
20 Bomax Drive [CR][LF]	This will be buffered by the printer until the
Ithaca, New York, 14850 [CR][LF]	End Rotate Print is received.
Series 60 Slip Printer [CR][LF]	Note This time we have left the [LF] on, although it is
270 Degree Rotated Print Mode [CR][LF]	not necessary.
[ESC]r<0>	End the rotate mode. The printer will now print it's buffer.

Next print a normal section of print. However, instead of printing in the normal feed direction we will print in the reverse direction (from back to front). This requires that the information be sent to the printer from the bottom up.

[ESC]:	Set the character pitch to 12 CPI.
[ESC]0	Set the line spacing back to 1/8 inch.
[ESC]p<90>	Set the left margin in 90 dots or 1.5 inches.
[LF]	Position the form.
Normal Orientation Print Mode [CR][LF]	Send the data to the printer from the bottom up.
Series 60 Slip Printer [CR][LF]	
Ithaca, New York 14850 [CR][LF]	
20 Bomax Drive [CR][LF]	
Ithaca Peripherals Incorporated[CR][LF]	
[ESC]p<0>	Reset the left margin.
[ESC]z	Open the slip clamp.

Now reset defaults.

[ESC]u<0>	Reset Rotated print line spacing.
[ESC]y<1>	Reactivate the ENQ processing.
[ESC]#0	Set High speed print mode.
[ESC]:	Set 12 CPI.
[ESC]6	Set character set II.
[ESC]0	Set 1/8 inch line spacing.
[ESC]A<9>	Set variable line spacing to 1/8 inch.
[ESC]p<0>	Set left margin to 0.

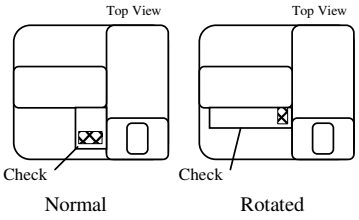
The following is the complete CFG60 Control Script for the rotated print example.

{sensor}	[ESC]0
[ESC]h	[LF]
[ESC]<48>	[LF]
[ESC]p<0>	[LF]
[ESC]u<0>	[LF]

```
[ESC]3<18>
[ESC]r<1>
Ithaca Peripherals Incorporated[CR]
        20 Bomax Drive         [CR]
   Ithaca, New York, 14850     [CR]
    Series 60 Slip Printer     [CR]
 90 Degree Rotated Print Mode  [CR]
[ESC]r<0>
[ESC]0
[LF]
[LF]
[LF]
[LF]
[LF]
[ESC]n
[LF]
[ESC]:
[ESC]r<2>
Ithaca Peripherals Incorporated[CR][LF]
        20 Bomax Drive         [CR][LF]
   Ithaca, New York, 14850     [CR][LF]
    Series 60 Slip Printer     [CR][LF]
 180 Degree Rotated Print Mode [CR][LF]
[ESC]r<0>
[ESC]3<18>
[ESC]p<90>
[ESC]r<3>
Ithaca Peripherals Incorporated[CR][LF]
        20 Bomax Drive         [CR][LF]
   Ithaca, New York, 14850     [CR][LF]
    Series 60 Slip Printer     [CR][LF]
 270 Degree Rotated Print Mode [CR][LF]
[ESC]r<0>
[ESC]:
[ESC]0
[ESC]p<90>
[LF]
 Normal Orientation Print Mode [CR][LF]
    Series 60 Slip Printer     [CR][LF]
   Ithaca, New York  14850     [CR][LF]
        20 Bomax Drive         [CR][LF]
Ithaca Peripherals Incorporated[CR][LF]
[ESC]p<0>
[ESC]z
{rem} Restore a default mode
[ESC]u<0>
[ESC]y<1>
[ESC]#0
[ESC]:
[ESC]6
[ESC]0
[ESC]A<18>
[ESC]p<0>
```

How to endorse a check

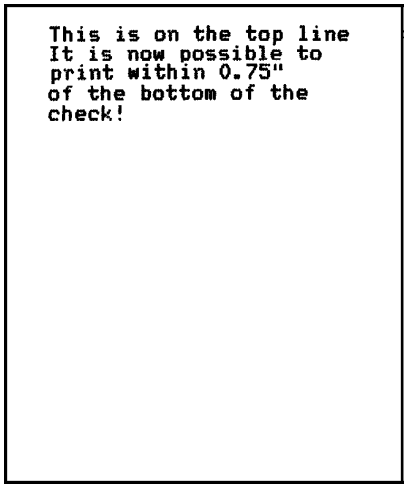
The typical check endorsement is done in the top two inches, on the back of a check. There are two ways that the series 60 printer can perform an endorsement. The illustration to the right shows the "Normal" print mode. This is where the check is placed with the long side against the slip stop and the part to be endorsed toward the front of the printer. The other method shown is "Rotated" print mode. In this example the check is placed with the short edge that is to be endorsed against the slip stop.



The first example will be the normal operation. In this example the check is placed face down in the printer. It is positioned against the slip stop and far enough into the printer to activate both sensors.

This example is shown to the right and was printed with the following script.

```
{sensor}Check      Ask for the Check to be inserted.[16]
[ESC]p<0>          Set the left margin to 0.
[ESC]0             Select 1/8 inch line spacing.
[ESC]:             Select 12 CPI.
[ESC]b             Clamp on the check. And position to the first print line of the
                   check. The printer will print from back to front. The end of
                   the check to be endorsed should be toward the operator.
This is on the top line[CR][LF]
It is now possible to[CR][LF]
print within 0.75"[CR][LF]
of the bottom of the [CR][LF]
check![CR][LF]
 [ESC]m            Continue to feed the check until the back sensor is uncovered.
[ESC]z             Release the check.
```



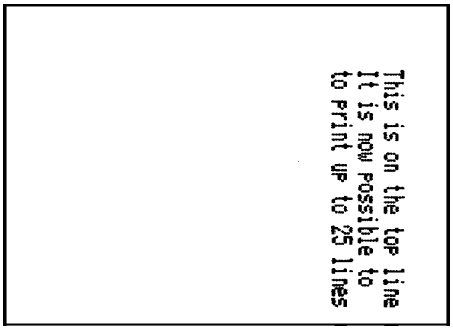
Normal Print Check Endorsement

Now return the printer to the defaults.

```
[ESC]u<0>          Reset rotated print line spacing.
[ESC]y<1>          Reactivate the ENQ processing.
[ESC]#0            Set high speed print mode.
[ESC]:             Set 12 CPI.
[ESC]6             Set character set II.
[ESC]0             Set 1/8 inch line spacing.
[ESC]A<9>          Set variable line spacing to 1/8 inch.
[ESC]p<0>          Set left margin to 0.
```

The "rotated" check endorsement example uses rotated 90° print. The check must be placed in the printer until the front sensor is covered. The check must be at least 1.5 inches in the printer. The application must take on the responsibility of assuring that the check is correctly positioned.

```
Using ENQ<5> Make sure the front sensor is covered. Instruct the operator to insert the check until about 1/2 inch[17] is
             visible from the front of the printer.
[ESC]p<0>    Set the left margin to 0.
[ESC]3<18>   Set the character spacing to 12 CPI.
[ESC]j       Clamp the slip with no sensor checks.
[ESC]o       Set the feed direction for the printer to be front to back.
[ESC]J<216>  Feed the slip until the rear sensor is covered. Because the
             exact position of the check is not known this feed must be
             adjusted for various size checks.
[ESC]i       Do a normal slip load to the first print line.
[ESC]n       Reverse the feed direction.
[LF]         Feed 3 line feeds (one for backlash) at 1/12 per feed.
[LF]
[LF]
[ESC]o       Reverse feed direction again.
[LF]         Remove any backlash.
[ESC]r<1>    Request print to be rotated 90 degrees.
This is on the top line[CR][LF]    Send the print to the
             printer.
It is now possible to[CR][LF]
print up to 25 lines[CR][LF]
```



Rotated Check Endorsement

[16]"{sensor}Check". is a CFG60 Demo processor command and is NOT sent to the printer. It instructs CFG60 to ask the operator for a "Check" and makes sure it is inserted correctly.

[17]A mark on the slip table can be added to help align the check.

[ESC]r<0>	End the rotated print. This will cause the print to be printed in a 90° rotation while moving the check into the printer.
[ESC]n	Reverse the line feed.
[ESC]e	Feed the check out of the printer.
[ESC]z	Open the slip clamp.

Now return the printer to the defaults.

[ESC]u<0>	Reset rotated print line spacing.
[ESC]y<1>	Reactivate the ENQ processing.
[ESC]#0	Set high speed print mode.
[ESC]:	Set 12 CPI.
[ESC]6	Set character set II.
[ESC]0	Set 1/8 inch line spacing.
[ESC]A<9>	Set variable line spacing to 1/8 inch.
[ESC]p<0>	Set left margin to 0.

The following is the complete control script used to generate rotated endorsement example.

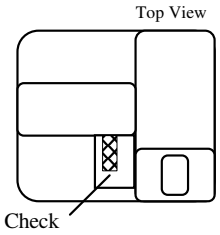
```
{REM} make sure front slip sensor is
covered
[ESC]p<0>
[ESC]3<18>
[ESC]j
[ESC]o
[ESC]J<216>
[ESC]i
[ESC]n
[LF]
[LF]
[LF]
[ESC]o
[LF]
[ESC]r<1>
This is on the top line[CR][LF]
It is now possible to[CR][LF]
print up to 25 lines[CR][LF]
[ESC]r<0>
[ESC]n
[ESC]e
[ESC]z
{rem} Restore a default mode
[ESC]u<0>
[ESC]y<1>
[ESC]#0
[ESC]:
[ESC]6
[ESC]0
[ESC]A<18>
[ESC]p<0>
```

How to fill out a personal check.

There are many formats used on personal checks. We will show how to fill out the typical format used in the US and the EC Eurocheque format. The physical size of these two checks are different. The software could be written to handle many different formats, however, we will use two separate examples.

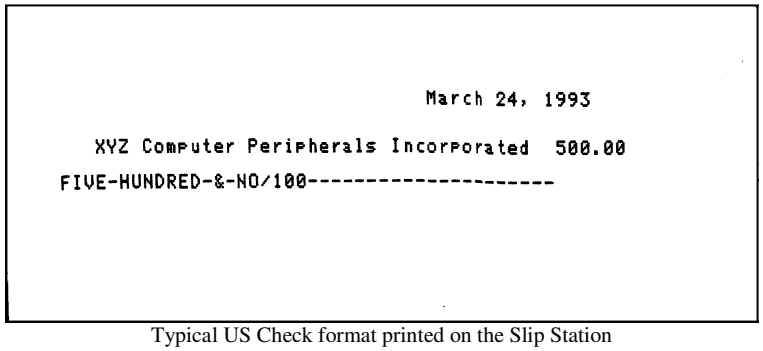
First lets look at a typical US check format. This check is 2.75 by 6.25 inches. Because the slip station width is less than 6.25 inches the check will have to be printed rotated. This will allow access to the full length of the check.

We will print on the check in rotated 270° mode. This is the most reliable print direction for a small form. (There are fewer things inside the printer for a non flat or a folded check to catch on.)



Check Orentation

Have the operator place the check into the printer with the bottom of the check next to the slip guide.
Then check the sensors with the ENQ <5> and <6> commands. This is to insure it is inserted correctly. It is also possible to let the printer check the form by using [ESC]h instead of [ESC]j.



Typical US Check format printed on the Slip Station

`{sensor}Check` Request a check be placed in the printer.[18]

`[ESC]y<0>` Disable ENQ commands. This should be done as soon as possible after the sensors are checked. This is required because there may be ENQ look alike commands embedded in the rotated print line spacing command.

`[ESC]j` Clamp on the slip. Note that the printer is not checking sensors with this command

`[ESC]o` Set the feed direction.

`[ESC]m` Find the front edge of the slip. This requires that both sensors were covered when the check was inserted.

`[ESC]n[LF][LF]` Position the check for the first character.

`[ESC]1` Set the inter character spacing to about 10 CPI.

`[ESC]p<127>` Set the left margin in as far as possible.

`[ESC]u<1><38><2><16><3><10><4><4><0>`
Send the line spacing to the printer. This command is used to align the print with the check. A real check may require adjustments to this command.

`[ESC]y<1>` ENQ commands may now be re-enabled.

`[ESC]s<49>` Set the rotated print line length. Set this to whatever the maximum line length will be. We will use 49 characters here. This allows 20 lines to be printed.

`[ESC]r<3>` Request rotated 270° mode.

`{date}[CR]`
Print the date field. {date} is a CFG60 command that requests that the date be inserted.

```
   XYZ Computer Peripherals Incorporated  500.00[CR]
FIVE-HUNDRED-&-NO/100----------[CR]
```

`[ESC]r<0>` End the rotate command. This will cause the rotated print buffer to be printed.

`[ESC]n` Reverse the feed direction.

`[ESC]e` Eject the check.

`[ESC]z` Release the slip clamp.

(Now do the standard clean up.)

`[ESC]u<0>` Reset rotated print line spacing.

`[ESC]y<1>` Reactivate the ENQ processing.

`[ESC]#0` Set high speed print mode

`[ESC]:` Set 12 CPI.

`[ESC]6` Set character set II.

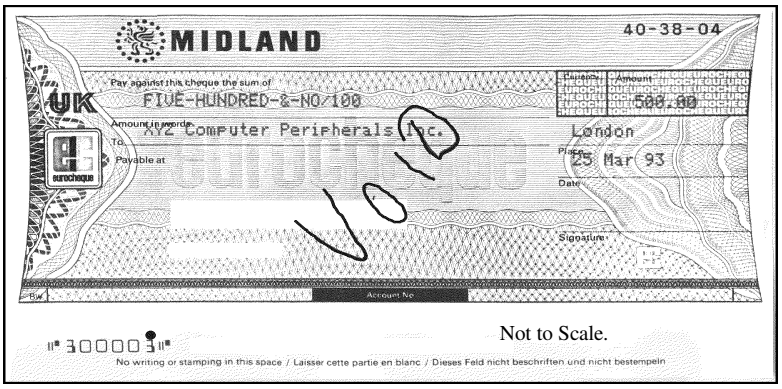
`[ESC]0` Set 1/8 inch line spacing.

`[ESC]A<9>` Set variable line spacing to 1/8 inch.

`[ESC]p<0>` Set left margin to 0.

[18] "{sensor}Check" is a CFG60 Demo processor command and is NOT sent to the printer. It instructs CFG60 to ask the operator for a "Check" and makes sure it is inserted correctly.

This example is for an Eurocheque. It is printed in a similar manner to the US check except for spacing. Most any check format can be printed in this way.



Not to Scale.

Eurocheque Printed on the Slip Station

The control codes to print this example are as follows.

{sensor}Check	Request that a check be placed in the printer.
[ESC]y<0>	Disable ENQ pre-processing so that it will not interfere with the rotated print format.
[ESC]0	Set 1/8 line spacing so forms positioning is consistent.
[ESC]j	Clamp on the check.
[ESC]o	Set feed direction into the printer.
[ESC]m	Find the end of the check.
[ESC]n	Set feed direction out of the printer.
[LF][LF]	Position the check.
[ESC]3<18>	Set character spacing.
[ESC]p<127>	Set the left margin in as far as possible.
[ESC]u<1><5><2><8><3><8><0>	Set the line spacing to align with the form.
[ESC]y<1>	Re-enable the ENQ pre-processor.
[ESC]s<80>	Set the maximum line length.
[ESC]r<3>	Request rotated 270° print.
FIVE-HUNDRED-&-NO/100 500.00[CR]	
XYZ Computer Peripherals Inc. London[CR]	
{date:1}[CR]	
[ESC]r<0>	Print the data.
[ESC]n	Setup to feed the check out of the printer.
[ESC]e	Feed the check out 2".
[ESC]z	Release the slip clamp.
[ESC]p<0>	Restore the printer defaults.
[ESC]s<48>	
[ESC]u<0>	
[ESC]0	

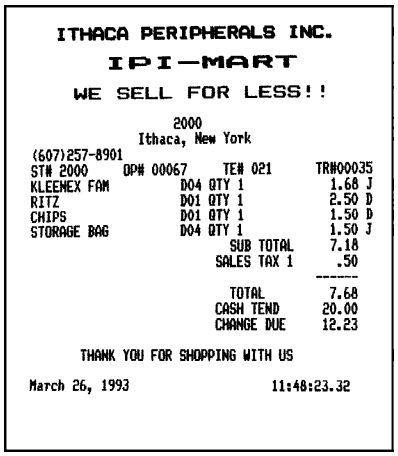
How to use the Receipt Station

The special feature of the receipt station is the ability to feed paper from a supply roll into print position, print on it, cut it, and then deliver a printed receipt.

The receipt station is easy to use. There are, however, a few restrictions when printing a receipt. The most important thing to remember is to never allow the receipt to be fed back into the printer more than 1/8 inch. This will cause a head jam.

Because of the versatility of the Series 60 printer some design trade off is inevitable. On the receipt the most difficult trade off to overcome is the position of the cut off knife in relation to the print line. The knife cuts the receipt paper 3 inches before the print line.

This can be overcome by cutting the receipt 20 lines or so before the print end. Typically when a receipt is printed the application knows that the transaction is complete. If the application program buffers 15 lines of print until the transaction is complete the knife cut command can be inserted 15 lines before the last line is printed. This will minimize receipt paper utilization.


ITHACA PERIPHERALS INC.
IPI—MART
WE SELL FOR LESS!!
2000
Ithaca, New York
(607)257-8901
ST# 2000 OP# 00067 TE# 021 TR#00035
KLEENEX FAM D04 QTY 1 1.68 J
RITZ D01 QTY 1 2.50 D
CHIPS D01 QTY 1 1.50 D
STORAGE BAG D04 QTY 1 1.50 J
SUB TOTAL 7.18
SALES TAX 1 .50
TOTAL 7.68
CASH TEND 20.00
CHANGE DUE 12.23
THANK YOU FOR SHOPPING WITH US
March 26, 1993 11:48:23.32

Receipt Print

Another way to use the 3 inches of paper is with some type of advertisement or promotion. The rotated print example shown in the next section illustrates printing a promotional coupon on the receipt.

The receipt station is a full feature station. All print features are available on the receipt station except reverse feed. It is possible to reverse feed the receipt tape about 1/8 inch. This allows all extended character features to operate.

To illustrate receipt station operation, the receipt shown above will be explained.

`[ESC]f` Select and load the receipt paper.
`[DC2]` Select 10 CPI.
`[ESC]I<1>` Select utility mode print.
`[ESC]E` Select emphasized print.
`[ESC]G` Select enhanced print.
`[ESC]0` Set 8 lines per inch.

```
  ITHACA PERIPHERALS INC.[CR][LF]
[CR][LF]
```

`[ESC]W<1>` Select double wide.

```
   IPI-MART[CR][LF]
[CR][LF]
```

`[ESC]F` End emphasize print.
`[SI]` Select 17 CPI.
`[ESC]v` Cut the receipt. There is now only 3 inches of paper left.

```
   WE SELL FOR LESS!![CR][LF]
```

`[ESC]W<0>` End double wide print
`[ESC]H` End enhanced mode.
`[ESC]F` End emphasized print.
`[ESC]#0` Select high speed draft print.
`[CR][LF]` Print the receipt information.

```
                2000[CR][LF]
             Ithaca, New York[CR][LF]
(607)257-8901[CR][LF]
ST# 2000     OP# 00067     TE# 021      TR#00035[CR][LF]
KLEENEX FAM          D04 QTY 1            1.68 J[CR][LF]
RITZ                 D01 QTY 1            2.50 D[CR][LF]
CHIPS                D01 QTY 1            1.50 D[CR][LF]
STORAGE BAG          D04 QTY 1            1.50 J[CR][LF]
                           SUB TOTAL      7.18[CR][LF]
                      SALES TAX 1          .50[CR][LF]
```

```
                                        ------[CR][LF]
                              TOTAL       7.68[CR][LF]
                            CASH TEND    20.00[CR][LF]
                            CHANGE DUE   12.23[CR][LF]
[CR][LF]
       THANK YOU FOR SHOPPING WITH US[CR][LF]
[CR][LF]
{DATE:0}                    {TIME:0}[CR][LF]
```

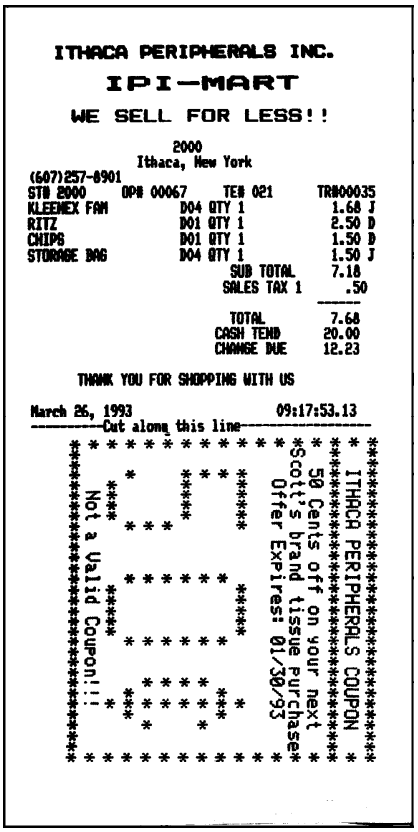
`[ESC]z` Release the receipt.

How to use rotated print in the Receipt Station

Rotated print on the receipt has some restrictions. This is because the receipt can not be reverse fed back into the printer. If receipt is fed more than 1/8 inch into the printer, a paper jam may occur. This means that only rotate 180° and 90° are easily printable on the receipt.

The receipt on the right was printed with the following control script:

```
[ESC]f          Select the receipt station and load the receipt paper.
[DC2]           Set 10 CPI.
[ESC]I<1>       Select utility mode print.
[ESC]E          Select emphasized print.
[ESC]G          Use enhanced double pass print.
[ESC]0          Set 1/8" line spacing.
  ITHACA PERIPHERALS INC.[CR][LF]
                Print top line.
[CR][LF]        Double space to the next line.
[ESC]W<1>       Switch to double wide print.
   IPI-MART[CR][LF]      Print the title.
[ESC]F          End emphasized print.
[SI]            Select 17 CPI.
[CR][LF]
   WE SELL FOR LESS!![CR][LF]
                Print in 17 CPI double wide.
[ESC]W<0>       End double wide print.
[ESC]#0         Select normal HDS print mode.
[CR][LF]
[ESC]H          End enhanced print
         2000[CR][LF]
                Print address.
              Ithaca, New York[CR][LF]
(607)257-8901[CR][LF]
ST#  2000            OP#  00067            TE#  021
                              TR#00035[CR][LF]
KLEENEX FAM             D04 QTY 1               1.68
                              J[CR][LF]
RITZ                  D01 QTY 1              2.50 D[CR][LF]
CHIPS                 D01 QTY 1              1.50 D[CR][LF]
STORAGE BAG           D04 QTY 1              1.50 J[CR][LF]
                         SUB TOTAL           7.18[CR][LF]
                       SALES TAX 1            .50[CR][LF]
                                            ------[CR][LF]
                         TOTAL               7.68[CR][LF]
                       CASH TEND            20.00[CR][LF]
                       CHANGE DUE           12.23[CR][LF]
[CR][LF]
       THANK YOU FOR SHOPPING WITH US[CR][LF]
[CR][LF]
{DATE:0}                 {TIME:0}[CR][LF]
----------Cut along this line-----------------[CR][LF]
                                Start the coupon.
[ESC]v                          Cut the Receipt, this leaves 3 inches for the coupon.
[ESC]u<0>                       Clear the line spacing table.
[ESC]p<0>                       Set the left margin to 0.
[ESC]3<18>                      Set the line spacing to 12 CPI.
[ESC]s<40>                      Select a 40 character line buffer, this will allow 25 lines.
[ESC]r<1>                       Start rotated print.
```



Receipt Print

```
*******************************[CR]
*  ITHACA PERIPHERALS COUPON  *[CR]
*******************************[CR]
*  50 Cents off on your next  *[CR]
*Scott's brand tissue purchase*[CR]
*   Offer Expires: 01/30/93   *[CR]
*                             *[CR]
*  ******     *****      *    *[CR]
*  *         *     *    ***   *[CR]
*  *         *     *   * * *  *[CR]
*  *****     *     *   * *    *[CR]
*       *    *     *   * *    *[CR]
*       *    *     *   * * *  *[CR]
*  *    *    *     *    ***   *[CR]
*   ****      *****      *    *[CR]
*    Not a Valid Coupon!!!    *[CR]
*******************************[CR]
```

Send the print date to the rotate buffer.

[ESC]r<0>	End input and start the print operation.
[ESC]z	Release the slip clamp.
[ESC]0	Reset the 1/8 line spacing.
[ESC]:	Set 12 CPI.
[ESC]p<0>	Clear the line spacing buffer.

How to use the Journal Station

Of all the print stations the Journal is the easiest to use.

It is important to note, however, that the journal station is limited in its paper motion capabilities. The journal paper always feeds from back to front and always at 8 lines per inch. Because the paper motion is restricted any print operation that requires fine paper motion or the paper to be fed in reverse will not operate correctly.

The journal will not operate correctly in enhanced print mode.

It can not print any of the graphics characters in the character set.

It is limited to single pass characters only.

It will not operate in rotated 90° or 270° print mode. It will, however, operate in rotated 180°[19] mode.

Because the journal feed is from the back to the front of the printer, the print (in normal mode) is upside down when viewed from the front of the printer. If this is undesirable, the print can be rotated and printed in reverse.

The following example shows typical journal printing.

```
[ESC]g          Select the journal.
[ESC]#0         Select High speed draft.
[SI]            Select 17 CPI.
ST# 2000   OP# 00067   TE# 021 TR#00035[CR][LF]
KLEENEX FAM       D04 QTY 1       1.68 J[CR][LF]
RITZ              D01 QTY 1       2.50 D[CR][LF]
CHIPS             D01 QTY 1       1.50 D[CR][LF]
STORAGE BAG       D04 QTY 1       1.50 J[CR][LF]
                    SUB TOTAL     7.18[CR][LF]
                  SALES TAX 1      .50[CR][LF]
                    TOTAL         7.68[CR][LF]
                  CASH TEND      20.00[CR][LF]
                  CHANGE DUE     12.23[CR][LF]
[CR][LF]
[ESC]z          Open the slip clamp. This is optional. The only time the slip clamp needs to be open is when a slip is
                inserted.
```

```
ST# 2000   OP# 00067   TE# 021 TR#00035
KLEENEX FAM       D04 QTY 1       1.68 J
RITZ              D01 QTY 1       2.50 D
CHIPS             D01 QTY 1       1.50 D
STORAGE BAG       D04 QTY 1       1.50 J
                    SUB TOTAL     7.18
                  SALES TAX 1      .50
                    TOTAL         7.68
                  CASH TEND      20.00
                  CHANGE DUE     12.23
```

Journal Print

In many cases a receipt operation also requires a journal entry. There are many ways to do this, but the two fastest ways are to use the auto start journal or the dual station mode.

To do an auto start journal the receipt operation should be done first. After the receipt do not open the slip clamp. Instead feed the receipt out from under the feed rolls. Now before (or while) the operator removes the receipt from the printer, send the complete journal entry to the printer. In fact the complete receipt and journal can be sent to the printer as one block of information. When the receipt is removed from the printer the printer will automatically start the journal entry.

To illustrate this operation the following codes were used to produce the receipt on the far right and then the journal entry above.

```
[ESC]f          Select the receipt station and load paper.
                Send the receipt data.
[DC2][ESC]I<1>[ESC]E[ESC]G[ESC]0
                ITHACA PERIPHERALS INC.[CR][LF]
[CR][LF][ESC]W<1>
                IPI-MART[CR][LF]
[ESC]F[SI] [CR][LF]
```

```
ITHACA PERIPHERALS INC.
IPI—MART
WE SELL FOR LESS!!
2000
Ithaca, New York
(607)257-8901
ST# 2000   OP# 00067   TE# 021   TR#00035
KLEENEX FAM       D04 QTY 1       1.68 J
RITZ              D01 QTY 1       2.50 D
CHIPS             D01 QTY 1       1.50 D
STORAGE BAG       D04 QTY 1       1.50 J
                    SUB TOTAL     7.18
                  SALES TAX 1      .50
                                  ------
                    TOTAL         7.68
                  CASH TEND      20.00
                  CHANGE DUE     12.23
THANK YOU FOR SHOPPING WITH US
March 26, 1993              11:48:23.32
```

Receipt Print

[19]Note: Some early production printers do not position print correctly in 180° rotated mode on the journal.

```
ST# 2000   OP# 00067   TE# 021 TR#00035
KLEENEX FAM      D04 QTY 1       1.68 J
RITZ             D01 QTY 1       2.50 D
CHIPS            D01 QTY 1       1.50 D
STORAGE BAG      D04 QTY 1       1.50 J
                   SUB TOTAL     7.18
                 SALES TAX 1      .50
                   TOTAL         7.68
                 CASH TEND      20.00
                 CHANGE DUE     12.23
```

Cut the Receipt

```
[ESC]v
   WE SELL FOR LESS!![CR][LF]
[ESC]W<0>[ESC]#0[CR][LF][ESC]H[ESC]F
                    2000[CR][LF]
                Ithaca, New York[CR][LF]
(607)257-8901[CR][LF]
ST# 2000     OP# 00067     TE# 021      TR#00035[CR][LF]
KLEENEX FAM          D04 QTY 1            1.68 J[CR][LF]
RITZ                 D01 QTY 1            2.50 D[CR][LF]
CHIPS                D01 QTY 1            1.50 D[CR][LF]
STORAGE BAG          D04 QTY 1            1.50 J[CR][LF]
                           SUB TOTAL     7.18[CR][LF]
                     SALES TAX 1          .50[CR][LF]
                                         ------[CR][LF]
                           TOTAL         7.68[CR][LF]
                     CASH TEND          20.00[CR][LF]
                     CHANGE DUE         12.23[CR][LF]
[CR][LF]
      THANK YOU FOR SHOPPING WITH US[CR][LF]
[CR][LF]
{DATE:0}                  {TIME:0}[CR][LF]
```

Journal Print

[ESC]J<100> Feed the receipt out from under the feed rolls. This requires that you know where the end of the receipt is.

[ESC]g Then select the journal station. (Do not release the slip clamp.)

[ESC]#0 Setup the journal print.

```
[SI][CR][LF]
ST# 2000   OP# 00067   TE# 021 TR#00035[CR][LF]
KLEENEX FAM      D04 QTY 1       1.68 J[CR][LF]
RITZ             D01 QTY 1       2.50 D[CR][LF]
CHIPS            D01 QTY 1       1.50 D[CR][LF]
STORAGE BAG      D04 QTY 1       1.50 J[CR][LF]
                   SUB TOTAL     7.18[CR][LF]
                 SALES TAX 1      .50[CR][LF]
                   TOTAL         7.68[CR][LF]
                 CASH TEND      20.00[CR][LF]
                 CHANGE DUE     12.23[CR][LF][CR][LF]
```

[ESC]z Release the slip clamp.

To provide even faster throughput, Dual Station operation is provided.

Dual Station mode prints the receipt (or slip) at the same time as the journal. This requires that the journal paper be self printing. Dual Station is done by enabling the journal feed during the receipt print operation. In addition, because the journal is narrower than the receipt, the receipt print that is to be recorded must be centered on the journal.

The journal print example to the right was printed in dual station mode. Note that the top and bottom line are overprinted. This is because all data printed on the receipt before the dual station mode was activated was also printed on the journal. This means that at least one line feed must be done on the journal (and receipt) before and after the journal print.

The following control script was used to generate the dual station example.

[ESC]f Select and load the receipt station

... Complete the non journal portion of the receipt.

```
(607)257-8901[CR][LF]
```

```
ITHACA PERIPHERALS INC.
IPI-MART
WE SELL FOR LESS!!
2000
Ithaca, New York
(607)257-8901

ST# 2000   OP# 00067   TE# 021 TR#00035
KLEENEX FAM      D04 QTY 1       1.68 J
RITZ             D01 QTY 1       2.50 D
CHIPS            D01 QTY 1       1.50 D
STORAGE BAG      D04 QTY 1       1.50 J
                   SUB TOTAL     7.18
                 SALES TAX 1      .50
                   TOTAL         7.68
                 CASH TEND      20.00
                 CHANGE DUE     12.23

THANK YOU FOR SHOPPING WITH US

March 26, 1993                10:54:33.75
```

Receipt Print

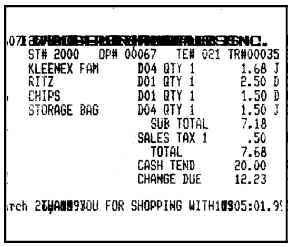
`[ESC]l<1>` Turn on dual station mode.

`[CR][LF]` Feed one line on both stations to feed past the over print on the journal.

`[ESC]#0` Proceed with the receipt setup. Do not use any print modes that will require reverse paper motion.

`[SI]` Print the receipt and journal information. Make sure information to be on the journal is over the journal station.

```
     ST# 2000   OP# 00067   TE# 021 TR#00035[CR][LF]
     KLEENEX FAM      D04 QTY 1       1.68 J[CR][LF]
     RITZ             D01 QTY 1       2.50 D[CR][LF]
     CHIPS            D01 QTY 1       1.50 D[CR][LF]
     STORAGE BAG      D04 QTY 1       1.50 J[CR][LF]
                        SUB TOTAL     7.18[CR][LF]
                      SALES TAX 1      .50[CR][LF]
                        TOTAL         7.68[CR][LF]
                      CASH TEND      20.00[CR][LF]
                      CHANGE DUE     12.23[CR][LF]
```



Journal Print

`[CR][LF]` Feed one more line of receipt tape and journal paper. this will assure the last line is not over-printed.

`[ESC]l<0>` Turn off dual station mode.

```
       THANK YOU FOR SHOPPING WITH US[CR][LF]
```

`[CR][LF]` Finish the receipt.

`{DATE:0}` `{TIME:0}[CR][LF]`

`[ESC]z` Release the receipt.

Special Tricks.

How to make a coupon

One very interesting trick is to make a coupon from the receipt tape. In effect what can be done is to load the receipt tape, feed out a portion of it, cut it, and then feed it far enough so it will fall out of the receipt paper path. It must not be fed out so far as to come out from under the feed rollers. When the receipt tape is no longer in the receipt paper path it can be treated as a slip.

Several things that must be taken into account when treating a receipt as a slip. First the definition of normal print is 180° from the normal slip. When using rotated printing this must be considered. The set slip left margin command does not work in receipt mode, it should be set to 0.

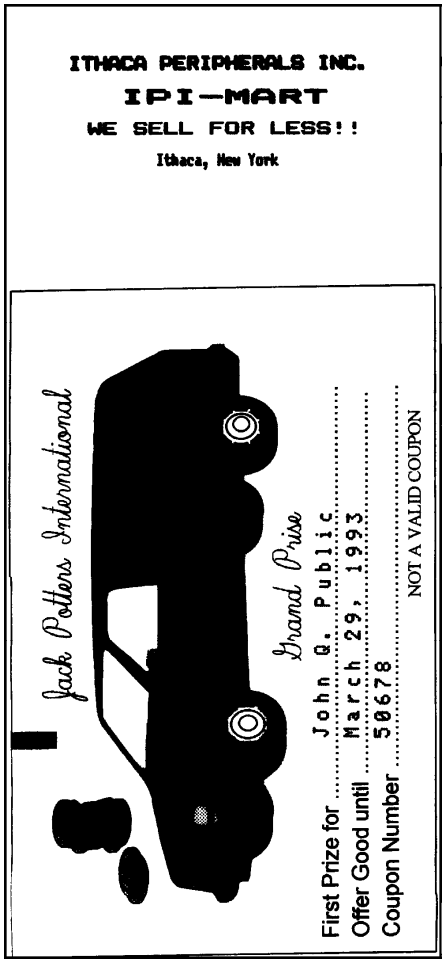
You may also reload the receipt as a slip. This will make the rotate print commands work like the slip. This can be done by selecting the slip station with **[esc]h** or **[esc]j** (Do not open the slip clamp). If you select the slip station, keep in mind that the receipt is loaded to the left of the slip stop. The first few characters of the slip station will not print on the receipt paper.

To help locate print on a pre-printed receipt tape, the slip in sensor can be used to find a black mark on the receipt tape. The [ESC]k or feed to mark command will do this. After the feed to mark command the black mark is about 1.25 inches past the cutter. Note, however, that the cutter will not cut with the slip-in sensor over a black mark. Because the slip in sensor[20] does not see any paper the knife will not operate. The pre-printed coupon tape should be fed forward until the cutter is at the coupon edge and then cut. The black mark must be more than 1.5 inches from the cut edge of the receipt coupon. After the receipt tape is cut, the **[esc]e** command will then feed the receipt forward until the cut end falls out of the receipt paper path. The receipt can then be reversed and feed back into the printer with a second **[esc]e** command and then loaded with a slip load command if desired. The receipt can then be processed as a slip. The receipt is not, however completely against the slip guide. This must be taken into account as the print is formatted. The following example will demonstrate coupon printing.

The coupon could be completely printed by the printer, or as in this case, a preprinted[21] receipt roll. We will print a ticket stub and then use rotated print to fill out the coupon.

[esc]f	Load the receipt coupon. NOTE: When the preprinted receipt is loaded it must be cut at the first coupon by hand.
[esc]y<0>	Disable ENQ commands.
	Print the ticket stub on the top of the coupon.

```
[DC2][esc]0[esc]I<1>[esc]E[esc]G
  ITHACA PERIPHERALS INC.[CR][LF]
[cr][lf]
[esc]W<1>
  IPI-MART[CR][LF]
[esc]F[SI]
[cr][lf]
```



Pre-printed Coupon

[20]The knife will not cut unless both the front and back sensors are covered. This prevents the knife from operating when there is no paper.

[21]This coupon was printed on a laser printer and is not a real coupon.

WE SELL FOR LESS!![CR][LF]	
[esc]W<0>[esc]H[esc]F[esc]#0	
[CR][LF]	
Ithaca, New York[CR][LF]	
	Now that the title is complete the receipt mark can be found. Take care to not print past the marker.
[esc]0	Set the line spacing
[esc]k	Find the mark
[lf][lf][lf][lf]	Adjust to the cut point. This can not be at the mark. The mark prevents the knife from activating.
[esc]q	This command synchronizes the input que with the forms control and prevents the knife from falsely thinking there is no receipt paper.
[esc]v	Cut the coupon
[esc]e	Move the coupon out of the receipt paper path. After this command the receipt is on the slip table and can be moved back into the printer.
[esc]o	Reverse the feed direction
[esc]J<162>	Position the coupon to the prize winner line start
[esc]p<0>	Set the left margin to 0
[esc]u<1><128><2><6><3><6><0>	
	Position the lines on the pre-printed form
[esc]r<3>	Select rotated 270° mode.
John Q. Public[cr]	
{date}[cr]	Send the print data to the printer
50678[cr]	
[esc]r<0>	End rotated print and have it printed
[esc]n	Set the feed direction, and deliver the coupon
[esc]e	Feed the form out 2 inches
[esc]z	Release the slip clamp
[esc]u<0>	Reset the line spacing for rotated print
[esc]y<1>	Re-enable the ENQ commands

Printing Graphics

The Series 60 has a bit image graphics capability and a full PC compatible character graphics character set. The bit image format is similar to that used on other PC printers. There are three modes of operation, Single density, half speed double density, and full speed double density.

Single density is the fastest mode. It makes a single unidirectional 60 DPI print pass. The full speed double density makes two passes with a half dot offset. This mode is half the speed of single density print but will print at 120 DPI. Half speed double density is half the speed of full speed double density, however, the print quality is enhanced.

Character Graphics.

Character graphics are created by joining individual characters together to produce a mosaic of characters that form a graphic image. The simplest method is to use the "*" (or any other character) to form an image. For example IPI might be formed as follows:

```
***    ****    ***
 *     *  *     *
 *     ***      *
 *     *        *
***    *       ***
```

The Extended character set of the printer supports line graphic characters that can be combined to form windows and other shapes. For the shapes to join from line to line the line spacing must be set properly.

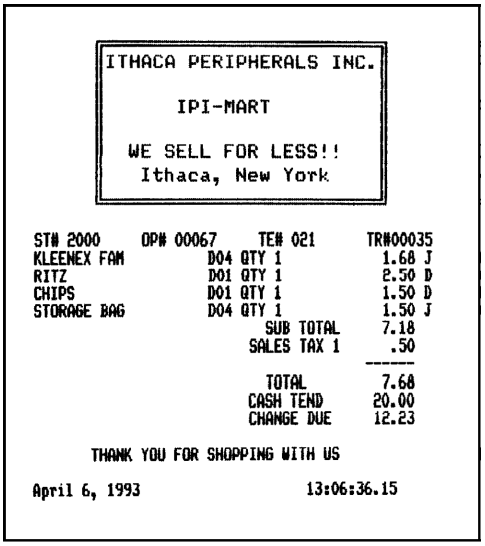
All characters are in a 9 dot high character cell. The dots are 1/60 of an inch apart. Therefore, the line spacing should be 10/60 or 1/6 of an inch. The set fine line space command can be used to set this line spacing. If possible the spacing should be reduced slightly to overlap the rows. This prevents any white spacing form appearing between the lines.

The following example illustrates the use of extended graphics characters.

`[ESC]h` Select the slip station and load the form to the first line.
`[ESC]U<1>` Select Unidirectional print for better alignment.
`[ESC]:` Select 12 CPI.
`[ESC]3<34>` Set line spacing for 0.157 inches. (slightly smaller than 1/6)
`<201>` Send the line graphics characters to the printer.

```
<205><205><205><205><205><205><205><205><205>
<205><205><205><205><205><205><205><205><205>
<205><205><205><205><205>
<187>[cr][lf]
     <186>ITHACA PERIPHERALS INC.<186>[CR][LF]
     <186>                       <186>[CR][LF]
     <186>      IPI-MART         <186>[CR][LF]
     <186>                       <186>[CR][LF]
     <186>  WE SELL FOR LESS!!   <186>[CR][LF]
     <186>   Ithaca, New York    <186>[CR][LF]
     <200>
<205><205><205><205><205><205><205><205><205>
<205><205><205><205><205><205><205><205><205>
<205><205><205><205><205>
```

`<188>[cr][lf]` This finishes the line graphics.
`[ESC]U<0>` Reenable bi-directional printing
`[ESC]0` Set standard 1/8 inch line spacing.
`[SI]` Set 17 CPI.
`[CR][LF]` Finish the form.




```
ST# 2000     OP# 00067     TE# 021      TR#00035[CR][LF]
KLEENEX FAM          D04 QTY 1            1.68 J[CR][LF]
RITZ                 D01 QTY 1            2.50 D[CR][LF]
CHIPS                D01 QTY 1            1.50 D[CR][LF]
STORAGE BAG          D04 QTY 1            1.50 J[CR][LF]
                            SUB TOTAL     7.18[CR][LF]
                         SALES TAX 1       .50[CR][LF]
                                          ------[CR][LF]
                           TOTAL          7.68[CR][LF]
                         CASH TEND       20.00[CR][LF]
```

```
                          CHANGE DUE     12.23[CR][LF]
[CR][LF]
       THANK YOU FOR SHOPPING WITH US[CR][LF]
[CR][LF]
{DATE:0}                     {TIME:0}[cr][lf]
[ESC]z       Open the slip clamp.
```

When printing line graphics the data path to the printer must be 8 bits. 7 Bit serial protocols will not access the extended characters.

The extended characters require that the form be reverse fed. This means that printing line graphics on the receipt may be less than acceptable.

APA Graphics

The printer is capable of APA[22] graphics. To generate a graphics image by hand is time consuming and tedious.

It is possible to use a graphic package to create a graphic image. The following procedure will help with setting things up.

1). Generate the graphic image in whatever program you wish.

2). Make sure the paper size you pick will fit on the printer station you intend to print on. If the paper size can not be set, print a portion of the page.

[22]APA - All Points Addressable.

3). Print the graphic to a file using a "Generic IBM Graphics 9 pin" driver. The standard IBM resolutions are: 240 x 216, 120 x 72, and 60 x 72. The Series 60 printer supports all three resolutions. 120 x 72 gives good resolution with reasonable speed.

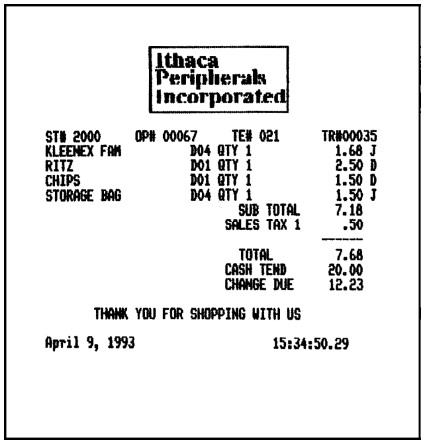
4). Print the graphic image to a file.

5). Edit the resulting file to remove any unwanted forms control and insert the Series 60 forms control.

6). Make the resulting file available to your application so that it will be sent to the printer when required.

As with all graphics the data path to the printer must be 8 bits, 7 bit protocols will not work.

The Quad density graphics resolution will give the best rendition of your graphic image however, this mode is very slow and prints very dark. The printer is setup to provide the best performance in normal operation. For this reason the quad density graphics should be limited.



Receipt with APA Graphics

The APA graphic example on the left was done with the double density graphics. The graphic driver used made an approximation of the graphic image.

The procedure to produce the receipt format is a follows:

```
[esc]f          Select the Receipt station and load the paper.
[esc]y<0>       Disable ENQ processing
[esc]U<1>       Select uni-directional printing
[lf]
{graphic:logo.gph}          Read the graphic file
[esc]y<1>           Re-enable ENQ processing
[Esc]U<0>       Reselect bi-directional printing
[esc]0          Continue with normal print.
[SI][CR][LF][esc]v
ST# 2000     OP# 00067     TE# 021      TR#00035[CR][LF]
KLEENEX FAM          D04 QTY 1            1.68 J[CR][LF]
RITZ                 D01 QTY 1            2.50 D[CR][LF]
CHIPS                D01 QTY 1            1.50 D[CR][LF]
STORAGE BAG          D04 QTY 1            1.50 J[CR][LF]
                            SUB TOTAL     7.18[CR][LF]
                          SALES TAX 1      .50[CR][LF]
                                          ------[CR][LF]
                            TOTAL         7.68[CR][LF]
                          CASH TEND      20.00[CR][LF]
                          CHANGE DUE     12.23[CR][LF]
[CR][LF]
       THANK YOU FOR SHOPPING WITH US[CR][LF][CR][LF]
{DATE:0}                    {TIME:0}[cr][lf]
[esc]z
```

The first part of the graphic file is listed here in hex. This is a hex dump of the first 512 bytes of the logo.gph graphics file.

```
0100  0D 20 20 20 20 20 20 20-20 20 20 20 20 20 20 20   .
0110  1B 4C 8D 00 FF 7F 80 00-80 00 80 00 80 0F 80 0F   .L..............
0120  80 00 80 00 82 01 86 0D-82 02 80 00 80 0F 80 0F   ................
0130  80 02 80 03 82 01 80 00-80 01 80 03 80 02 80 03   ................
0140  80 01 80 00 80 00 81 01-82 00 82 01 82 01 80 00   ................
0150  81 00 83 00 82 00 83 00-81 00 80 00 80 00 80 00   ................
0160  80 00 80 00 80 00 80 00-80 00 80 00 80 00 80 00   ................
0170  80 00 80 00 80 00 80 00-80 00 80 00 80 00 80 00   ................
0180  80 00 80 00 80 00 80 00-80 00 80 00 80 00 80 00   ................
```

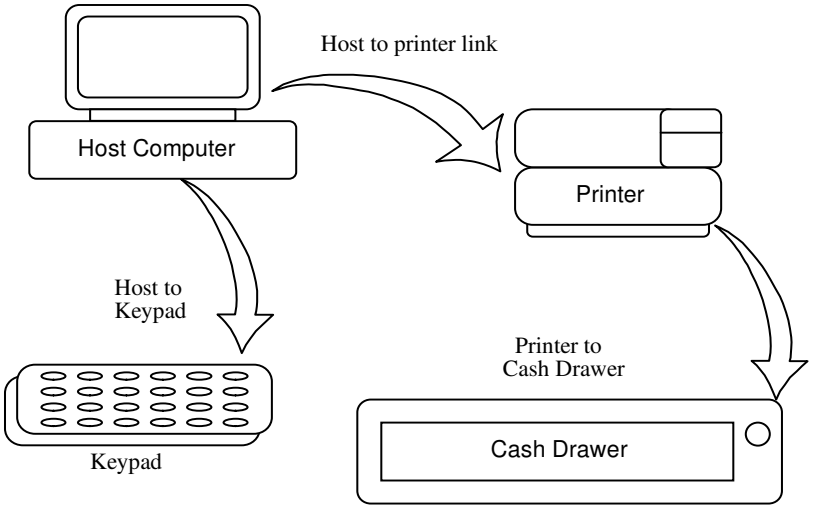
```
0190  80 00 80 00 80 00 80 00-80 00 80 00 80 00 80 00   ................
01A0  FF 0D 1B 4A 18 20 20 20-20 20 20 20 20 20 20 20   ...J.
01B0  20 20 20 20 1B 4C 8D 00-FF FF 00 00 00 00 02 08       .L..........
01C0  03 F8 03 F8 02 08 03 02-01 F1 08 F0 08 08 10 00   ................
01D0  08 F0 08 F0 08 00 08 F0-08 F0 08 00 00 B0 08 B0   ................
01E0  48 50 03 F0 0B F0 08 00-00 E0 10 E0 18 10 08 00   HP..............
01F0  18 10 00 00 B2 09 B2 4B-50 00 F0 08 F0 08 00 00   .......KP.......
0200  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
0210  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
0220  00 02 01 02 03 00 00 00-00 00 00 00 00 00 00 00   ................
0230  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
0240  00 00 00 00 FF 0D 1B 4A-18 20 20 20 20 20 20 20   .......J.
0250  20 20 20 20 20 20 20 20-1B 4C 8D 00 FF FF 00 00           .L......
0260  00 00 00 00 FE 00 FE 00-00 00 20 00 E0 20 C0 00   .......... .. ..
0270  00 18 66 38 46 12 00 70-42 34 00 00 00 7E 00 7E   ..f8F..pB4...~.~
0280  40 00 40 60 00 00 7E 00-7E 00 00 00 7F 00 7F 42   @.@`..~.~......B
0290  00 00 42 3C 66 18 00 00-00 FE 00 FE 40 00 00 7E   ..B<f.......@..~
02A0  00 7E 00 00 00 18 66 38-46 12 00 70 42 34 00 00   .~....f8F..pB4..
02B0  00 7E 00 7E 40 00 40 60-00 00 26 48 26 08 02 14   .~.~@.@`..&H&...
02C0  6A 54 3E 00 00 00 FE 00-FE 00 00 76 62 10 08 50   jT>........vb..P
02D0  6E 0E 00 00 00 00 00 00-00 00 00 00 00 00 00 00   n...............
02E0  00 00 00 00 00 00 00 00-FF 0D 1B 4A 18 20 20 20   ...........J.
02F0  20 20 20 20 20 20 20 20-20 20 20 20 1B 4C 8D 00               .L..
```

Communications Protocol and Print Buffers

Overview

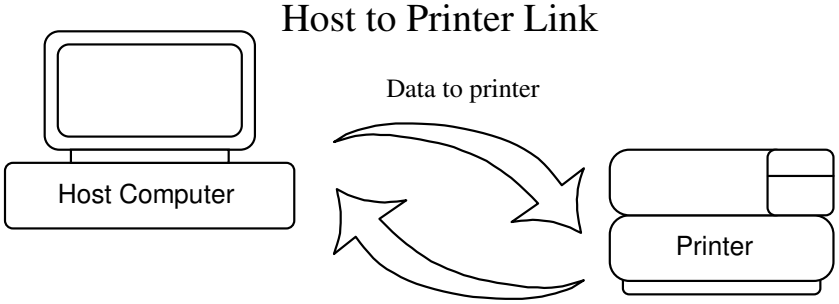
The following figure illustrates the communications flow from host computer to printer and from printer to cash drawer.

Typical POS System



For the Host to printer communications link the Series 60 printers support both serial and parallel communications ports as standard features. Selecting which port is active is part of the configuration process.[23] The Serial port and parallel port both follow standards developed for the PC environment.

Host to Printer Link



Status and Flow Control Back

In most cases the host computer is capable of sending information to the printer much faster than the printer can print it. To prevent information from being lost a flow control mechanism is provided. This mechanism is called "flow control protocol". The goal of the flow control protocol is to exchange as much information as possible as fast as possible without losing any data.. The Series 60 supports three flow control protocols, two in serial mode and one in parallel.

From the printers point of view there are four basic functions that are required of communications. All four are common to all three flow control protocols. There must be some type of communications driver, a status inquire procedure, a storage buffer, and a print control mechanism that is using the data.

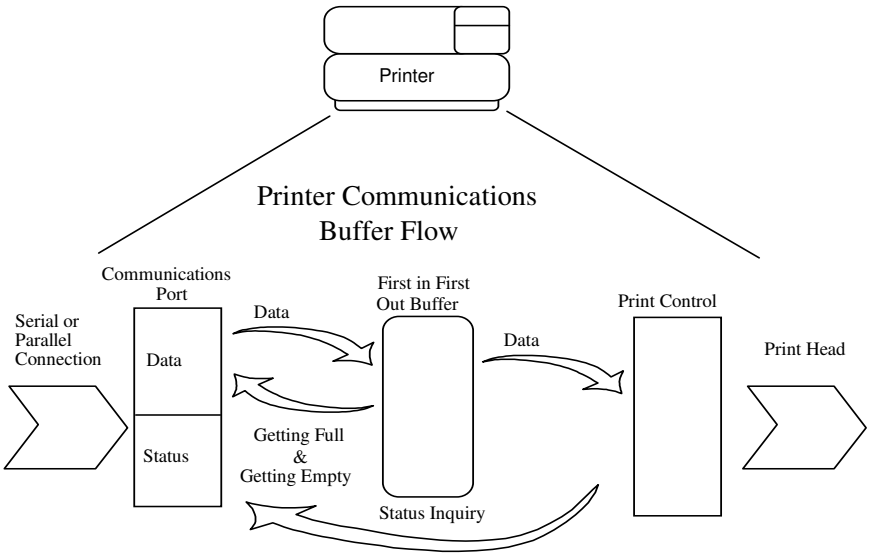
1. The communications port is either the serial port hardware or the parallel port hardware and the associated communications software driver.
2. Some means for the host to bypass the buffer for status information. This is required because the buffer offsets the printer in time from the host. (The printer is generally behind the host)

[23]It is not possible to have the Serial and Parallel port active at the same time. The configuration process is described in the configuration section of this document.

3. The storage buffer is a software implemented, First In First Out (FIFO) circular buffer. It stores information in an asynchronous fashion where information can be placed in it at any rate and retrieved from it at any rate. However, the information order is not altered. Any buffer has a finite size and if information is put in faster than it is taken out, it will overflow. This overflow is what requires a flow control mechanism.

4. The print control mechanism is the remainder of the printer hardware and control software. It interprets control codes, operates the control panel, the print head and the cash drawer interface.

The following figure illustrates the four basic parts of printer flow control.



The Communication port is either serial or parallel and is controlled by a software communications driver. This driver receives data and returns requested status. (The communications driver is a high priority interrupt driven software event.) As information is received from the host, data is taken from the communications port hardware by the driver and placed in the FIFO. When the FIFO input function finds that the buffer is getting full it notifies the communications driver to implement "flow control". Flow control will attempt to stop further information from being sent from the host.

In addition to flow control, the communications driver is also responsible for identifying status requests from the host. Some received data is translated by the communications driver as status inquiries, in this case the series 60 printer uses [ENQ] commands. The driver then gets the ENQ from host, asks the print controller for the information and responds directly to the host.

The print control software takes information from the FIFO (as it needs it and can use it). When FIFO output function finds that the FIFO is getting low it notifies the communications driver that the information flow can be resumed (if it was stopped) and allow more information to be placed in the FIFO.

The series 60 printer has a 2000 character input buffer. This means that 2000 characters (or control codes) can be sent to the printer before it is interpreted and printed. In effect the host computer can get 2000 characters ahead of the printer.

The fact that the information sent to the printer is stored and not acted upon immediately is of concern to ENQ commands. If the printer is asked to feed a form to the end and then an ENQ is sent to check for end of form, the printer may not have started the form movement until after the ENQ response. The wait que command can be used to make sure that the printer has done the command before the ENQ is sent.

Parallel Port

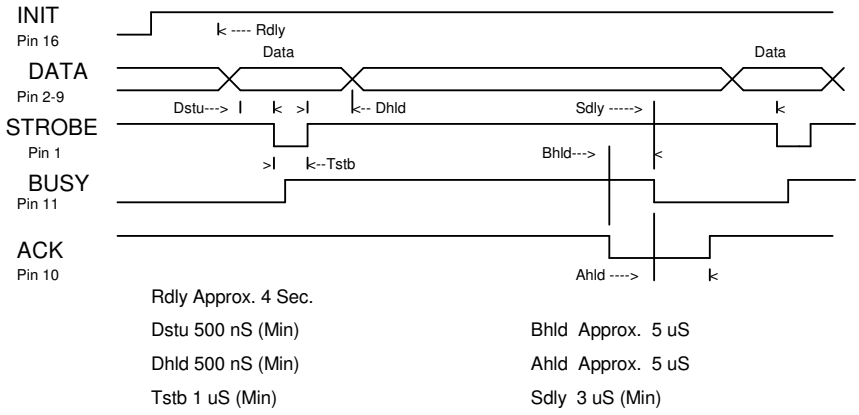
Parallel Port Protocol

The Model 60 parallel port behaves just like any printer connected to a PC. The parallel interface accepts 8 bits of data from the host. The "STROBE" signal from the host is used to indicate that data is available. When the printer sees the "STROBE" and has accepted the data it asserts "BUSY". The "BUSY" signal indicates to the host that the printer has accepted the data and is busy working on the data. When the printer has been able to absorb the data and is ready to accept another byte, the printer asserts "ACK" (Acknowledge) and negates "BUSY" and then finally negates "ACK".

The following parallel port specifications and timing should be met by the host computer. In standard PC's the strobe signal is generated by software writes to the parallel port control port. This is typically done in the BIOS or in some parallel port driver. As PC get faster and faster it is up to the software to assure that the "STROBE" signal does not get too narrow. 1 uS is about the minimum pulse width that should be sent down a cable. Shorter pulse widths (500nS) will be accepted by the printer, however the cable can introduce significant signal degeneration and skew.

It is very important that the Data be valid before strobe is asserted and remain valid until after the strobe is removed. A 500 nS. setup and hold time is required by the printer.

The following chart illustrates this sequence:



Rdly Approx. 4 Sec.

Dstu 500 nS (Min)	Bhld Approx. 5 uS
Dhld 500 nS (Min)	Ahld Approx. 5 uS
Tstb 1 uS (Min)	Sdly 3 uS (Min)

Parallel Port Data Timing

To implement flow control the "BUSY" signal is asserted by the printer outside the normal data transfer sequence.

The BUSY signal has several uses but it always indicates that the printer can not accept information. The BUSY signal may happen at any time and may not adhere to the above timing chart in all cases. It is up to the host's parallel port driver to handle all possible BUSY states. It is important that the host driver does not hang-up if it takes some time for an ACK (Acknowledge) response to a "STROBE". The standard PC parallel port hardware implements an Interrupt on ACK signal to make this task easier.

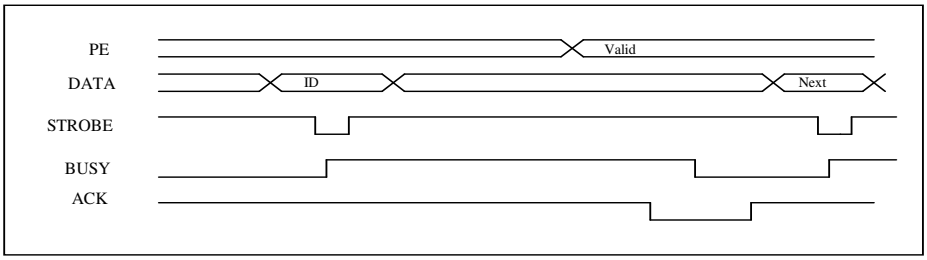
Parallel Port Inquire

All ENQ commands require some type of response from the printer. The serial port is bi-directional, the parallel port is not. For this reason the parallel and serial operation of ENQ commands are different. In serial operation all ENQ commands are responded to by ACK or NAK and then the command ID on the return link.

In parallel operation there is no easy way to return complex information to the host. For this reason the PE (Paper Error) signal is driven in response to ENQ's. If a true PE is being signaled the ERR line will also be driven. It is, therefore, possible to distinguish between a paper error and an ENQ response.

In parallel mode the printer will respond to the ENQ before the parallel port sequence is complete. When the parallel port acknowledges the ID portion of the ENQ sequence, the PE signal will be valid. The host must, however, remember what

status was requested as the printer has no way of signaling that information. In addition, the host must not interpret the PE signal as an error but as a response to an ENQ. The PE signal will remain valid until the next ENQ is issued or until a true paper exhaust is found. A true paper exhaust will only be reported after a line feed and will also drive the fault signal. If the PE signal is to be returned to the valid paper error state, an **[ENQ] <4>** can be issued.



PE to ENQRequest Timing

There is an **important** performance effect on the printer of ENQ commands. The priority of communications in the printer is very high. ENQ commands are processed at the high priority of the input ISR[24]. The priority of the communications is the second highest, the highest is a motor control timer. It is possible in parallel mode for the host computer to send ENQ commands so fast that the printer does not have any time for printing (or do anything else). ENQ commands must be paced to allow the printer time to get to its idle task. The pacing of ENQ's should average no more than 100 per second.

Parallel Port [ESC] Q .

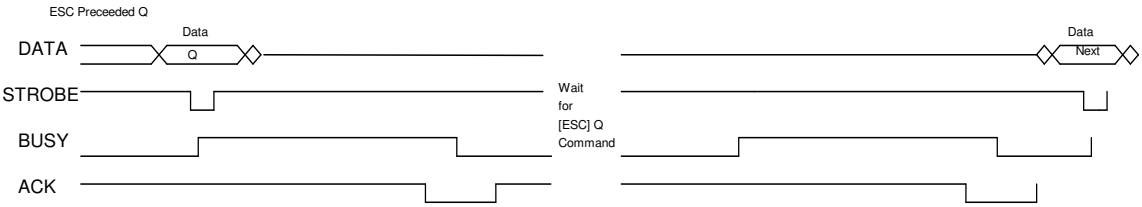
The parallel port is difficult to operate in a bi-directional mode. The [ESC] Q command requires that a response be returned to the host when the command is complete. To do this a busy/acknowledge sequence was chosen. This was done because it gives two ways for a programmer to deal with the response.

1) The [ESC} Q command can be sent to the printer and it's acknowledge waited for in a polling loop.

> This procedure is simple and relatively easy to implement. It however, suffers from a performance problem because the PC must be dedicated to looking for the response.

2) The [ESC} Q command can be sent to the printer and it's acknowledge picked up by a interrupt from the ACK parallel port interrupt.

> This procedure is more complicated that polling. However, it allows an interrupt service routine to handle the responses. Please note that some PC's share this interrupt with the CRT (EGA Displays).



The above timing diagram is the relative timing of the and parallel port [ESC]Q response.

For applications that do not have control over the parallel port, the [ESC]q and [ENQ] commands may be easier to implement.

[24]ISR - Interrupt Service Routine.

Parallel Port Connector

The INIT\ (Initialize) printer input acts as a hardware reset to the printer. This signal must be inactive (high) for about 4 seconds before the printer will respond to information input.

The PE signal is asserted by the printer whenever the journal paper is exhausted and an attempt is made to print on the journal. The PE signal is also asserted in response to [ENQ] commands. If the printer does not have a journal this signal is only used for [ENQ] commands.

The ERR\ signal is asserted if a head jam occurs or if the PE signal is asserted for a true paper error.

NOTE: The "AUTOFD" (Auto feed Pin 14) and "SLIN" (Select input Pin 17) signals are not used by the series 60 printers.

Pin 1	STROBE	Clock Data to printer	Host to Printer
Pin 2-9	D0 - D7	Data	Host to Printer
Pin 10	ACK\	Printer Accepted Data	Printer to Host
Pin 11	BUSY	Printer is Busy	Printer to Host
Pin 12	PE	Paper Out / Status	Printer to Host
Pin 13	SLCT	Printer Selected	Printer to Host
Pin 14	AUTOFD	Auto feed paper	Host to Printer
Pin 15	ERR\	Printer Error	Printer to Host
Pin 16	INIT\	Initialize the Printer	Host to Printer
Pin 17	SLIN	Select Printer	Host to Printer
Pin 18-25	GND	Ground	

Parallel Port Pin-outs

Serial Port

Serial Port Features

The serial port features are as follows:

Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19.2K
Bit Patterns	8 Bit No Parity, 8 Bit Odd, 8 Bit Even, 7 Bit No Parity, 7 Bit Odd, 7 Bit Even
Flow Control	DRT and XON/XOFF

It should be noted that the 7 bit no parity is in fact an 8 bit format. The implementation of the hardware UART in the Intel 8051 family will not implement a true 7 bit no parity format. If the host provides a true 7 bit no parity format, it must be configured with 2 stop bits.

Serial Port Pin-out

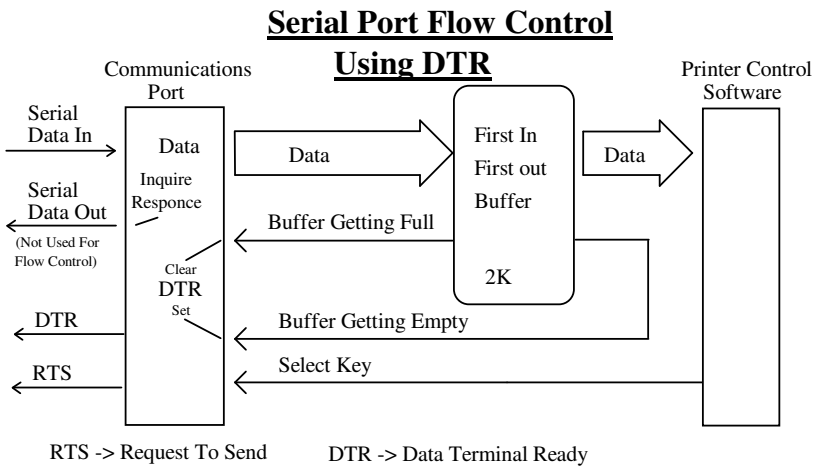
Pin 1	DCD	Data Carrier Detect
Pin 2	RX	Receive Data
Pin 3	TX	Transmit Data
Pin 4	DTR	Data Terminal Ready
Pin 5	GND	Signal Ground
Pin 6	DSR	Data Set Ready
Pin 7	RTS	Request To Send
Pin 8	CTS	Clear To Send
Pin 9	SSD	Secondary Data

Because both the host and the printer are DTE's (Data Terminal Equipment) they use the same serial port pin-outs. If the cable that is used to connect the host to the printer is a pin-to-pin interconnect it will not work. For this reason a null modem or turn-around cable must be used to interconnect the host and the rinter.

Serial Port Protocol

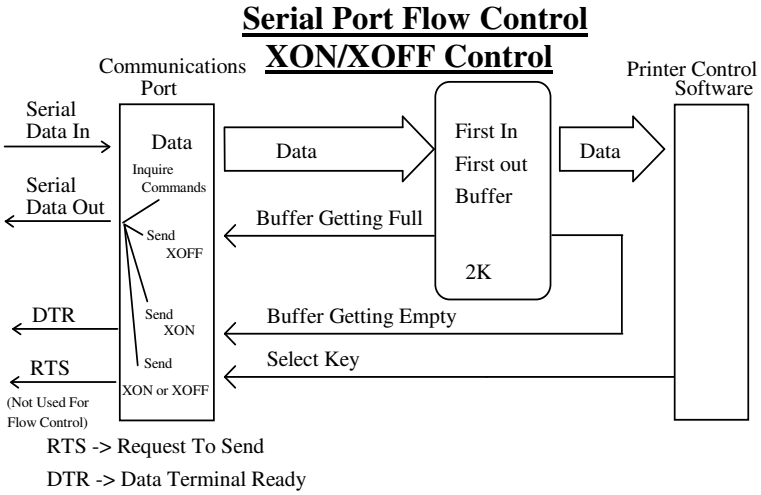
The serial Port supports two flow control standards, XON/XOFF and Ready/Busy (sometimes called DTR or hardware handshake.)

The Ready/Busy protocol uses the DTR (Data Terminal Ready) signal to indicate to the host computer that the printer is not ready to accept data. The host should stop sending data to the printer as soon as possible. Because the host may not notice the DTR signal until it has transmitted several bytes of data to the printer, the printer will continue to except up to 198[25] bytes of data after it indicates that it is not ready. The figure below illustrates how the Ready / Busy protocol works.



The following flow chart illustrates the communications driver getting data from the serial port and placing the data in the buffer using DTR or XON/XOFF flow control.

At the top of the flow diagram the driver is waiting for data. When data is received from the host it is checked to see if it is an ENQ command. If the data is an ENQ it is responded to and placed in the buffer. If not the data is placed in the FIFO. The FIFO is then checked to see if it is full before the internal pointer is incremented. If it is not full the pointer is incremented in preparation for the next data byte. The FIFO is then checked to see if it is getting full by checking the amount of information in the buffer to see if it has passed a high water mark. If it has the communications driver is notified and it will reset DTR indicating to the host that no more data should be sent.



[25]The buffer is really 2200 bytes long with a 200 byte pad.

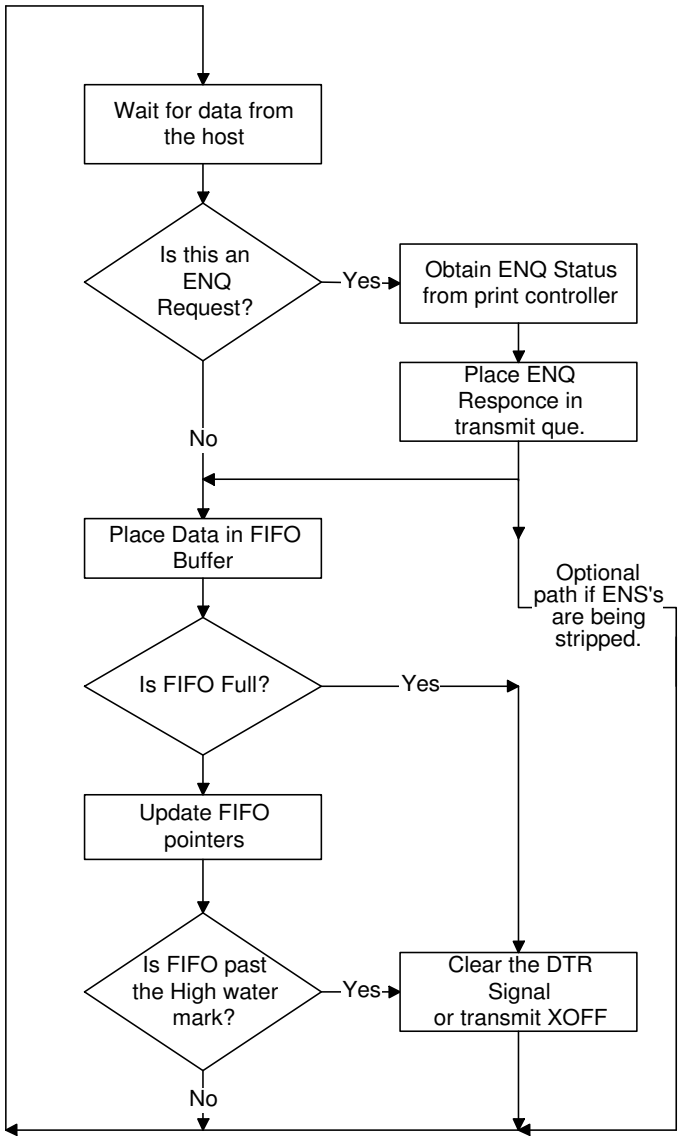
The following flow diagram illustrates how the print controller takes information from the FIFO.

At the top of the chart the print control software asks for data. If there is no data in the buffer a "no data flag" is returned. The print software must then wait for data.

If there is data in the FIFO it is read from the FIFO and pointers are updated. The FIFO is then checked to see how much information is left in the buffer. If the buffer is below a low water mark (about 100 bytes left) communications driver is notified and DTR is re-asserted.

If XON/XOFF flow control is being used the flow is very similar to DTR flow except that DTR is not used and XON and XOFF control characters are transmitted back to the host on the serial link.

XON/XOFF has an advantage in that only three wires are required to interconnect to a printer. The disadvantage is that a serial port receiver driver must be written for the host.



DTR - Data Terminal Ready

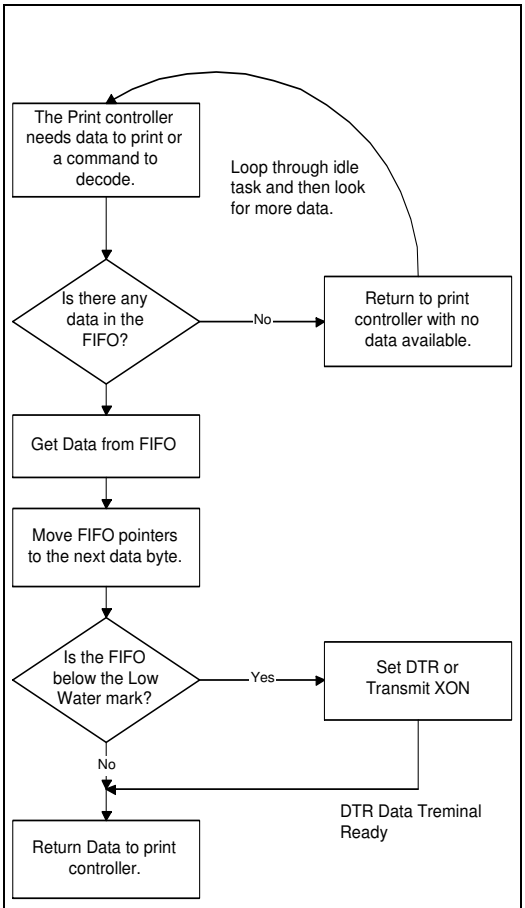
The following flow diagram illustrates how the print control software takes data from the FIFO and controls flow control.

The print controller is always looking for data if the printer is "ON-LINE" and not printing. It continuously asks the FIFO if it has any data. If there is no data in the FIFO it does some housekeeping like keyboard scanning, etc. If there is data, it processes it. The flow control is done when the data is taken from the FIFO and the amount of data in the FIFO is less than a prescribed amount. This low water mark is set based on the expected environment. The series 60 printer sets this at 200 characters. This gives the host application time to get more data to the printer before the printer uses up what it has.

When XON/XOFF protocol is implemented, it is possible for the host to miss an XON or an XOFF. To prevent this from causing a communications lockup, the printer will send an XOFF for every character received after the high water mark is reached.

Whenever the printer detects that the serial data link is inactive it will send out an XON. This results in an XON being sent out about every 2 Seconds.

When the printer is selected or de-selected (with the "SELECT" key), an XON or XOFF will also be sent. This happens even if the internal data buffer is past the high water mark[26]. This is done to allow the host to know that the "SELECT" key has been pressed. If the buffer is full and an XON is sent the next character sent by the host will cause an XOFF to be sent. The data that was sent by the host will not be lost unless the 200 character pad buffer is used up.

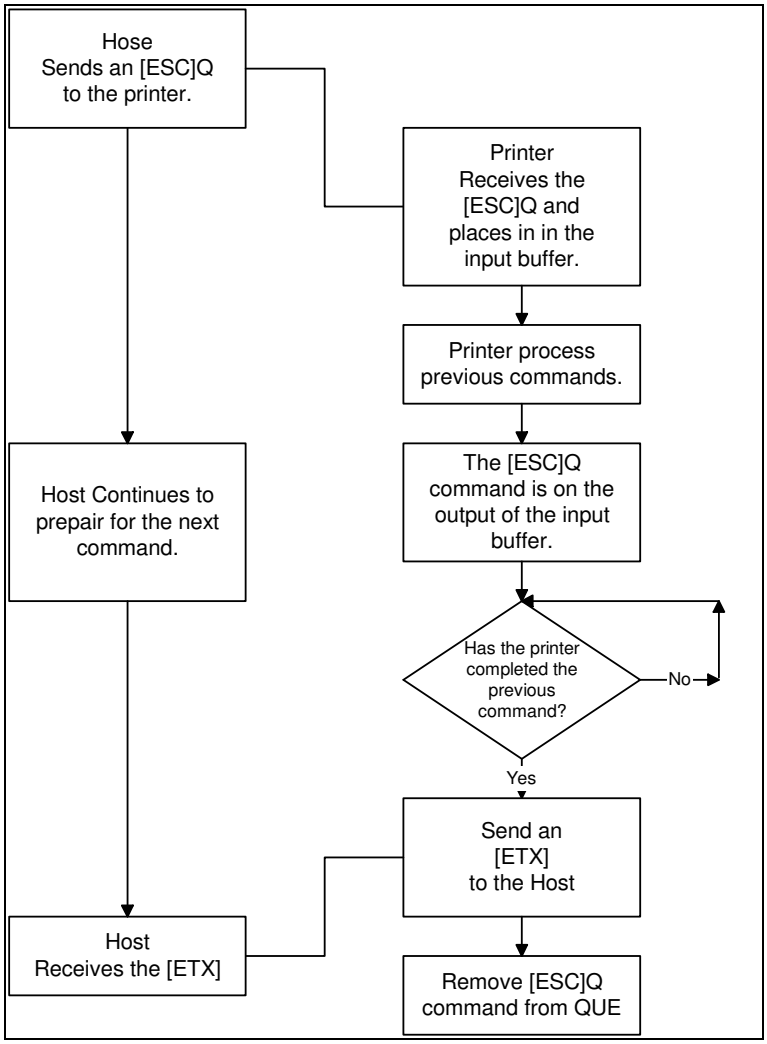


Print Controller using data

[26]If the host sends more information it will be responded to by an XOFF. If the printer is selected and de-selected in this mode too many times it is possible for the buffer to overflow

Serial Port [ESC] Q

The Serial port handles [ESC] Q responses by transmitting an [ETX] (03H or <3>). The following flow chart illustrates this sequence:



Serial Port Inquire

The serial port inquire is more straight forward than parallel mode. The serial ACK or NAK responses follow a uniform format, the ACK or NAK is always followed by the command ID that requested it. This makes the design of the host application easier because the response can be identified and always follows the same format.

In serial mode the Series 60 printer will always accept data. This is true even if the DTR signal is invalid for "buffer full" or for "off-line" It is, therefore, possible for the printer to respond to ENQ commands if the printer is off-line or if the printers buffer is full. (NOTE: ENQ commands go into the print buffer, this prevents an ENQ that is part of graphics from being lost. This could cause a true buffer overflow. When this happens unexpected results can occur. The [ESC]y command can be used to prevent ENQ commands from go into the buffer.

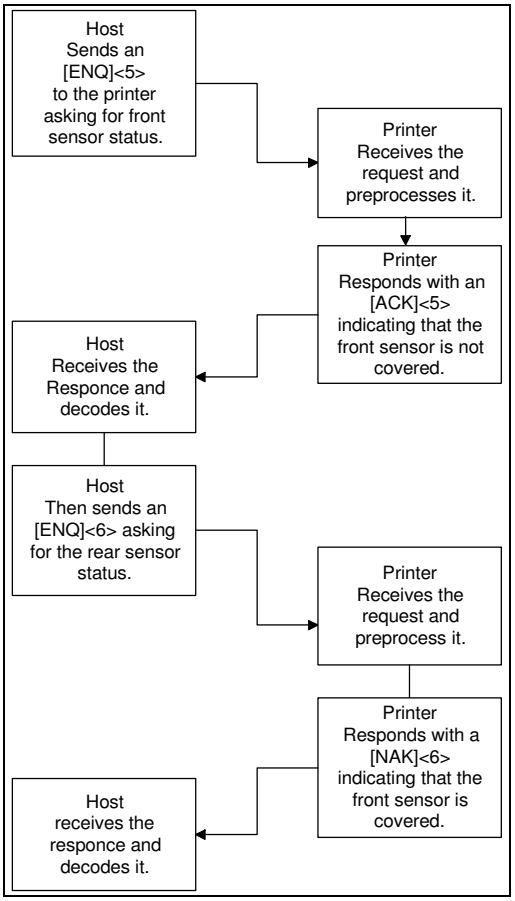
The following is an example of a Host/Printer inquiry response exchange

The Host sends an [ENQ]<5> (Front slip sensor status) to the printer.

The printer responds with an [ACK}<5> indicating that the request was 5 and the status is TRUE (no slip in position).

The Host then sends an [ENQ]<6> (Rear sensor status) to the printer.

The printer responds with [NAK] <6> indicating that the request being responded to is 6 and is FALSE (Paper is present).



An effect on the printer by ENQ commands is performance. The priority of communications in the printer is very high. ENQ commands are processed at the high priority of the input ISR[27]. It is possible at 19200 baud for the host computer to send ENQ commands so fast that the printer does not have any time for printing (or do any thing else). ENQ commands must be paced to allow the printer time to get to its idle task.

In serial mode it is very **IMPORTANT** that the response to an ENQ be received by the host before another command is issued to the printer. When an ENQ is received by the printer, the printer may do some complicated processing at a very high priority. During this time the printer disables it's interrupts. This means that any data sent to the printer during this time may be lost.

[27]ISR - Interrupt Service Routine.

Remote Printer Reset

Reset in Serial Mode

It is possible to generate a printer reset in serial mode. The <ENQ]<10> command will request that the printer reset (This is not a hardware reset). It will, however, completely initialize the hardware and software but will not recover from a loss of software control.

The command flow is as follows:

1. The [ENQ]<10> will be acknowledged and then the software will reset.
2. The Printer will be placed off-line.
3. The hardware and software will be reinitialized.
4. The printer will then go back on-line. Any information sent to the printer while it is off-line will be lost.

Reset in Parallel Mode

In parallel mode driving the INIT signal on the parallel port for 100 nS will generate a hardware reset. As long as the INIT signal is low the printer will remain reset. It will take about 2 seconds for the printer to recover from a reset.

Power Cycle Recovery

There are times when the host needs to know if the printer was power cycled. An example would be changing the receipt tape. It is not necessary to turn the printer off to change the receipt. However, if the operator does, any information sent to the printer before the power cycle will be lost.

The Series 60 printer has a flag that is set after a reset. This flag stays set until it is requested by the host at which time it will be reset. The [ENQ]<11> command reads this flag. If this command returns [ACK], the power has been cycled and all unprinted information has been lost.

If the print operation is critical, it is a good idea to check this flag before and after all transactions. An alternate approach is to check the flag after every off-line to on-line transition.

How to Interpret Printer Error Codes

The series 60 printer indicates errors with various blinking patterns on the ALARM light. There are a number of errors that can be displayed. To simplify the codes they are organized into four basic classes:

1. Operator Alarms
2. Failure Alarms
3. Programming errors
4. Status and diagnostics indicators

Operator alarms are errors that can be recovered by the operator without power cycling the printer. If the error is cleared, operation of the printer can continue without information being re-transmitted to the printer by the host. Errors like out of paper or the form being out of position can be recovered without turning the printer off. These errors are the most common and are assigned blink patterns that are the easiest to decode.

Failure alarms are errors that will require the printer power to be turned off to correct. These are things like a print head or knife jam. These are all assigned to a single error code. These errors can be reset by a host reset request, however, in many cases the error will occur again unless the operator clears the obstruction.

Programming errors are errors that should never occur unless there is an application failure or the printer gets out of synchronization with the application. These are things like selecting the journal on a printer with no journal, or sending information to the printer without first selecting a print station. In some cases the host application can not control the presence of line terminators after printer setup sequences. In this case the print with slip clamp open error can be disabled. See the [ESC]y<6> command description.

In addition there are a number of status indicators that may be encountered during diagnostics and application development. These indicators are not error codes but status indications.

Operator Correctable Errors:

Receipt operations		
Receipt paper out or rear path blocked.	Two short blinks	Once every 2 seconds
Receipt load failed or Front path blocked.	Three short blinks	Once every 3 seconds
Journal operations		
Journal paper exhausted.	One long blink	Once every 2 seconds
Rear sensor detects a slip.	Two short blinks	Once every 2 seconds
Front sensor detects a slip.	Three short blinks	Once every 3 seconds
Slip operations		
Rear sensor is not covered.	Two short blinks	Once every 2 seconds

Unrecoverable Printer Errors

Unrecoverable errors all signal with the same code.	Three short on blinks, three long on blinks, Three short on blinks. (SOS Pattern)	Once every 3 seconds
Head Jam		
Knife Jam		

Application Errors

Receipt mode error (Selecting the receipt when the printer has no receipt.)	Three short off blinks	Once every 2 seconds
Journal mode error (Selecting the journal when the printer has no journal.)	Two short off blinks	Once every 2 seconds
Station select error[28] (attempt to print before the slip clamp is closed.)	One short off blink	Once every 2 seconds

Diagnostic Indicators

Diagnostic Mode.	Select light blinks	Once every second
Journal paper exhausted.	One long blink	Once every 2 seconds
Rear sensor Error.	Two short blinks	Once every 2 seconds
Front sensor Error.	Three short blinks	Once every 3 seconds
Receipt paper out or rear path blocked.	Two short blinks	Once every 2 seconds
Primary Processor Fault. RAM Fault. Processor Link Failure.	Both Alarm and Select light on.	Continuous
Inter processor Fault.	Both lights blinking	The select light blinks twice for every alarm blink.
ROM Failure	Alarm light on	Continuous
EEPROM Failure	Alarm and Select light blinking	Lights blink alternately.
EEPROM Invalid or configuration invalid.	Alarm and Select lights blinking	The alarm light blinks twice for each select light blink.

[28]This Error condition has been removed. You can force the printer to print with the slip clamp open. This should be avoided.

Series 60 Configuration and Test Program Overview

CFG60 Program

The CFG60 program is used to configure, demonstrate, test, and help develop applications for the Ithaca Peripherals Incorporated Series 60 printer.

> NOTICE: This is not shareware. This software can be freely distributed within your organization but can not be sold or otherwise distributed. It is designed to help you configure Ithaca Peripherals Inc. Series 60 printers and to develop applications for them. Portions of this program can be made available to you for inclusion in your application. For more information please contact Ithaca Peripherals Incorporated

System Requirements

To run the CFG60 program a standard IBM compatible PC is required. It must have at least 1 serial port to configure a printer and at least 1 parallel port to test a printer configured for a parallel interface.

The CFG60 program is designed to run on any standard PC, however, any PC smaller than a 286 with 640K of memory will be excessively slow. A 386 SX 16 is a recommended minimum.

A Hard disk, Extended or Expanded memory is not required but desirable. CFG60 used EMS, XMS or disk for virtual memory. If CFG60 can't find any EMS or XMS memory it uses the disk for storage. If the disk is a floppy it will be very slow.

If a mouse is available it will be used. A mouse is highly desirable if the demo editor is to be used.

The CFG60 program is designed to use a EGA or VGA color CRT monitor. If a Laptop or monochrome computer is used the display can some times be improved by switching to mono80 mode or by setting TcxlAtrMapSet in the CFG60.INI and DEMOEDT.INI files[29]. See Appendix B

[29]There are several other system configuration parameters that can be set in the .INI or .CFG files, see appendix B for more information.

Installing the Software

The Software need not be installed, it will run directly from the distribution disk. If the software is to be run from a hard disk use the INSTALL command on the distribution disk. It is always a good idea to create a backup copy. Use DISKCOPY to do this. DISKCOPY will assure that all files are copied. If the program is to be run from a floppy, please backup the distribution disk before you use CFG60.

The following are the basic program files that are part of CFG60:

INSTALL.BAT	..... Install CFG60 on a hard disk (not copied to hard disk)
CFG60.EXE	..... Configuration Program
CFG60.CFG	..... Configuration file for printers
CFG60.MSG	..... Message and Help text for CFG60 (Compressed)
CFG60.INI	..... System Information file for CFG60
DEMOEDT.EXE	Demo Editor
DEMOEDT.MSG	Help and Message text for Demo Editor (Compressed)
DEMOEDT.INI	System Information file for Demo Editor

In addition there are a number of files with a .DMO extension. These files are the demonstration and test scripts. There is a PGDEMO directory that contains all of the examples contained in the programmers manual.

To run INSTALL, create a directory that will be used for CFG60 on your hard disk and run INSTALL from the hard disk prompt. INSTALL is not too sophisticated and needs to know what floppy you are using. You must pass it the disk ID. The following is an example:

C:> MD CFG60

C:> CD CFG60

C:\CFG60>A:INSTALL A

INSTALL will copy all required programs to the hard disk. In addition a PGDEMO directory will be created that will contain all of the programmers guide examples.

CFG60 requires that the DOS CONFIG.SYS file specify at least 20 Buffers and 20 Files. It is also a good idea to increase the environment space defined by command.com and increase the stack frames. The following is an example of at CONFIG.SYS file that will work for CFG60.

```
FILES=20

BUFFERS=20

SHELL=COMMAND.COM /P /E:1024

STACKS=9,256
```

The AUTOEXEC.BAT file should also have a path set to a temporary directory for CFG60 to put it's working file. The environment variable TEMP is used for a path to the working directory. If TEMP is not set the directory containing CFG60.EXE will be used. To set TEMP the following command should be added to AUTOEXEC.BAT.

```
SET TEMP=C:\TEMP
```

Where C:\TEMP is the directory to be used. (NOTE: C:\TEMP must be a valid directory)

Note: CFG60 Will run slowly if no extended or expanded memory is available and you are running from 1.2 or 1.44 Meg floppy.

Running CFG60

To run CFG60 move to the directory where CFG60 was installed and type CFG60 Enter. The following is an example:

C:>CD CFG60
C:>CFG60

When CFG60 starts the first thing it will do is look for initialization, message/help and configuration files. These files define a number of parameters for CFG60 and contain compressed text.. The .INI and .MSG files must be present for CFG60 to be fully functional. The .CFG file is not required but if present, will make the task of printer and program setup easier. (See section on creating configuration files to create a CFG60.CFG file).

If a CFG60.CFG file is not found CFG60 will ask which serial port, and which parallel port to use. If a CFG60.CFG file is found it will be read and a transcript will be displayed briefly.

CFG60 will then greet you and list a brief list of requirements. If you wish to skip these introduction windows, press Enter as they appear.

After the greeting, a menu of tasks will be displayed. To select a task move the selection bar to the task you wish to perform and press Enter. You can also press the highlighted character, or use the mouse[30] place the mouse pointer on the selection and press the left mouse button. (A list of key functions is listed in appendix A)

CFG60 has context sensitive help that will give you additional information. To get help at any time press [F1]. In the Help window, use [Tab] or the mouse to select cross-references, which are highlighted. Click on the Index button to get a selectable list of all cross-referenced topics. Use [PgUp], [PgDn], the cursor keys, or the PgUp and PgDn buttons to move around within the Help text. The Prev button will take you to the previously-viewed Help screen. To exit Help, press [Esc] or click on the Quit button.

There are currently 6 selections in the "Select Task" menu[31]:

Configure Printer
Run a **D**emo or Test Program
Run Extended Tests
Test **S**erial Communications
Test **P**arallel Communications
Exit Program

In most cases the "ESC" key will exit a menu. In this case selecting "Exit Program" or the [ESC] key will return to DOS.

[30]The Mouse can be disabled with a "NOMOUSE" entry in the CFG60.INI file. This should not be necessary if a mouse has not been installed.

[31]This menu may very slightly depending on which version you have of this program.

Configuring Printers

Configuring Series 60 Printers

There are two ways to configure a Series 60 printer. The first is to use the internal configuration sequence, the second is remote configuration.. Because the Series 60 printer only has 4 keys the internal self configuration mode is complicated and slow. To provide a faster easier way to configure or reconfigure a Series 60 printer, a remote configuration mode is available. The CFG60 program provides a means of configuring printers by using this remote configuration mode. Appendix H provides instructions for configuring printers with the internal configuration procedure.

The CFG60 program is setup to provide initial (factory) printer configuration as well as allow the printer to be reconfigured at any time. During initial configuration, the printer is configured as required by the customer and a serial number is embedded in the EEPROM. During the reconfiguration process features and communications configurations can be altered, however the serial number should not be changed.

In remote configuration mode the serial port on the printer is temporarily reconfigured to a predefined (9600 baud 8 bit) standard. The serial port is then used for the configuration or reconfiguration operation. (The parallel port can not be used as it does not provide bi-directional operation)

To configure a Series 60 printer, connect the printer's serial port to one of the PC's serial ports. Use a standard Ithaca Peripherals Inc. serial interconnect cable. (See appendix G for order information.) Load the CFG60 program on the PC and make sure the correct PC serial port is selected. Turn on the printer while holding both the JOURNAL and RECEIPT keys. The printer will begin to initialize, however, only the power light will be on once level 0 diagnostics is complete. This is normal for configuration mode. (NOTE: in remote configuration mode, the printer keypad is inactive and the printer will not print). Select the "Configure Printer" selection from the main menu.

The CFG60 program will then automatically communicate with the printer and get the current printer configuration information. (It can take a few seconds for the PC and printer to get in SYN) The current Printer Configuration is then displayed at the bottom of the screen. Due to space constraints the configuration is abbreviated.

For a parallel interface printer the format is as follows:

RV-A PE-0032-10 - ORV-0A SN-1234567 MD-6307 Centronics Parallel

Software Rev. Information | Serial # | Model # | Communications interface

For a serial interface printer the format is as follows:

RV-A PE-0032-10 - ORV-0A SN-1234567 MD-6307 Serial 9600 Baud 8 bN DTR

Software Rev. Information | Serial # | Model # | Communications interface

In this case the communications is Serial at 9600 baud with 8 bits of data and No parity using DTR flow control. Other options are as follows:

Baud Rates	19200,9600,4800,2400,1200,600,300
Data bits	7 or 8
Parity	None, Even, or Odd
Flow Control	DTR or XON/XOFF

Abbreviations are as follows:

8 bN	8 data bits No parity

8 bE	8 data bits plus Even parity
8 bO	8 data bits plus Odd parity
7 bN	7 data bits No parity (two stop bits)[32]
7 bE	7 data bits plus Even parity
7 bO	7 data bits plus Odd parity

When the current configuration is displayed a menu will be displayed asking what you would like to change. If this is a replacement board it will need to know what Series printer you have. It will have the following selections:

Default **S**ave Default
Adjust & Test **C**hange Communications
Model 6**1** Model 6**3**
Model 6**2** Model 6**4**
Exit

Select the change that you wish to make. If, for example, you are putting a new board in a Model 62 printer, select **Model 62**. The features of this printer will be displayed to make it easier to identify your printer. You will then be asked how the communications interface is to be configured.

Parallel Port
Serial Port

If serial is selected, more information is requested. The baud rate menu will be as follows:

A) 19200 **E**) 1200
B) 9600 **F**) 600
C) 4800 **G**) 300
D) 2400

The bit configuration will be asked next.

A) 8,N,1 **D**) 7,N,2
B) 8,E,1 **E**) 7,E,1
C) 8,O,1 **F**) 7,O,1

The format for bit configuration is "Bits Parity and Stop bits". The final serial question is what type of flow control is to be used. This menu is as follows:

DTR (Hardware)
Xon/Xoff

Flow control protocol can be either DTR hardware hand shake or XON/XOFF

If the Printer is to have a parallel interface, only the serial or parallel question is asked.

If this is the initial printer configuration, the serial number of the unit will be requested. The serial number should be entered carefully because the number can not be changed without a configuration key in the CFG60.CFG file.

When all required information is entered, CFG60 will display the selected configuration and ask if it is correct.

Is the Selected Configuration correct?
Yes/**N**o

If the displayed information is **not** correct select "No". If the information is correct select "Yes". CFG60 will then send the selected configuration to the printer. (This will take several seconds).

[32]7-bit No Parity is not a true 7 bit mode. It is 7 bit, don't care about parity. The parity bit must be present or the host must be configured for 7 bits with 2 stop bits.

There are two ways to predefine a printer configuration. The first is to define a configuration in the CFG60.CFG file. The second is to read a configuration from a printer.

To read a configuration from a printer, connect the printer to the PC as you would to configure it. Enter the **Configure Printer** menu and select **Save Default**. This will take the configuration read from the printer and make it the default. When the configuration is saved, you may connect another printer and configured it using the default configuration. This configuration will match the first printer.

Once a configuration is defined and saved you can program a number of printers to the same configuration by using the default selection. If a change is required in a configuration of a specific unit the defaults can be overridden by selecting a specific configuration or model from the **Select Configuration** menu.

Testing and Adjusting Series 60 Printers

One of the options from the configuration menu is to adjust and test the printer. Selecting this item allows several tests and adjustments to be made. The following menu will appear with a transcript window.

Adjust **S**ensors	**R**ead Sensors
Adjust Mech.	R**A**M Test
Test All	R**O**M Test
EEROM Test	MPU **L**ink Test
Read **K**eyboard	**P**ort Test

The Adjust Sensor procedure will read each of the slip sensors and adjust it's threshold for optimal operation. To run this procedure the printer must have all the covers installed, the slip table must be clear, and journal paper must be loaded (If the printer has a journal). The procedure will report the sensor voltages and current threshold levels, The new thresholds will be determined, recorded in the EEROM, and then reported to the transcript. This procedure also determines the type of journal sensor and sets it's configuration.

If the procedure detects a fault (like the presence of a slip) the adjustment will fail and the procedure will not be done. (Note: if the software revision is before RV-A PE-0032-12 the thresholds can not be adjusted).

The Read sensor procedure reads and reports all the sensor voltages. No setting are altered. This procedure can be used to diagnose a sensor failure.

The RAM, ROM, EEROM, and MPU link test are hardware tests. These devices on the printer are also tested at power up. These tests are provided here for diagnosing intermittent printer problems.

The Port test allows the Serial and Parallel port hardware and cables to be tested. This test works by sending data to the printer on the parallel port and returning it to the PC on the serial port. This checks to insure that all the parallel port data and control lines are functional. If this test fails, the failure will be displayed on the PC. The Printer will have to be power cycled as it is still waiting for the PC to send it data.

The Test all procedure will run all tests in sequence.

NOTE: For the parallel port test to be run the PORTTST command must be added to the CFG60.CFG file. This prevents the printer from locking up in configuration mode if no PC parallel port is available or the cable is not connected to the printer.

The Mech. Adjustment Menus appears as follows

E**x**it
Print Adjustment Selection Chart
Set **0 1 2 3 4 5 6 7 8 9** 10 11 12 13 14 15
Print Adjustment **V**erification

Adjustment **+**	Adjustment **-**
Open Clamp	**C**lose Clamp
Home **L**eft	Home **R**ight

Cycle **K**nife

All of these tests are designed for factory adjustment. To activate this menu the printer must contain Rev 19 or later software and the MECHADJ flag must be in the .CFG file.

NOTE: After the selection chart is printed the adjustment is set to 7. An adjustment must be selected to alter the adjustment. The initial adjustment is lost.

The files for mech. adjustments are:

START.MCH	Enable Mech. tests.
RESET.MCH	Restart configuration mode.

PRINTVRF.MCH	Print an alignment verification pattern. (Could be a check)
PRINT.MCH	Print alignment chart. (Leaves alignment set to 7)
PRINTCUT.MCH	Cycles the cutter
PRINTUP.MCH	Increases the vertical adjustment and prints a test pattern
PRINTDN.MCH	Decreases the vertical adjustment and prints a test pattern
CLAMPOP.MCH	Opens the Slip Clamp
CLAMPCL.MCH	Closes the Slip Clamp
HOMERT.MCH	Moves head to Right Home
HOMELF.MCH	Moves head to Left Home
ADJSET0.MCH	Sets Vertical adjustment to 0 and prints a test pattern.
.	
.	
.	
ADJSET15.MCH	Sets Vertical adjustment to 15 and prints a test pattern.

These files are not needed by typical CFG60 users. They can be deleted from the disk is the mechanical adjustments should not be required..

Creating Configuration files for CFG60

To make CFG60 easier there are a number of parameters can be preset in a configuration file. These fall into three categories: PC Configuration, Default Printer Configuration, and CFG60 Feature Selections.

PC Configuration

"COM 1"	Select COM1
"COM 2"	Select COM2
"COM 3"	Select COM3
"COM 4"	Select COM4
"NOLPT"	Select NO Parallel Port available
"LPT 1"	Select LPT1
"LPT 2"	Select LPT2

Default Printer Configuration

To define a default Printer Configuration, use the following commands in the CFG60.CFG file (NOTE: Some of the configuration commands will also define the test and demonstration communications configuration; these are tagged with a *). The last specified option will override a previous specification. In other words, if PARALLEL is after SERIAL in the file, the SERIAL command will be ignored. This allows a serial test and demonstration configuration to be defined but a parallel printer configuration to be the default.

"SERIAL"	Serial Configuration
"PARALLEL"	Parallel Configuration
"BAUD 19200 " *	19200_baud
"BAUD 9600 " *	9600_baud
"BAUD 4800 " *	4800_baud
"BAUD 2400 " *	2400_baud
"BAUD 1200 " *	1200_baud
"BAUD 600 " *	600_baud
"BAUD 300 " *	300_baud
"8BN " *	8 bit No parity
"8BE" *	8 bit Even parity
"8BO" *	8 bit Odd parity
"7BN" *	7 bit No parity
"7BE" *	7 bit Even parity
"7BO" *	7 bit Odd parity
"MODEL 61"	Model 61
"MODEL 62"	Model 62
"MODEL 63"	Model 63
"MODEL 64"	Model 64
"XON" *	Xon/Xoff Flow Control
"XOFF *	Xon/Xoff Flow Control
"DTR" *	Use DTR for Flow Control

CFG60 Feature Control

"NOFLOW"	No Flow Control in Serial Port Test (Test only)
"LOCKSN"	Allow Serial Number to be reentered on reconfiguration
"BARCODE"	Allows a barcode reader to be used for Serial number input (requires LOCKSN)

"RESTART"	Reset printer after Configuration (Allows printer testing)
"LEVEL0	Run Level 0 printer tests after configuration[33]
"TEST"	Run printer test after configuration (requires RESTART)
"EDITOR path\name.exe"	Select a custom editor for demo edits. Specify the complete path and name of the editor. Include any flags. Example: EDITOR C:\DOS\EDIT.EXE
"SWAPMODE x	What memory to use for program swapping 0 Auto Select 1 use EMS only 2 use XMS only 3 use disk only (Use environment variable TEMP for the path)
"PARDEMO"	Pre select parallel port for demos
"LIFETEST fname.dmo"	Names an alternate file "fname.dmo: of the life test demo file. lifetest.dmo is used as a default.
"SERDEMO"	Pre select serial port for demos

To create a CFG60.CFG file place each command on a separate line. Any blank lines are ignored. The following is an example configuration file:

```
COM 1
NOLPT
SERIAL
Baud 9600
8bn
DTR
MODEL 63
RESTART
TEST
LIFETEST fsttest.dmo
```

This specifies that COM1 will be used on the PC and No Parallel port is available. The printer is to be configured as a Model 63 with serial communications at 9600 baud, 8 bit no parity, and use DTR flow control. The printer will restart after configuration and be tested. The file fsttest.dmo will be used in place of lifetest.dmo for the "run extended tests" menu selection.

The demonstration editor can be used to create configuration files. To run the demo editor (outside of CFG60) to create or edit a CFG60.CFG file enter:

C:\CFG60> DEMOEDT CFG60.CFG (Enter)

The DEMOEDT program can also be used to modify .INI files as well. (Refer to appendix E for instructions on DEMOEDT operation.

[33]This feature is not available on rev 10 printers

Running Demonstrations

Selecting the DEMO Menu

There are several built in demonstrations as well as a user defined demonstration capability. To run a demonstration, load CFG60, connect a Series 60 printer, and select **Run a Demo** from the selection menu. (you are given several demonstrations to select). Three of these demonstrate various capabilities of each of the 3 stations of a Series 60 printer. The **Edit Demo** and **Select a Demo** selections provides the ability to create a demonstration file of your own and send it to the printer.

E**x**it	Select a **D**emo
Slip	**E**dit Demo
Journal	**C**hange Port
Receipt	

When a demo selection has been made, the program will ask to which port should data be sent. Select **Serial** or **Parallel**. Once a port is selected it will be remembered and need not be selected again. If you want to change the selection choose the **Change Port** selection. (Set "PARDEMO" or "SERDEMO" in CFG60.CFG if same port is always used)

Running the Slip Demo

To run a Slip demo, select "Slip" from the "Select a Demonstration" menu. The program will start by showing a printer status display at the bottom of the screen and a transcript window on the rest of the screen.

This will demonstrate the slip station and use the rotated print feature of the printer. After starting the demo you will be asked to insert a slip into the printer. Insert a slip placing it against the right hand guide and extending out the back of the printer. Then press any key on the PC. The demo information will be sent to the printer and printed.

Running the Journal Demo

To run a Journal Print demo, select "Journal" from the "Select a Demonstration" menu. The program will start by showing a Printer status display at the bottom of the screen and a transcript window on the rest of the screen.

This will print a short journal entry. You will not be required to interact with the program provided no errors are encountered. If the printer does not have journal capability an error will be displayed and the printer will go off line.

Running the Receipt Demo

To run a Receipt printing demo, select "Receipt" from the "Select a Demonstration" menu. The program will start by showing a Printer status display at the bottom of the screen and a transcript window on the rest of the screen.

This will print a short Receipt and deliver it to the operator. You will not be required to interact with the program provided no errors are encountered. If the printer does not have receipt capability an error will be displayed and the printer will go off line.

Creating and Editing Demonstration files

To create a custom demo, a printer control transcript must be generated. This transcript contains information for printing and printer control commands. Most printer control commands consist of non printable control characters and decimal numbers. To allow control sequences to be easily created, a printer control language has been defined. It is translated by CFG60 into printer control codes and print text before it is sent to the printer.

To create a custom demo script DEMOEDT[34] has been provided. This is a screen oriented text editor that has several enhancements to help create demo scripts. Full documentation for the DEMOEDT is contained in appendix E.

If Edit Demo is selected a sorted list of demo files will be displayed. Select the demo you wish to edit. The Ithaca Peripherals Inc. DEMOEDT program will then be called and the selected demo can be edited. If you wish to create a new demo file select any of the current demos and use the FILE command in DEMOEDT to create a new file.

Like CFG60 DEMOEDT contains context sensitive help. As part of this help is a complete list of Series 60 printer commands as well as demo control commands. This will make it easier for you to create demo scripts.

If the DEMOEDT program is not suitable for your needs it is possible for CFG60 to call your editor from the Edit Demo Menu. See Appendix B for more information.

Demo Scripts

Demo scripts are simple ASCII only files that allow printer control and text strings to be sent to a printer without having to write a program.

Most text editors don't deal well with control codes in text. In most cases the editor inserts control codes in text files to control things like top of page and end of line. To prevent these control codes from being sent to the printer, all control characters in a demo script file are ignored by the demo script processor. Control characters are inserted into the printer data stream with special grouping delimiters. This allows the control codes to be entered easily and clearly without requiring you to translate them into binary codes.

"[" and "]" characters are used to delimit printer control characters

For example the following sequence[35] would tell the printer to open the slip clamp:

Script: [ESC]z

Information: Escape code and then a "z".

[34]Any DOS text file editor can be used to create and edit demo scripts. For example the EDIT program that is supplied with DOS 5.0 is acceptable.

[35]Control sequences are not case sensitive. [ESC].[ESC] and [ESC] are the same.

Demo Nomenclature

[ ] Enclose a control character. This is a single 8 bit value as defined in the standard ASCII tables. The ASCII chart in Appendix A lists all the control codes. An example would be **[ESC]** which would represent a 1BH or 26 Decimal

< > Enclose an 8 bit value in decimal format. This value will be from 0 to 255

An example would be **<2>** which would represent 02H or 2 decimal

<n> This indicates a variable parameter. In this case a variable parameter "n" that can have a value of from 0 to 255. The meaning of "n" is described and defined in the description of the command.

$<n>^1$ $<n>^2$ This indicates that there are 2 parameters, n^1 and n^2 where both can have values from 0 to 255.

x All other characters in control strings represent ASCII characters.

For example " **[ESC] 1** " Would represent 1BH followed by 31H.

The following control characters can be represented in this form:

Sequence	Decimal	Hex Control Code	Sequence	Decimal	Hex Control Code
[NUL]	0	0x00	[DLE]	16	0x10
[SOH]	1	0x01	[DC1]	17	0x11
[STX]	2	0x02	[DC2]	18	0x12
[ETX]	3	0x03	[DC3]	19	0x13
[EOT]	4	0x04	[DC4]	20	0x14
[ENQ]	5	0x05	[NAK]	21	0x15
[ACK]	6	0x06	[SYN]	22	0x16
[BEL]	7	0x07	[ETB]	23	0x17
[BS]	8	0x08	[CAN]	24	0x18
[HT]	9	0x09	[EM]	25	0x19
[LF]	10	0x0A	[SUB]	26	0x1A
[VT]	11	0x0B	[ESC]	27	0x1B
[FF]	12	0x0C	[FS]	28	0x1C
[CR]	13	0x0D	[GS]	29	0x1D
[SO]	14	0x0E	[RS]	30	0x1E
[SI]	15	0x0F	[US]	31	0x1F

To allow decimal parameters to be easily placed in control scripts, a numeric format is defined

<000> would insert a 0 in the data stream. <065> would insert a decimal 65, hex 41H or ASCII "A" in the data stream.

Hex numbers can also be entered with a format similar to "C",<0x41> would insert a decimal 65 Hex 41 or an ASCII "A".

For example the following sequence would set the slip left margin to 60 dot columns.

[ESC]p<60>

To allow "[" and other delimiters to be inserted in the data stream a "\" (back slash) will turn off the translation for one character. For example, "\[" would insert a "[" in the printer data stream.

To make [CR][LF] sequences easier a "\n" will insert a [CR][LF] sequence.

To help control the flow of data to the printer several control commands are available. Control commands are enclosed in braces "{}".

Demo Commands

{ECHO}, {PAUSE:xx} and {STOP} commands are used to control the flow of data.

Pause

{PAUSE:xx} will pause the data stream for about xx seconds where xx can be from 1 to 99 seconds.

Stop

{STOP} will stop the data stream and wait for a key or it will time out after about 2 min.

Echo

{ECHO} will stop the flow and place the rest of the line in a window on the PC. For example the following sequence would stop the demo and display "Insert a Slip" in a window in the PC. ({ECHO} will also time out after about 2 Min.)

{ECHO}Insert a Slip

Any key on the PC keyboard will resume the demo after an {ECHO} command.

RV

In some cases it is required that the text to be sent to the printer be in reverse order. To allow text to be reversed a {RV} command is available. It reverse the order of data after it and stops at any control code[36] or the end of the line.

Example: "This is a test {RV} of the printer[CR][LF]"

Will transmit as "This is a test retnirp eht fo [CR][LF]"

RPT

In some cases a sequence may be repeated a number of times. To make this easier a {RPT:xx} command is available. This command will repeat the rest of the line xx times where xx can be from 1 to 99. (0 is equivalent to 1)

Example: "{RPT:5}[LF]"

Will transmit 5 linefeeds to the printer.

Example: "{RPT:40}*"
"[CR][LF]"

Will transmit 40 "*"'s and then a CRLF (if [cr][lf] were on the same line as the RPT 40 lines of a single * would be printed.

Date and Time

To allow demos to have current date and time information contained in them, {DATE:f} and {TIME:f} commands are included.

{DATE:f} inserts the date in a format specified by f. If {DATE} is used with no format f=0 is used. The date formats are as follows:

f	Format	f	Format
0	December 3, 1988	3	12/3/88
1	3 Dec 88	4	3/12/88
2	12-3-88	5	12/03/88

{TIME:f} inserts the time in a format specified by f. If {TIME} is used with no format f=2 is used. The time formats are as follows:

f	Format	f	Format
0	16:30:57.89	3	4:30p

[36] A "\" will stop a RV command.

1	16:30:57	4	4:30	
2	4:30 PM	5		04:30

DO

To allow a demo script to call a second demo script a {DO:file} command is provided. This command inserts the file specified in the parent demo script. There are some restrictions to the {DO:file} command; "file" must be in the same directory as the parent or must have a path relative to the parent, and {DO:file} can not be nested[37] more than 8 deep. A {DO:file} may, however, be repeated with a {RPT:xx} command.

Example: {DO:tstjnl.dmo}

This will read file tstjnl.dmo and then return to the next line of the parent.

REM

To allow demo scripts to be commented a " ` " or {REM} command will skip the rest of the line.

Example:

Print this part [CR][LF]` This is a comment

{REM} this is also a comment

Please note that any spaces before the " ` " or {REM} are transmitted to the printer.

Counters

To allow sequence numbers to be added to demonstration scripts two variables are defined; A and B. A and B are integers that can be assigned values from 32767 to - 32768. The variables can be set, added to, subtracted from, and printed in several formats.

{A=:xx} Sets A to xx

{A+:xx} Adds xx to A

{A-:xx} Subtracts xx from A

{A.} Prints A in free format. (no leading zeros)

{A.:x} Prints A in a fixed format of x digits with leading zeros. (x can be 2 to 7)

In all cases A can be replaced with B.

Example: {A=:55}
{RPT:5}Page: {A.}{A+:1}\n

Would print: Page: 55
Page: 56
Page: 57
Page: 58
Page: 59

[37] Care must be taken to prevent recursive DO calls. If the nesting stack is exceeded a nesting error will be displayed and the file will not be inserted.

Sensor and Front

To demonstrate the series 60 remote sensor capabilities, {SENSOR} and {FRONT} commands are included. These commands will request that a Slip be inserted and display the sensor status as it is positioned. These commands take the remainder of the input line and uses it as an input prompt. For Example:

{SENSOR}Guest Check

Would display: Please insert a Guest Check.

or The Guest Check is inserted too far.

If {SENSOR} is not followed with a prompt string, "Slip" is used by default.

{SENSOR} Requires that both front and back sensors be covered, {FRONT} requires only the front sensor

Reset

The {RESET} command asserts the INIT signal on the parallel port then waits 4 Seconds for the printer to reset. This command is ignored in serial mode.

Graphic

The {GRAPHIC:filename} command reads a file and transmits it to the printer with no translation of the imbedded data. Every character in the file is transmitted to the printer unaltered. This command is intended to allow graphic APA print images to be sent to the printer.

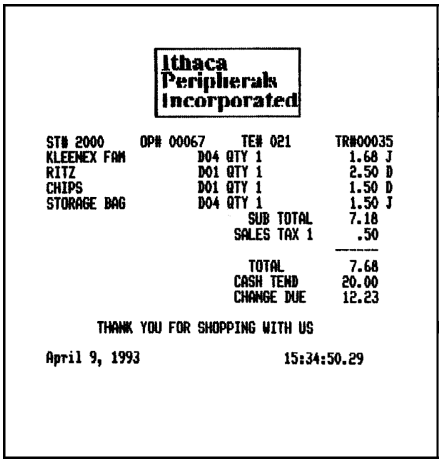
To generate a graphic print image use the following procedure.

1). Generate the graphic image in whatever program you wish.

2). Make sure the paper size you pick will fit on the printer station you intend to print on. If the paper size can not be set, print only a portion of the page.

3). Print the graphic to a file using a "Generic IBM Graphics 9 pin" driver. The standard IBM resolutions are: 240 x 216, 120 x 72, and 60 x 72. The Series 60 printer supports all three resolutions. 120 x 72 gives good resolution with reasonable speed.

4). Print the graphic image to a file. To keep graphic files separate from demo files use the file.GPH extension.



Example of APA Graphics

5). Make the resulting file available to CFG60 so that it will be sent to the printer when the {GRAPHIC:file.GPH} is encountered.

Demo Command Control Summary

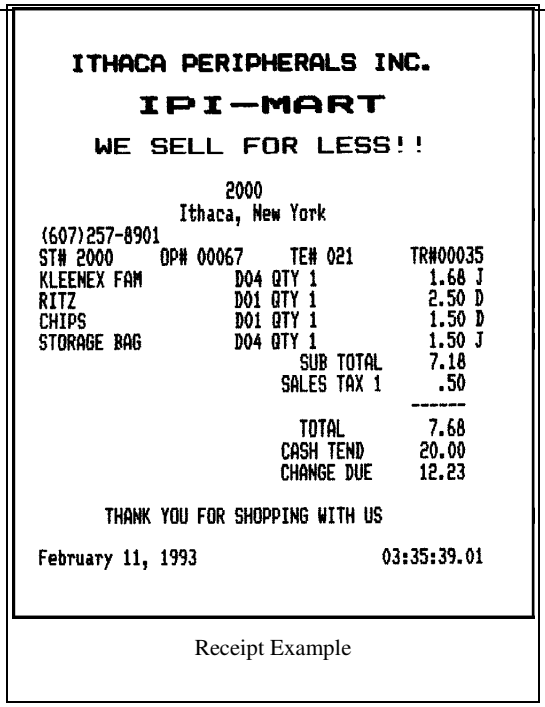
{COMMAND}	Flow Control Commands
[CTL]	Control Characters
<NUMBER>	Decimal or Hex Numbers
\X	Short hand and delimiter override

{REM}	Disregard the rest of this line(comment)
`	Disregard the rest of the line (comment)
{PAUSE:xx}	Pause Demo for xx Seconds
{RV}	Reverse the following text
{STOP}	Stop the demo for 2 Min. or any key
{FRONT}	Wait for a slip and display status (front sensor only)
{SENSOR}	Wait for a slip and display status (both sensors)
{ECHO}	Echo the following text to the display and stop
{RESET}	Reset Printer (Parallel mode only)
{DO:file}	Read demo file: "file.dmo"
{GRAPHIC:file}	Read a graphic file "file.gph"
{A=:xx}	Sets A equal to xx
{A+:xx}	Adds xx to A
{A-:xx}	Subtracts xx from A
{A.}	Prints A free format
{A.:x}	Prints A in a fixed format of x digits with leading zeros. (x can be 2 to 7)
{B=:xx}	Sets B equal to xx
{B+:xx}	Adds xx to B
{B-:xx}	Subtracts xx from B
{B.}	Prints B free format
{B.:x}	Prints B in a fixed format of x digits with leading zeros. (x can be 2 to 7)
{RPT:xx}	Repeat the rest of the line xx times.

Demo Example

The following is an example of a demo script and the resulting receipt on the right.

```
[ESC]f[DC2][ESC]I[SOH][ESC]E[ESC]G[ESC]0
  ITHACA PERIPHERALS INC.[CR][LF]
[cr][lf]
[ESC]W[SOH]
   IPI-MART[CR][LF]
[ESC]F[SI][cr][lf]
[ESC]v
   WE SELL FOR LESS!![CR][LF]
[ESC]W[ESC]#0
[CR][LF]
[ESC]H[ESC]F
                    2000[CR][LF]
                Ithaca, New York[CR][LF]
(607)257-8901[CR][LF]
ST# 2000     OP# 00067     TE# 021      TR#00035[CR][LF]
KLEENEX FAM          D04 QTY 1            1.68 J[CR][LF]
RITZ                 D01 QTY 1            2.50 D[CR][LF]
CHIPS                D01 QTY 1            1.50 D[CR][LF]
STORAGE BAG          D04 QTY 1            1.50 J[CR][LF]
                           SUB TOTAL      7.18[CR][LF]
                         SALES TAX 1       .50[CR][LF]
                                          ------[CR][LF]
                           TOTAL          7.68[CR][LF]
                         CASH TEND       20.00[CR][LF]
                         CHANGE DUE      12.23[CR][LF]
[CR][LF]
       THANK YOU FOR SHOPPING WITH US[CR][LF]
[CR][LF]
{DATE:0}                    {TIME:0}[cr][lf]
[ESC]z
```



Receipt Example

Using CFG60 to Test Printers

By generating a test script a printer can be tested by using the demo mode to send the script to the printer. Each printer feature has a test program that can be run after configuration. These files are as follows:

TSTJNL.DMO	Test journal station
TSTSLP.DMO	Test Slip station
TSTRCP.DMO	Test Receipt station

Use USER demo mode and select one of these file names to run the test.

The first selection menu allows the extended test "**R**un Extended Tests" operation to be selected. This selection automatically starts a demo file without going through the demo selection process. By default this file is "lifetest.dmo", however LIFETEST followed by a file name in the CFG60.CFG file will allow any file name to be used. An example of a test file might be as follows:

```
{a=:1}{b=:1}
{rpt:99}{do:ftstjnl.dmo}{do:ftstrcp.dmo}{b+:1}
{rpt:99}{do:ftstjnl.dmo}{do:ftstrcp.dmo}{b+:1}
{rpt:99}{do:ftstjnl.dmo}{do:ftstrcp.dmo}{b+:1}
```

Where ftstjnl.dmo and ftstrcp.dmo are files that would test the journal and receipt. The rpt command would repeat each test 99 times. This line could then be repeated as many times as necessary. The a and b counters are used to keep track of the number of test cycles.

There in no lifetest.dmo file included with CFG60. If this selection is made a DEMO file not found error message will be displayed.

Using CFG60 to Develop Applications

To help develop applications for Series 60 printers the CFG60 program can be used in interactive communications mode.

To use interactive communications mode, connect a printer to the PC through either the Serial or Parallel port. Use the "Test Serial" or Test Parallel" modes to interactively enter data to the printer. In both modes ALT-S will allow a string to be formed and sent to the printer. The same rules as demo files apply for inserting control characters in strings except that no {COMMANDS} are allowed. (Use F1 for help)

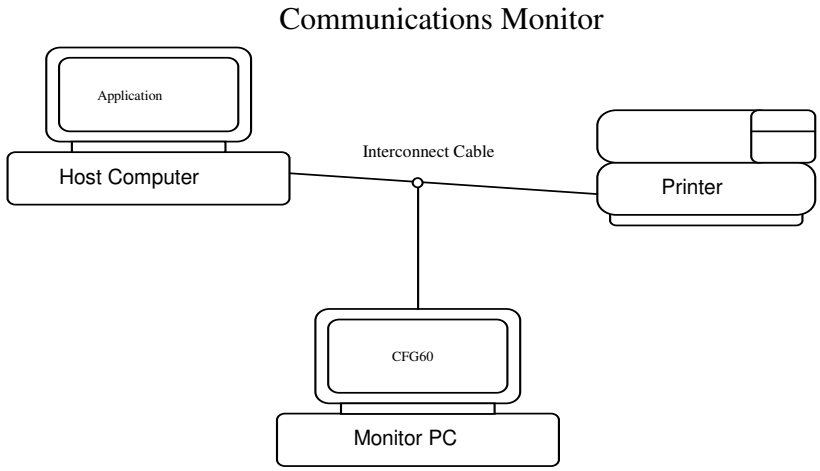
The status display at the bottom of the screen will show how the printer is responding to the string sequences. (Use F1 to help decode the status display)

To aid in displaying control codes a code translation mode is available that will display control codes in [ ] ASCII form. The F4 key will toggle this mode on and off.

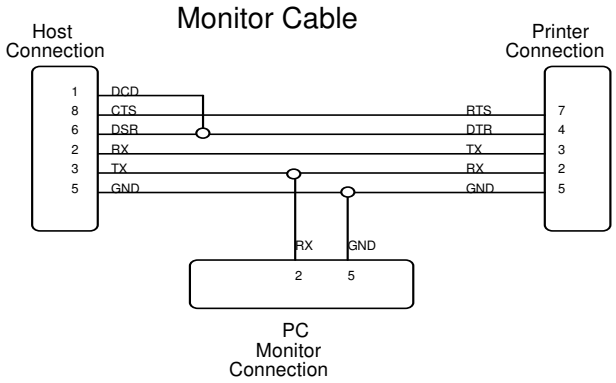
Only a few keys on the PC key board are intercepted by the test program. Therefore control keys (CRTL A) can be used to insert control sequences as well. These modes are very similar to other terminal emulation programs that are available for PC's.

Using CFG60 to Monitor Serial Communications

Because debugging control strings is sometimes difficult. it would be nice the have a way to display what was being sent to the printer. The CFG60 program provides this capability as part of the "Test Communications" mode. The Test Communications Mode is also a monitor[38] mode. The test "Serial Communications" mode with display control codes on, (The F4 key will toggle this feature on and off.) will display any information received on the serial link.



Because there will be three devices connected to the communications link, a special cable must be made to allow CFG60 to monitor the serial communications. The cable is constructed as follows:



The CFG60 program is reasonably fast, however to operate at the fastest rate (19200) a reasonably fast PC is required. A 386SX-16 should work well at 19200. If problems with the monitor develop with it responding to XON and XOFF characters place a NOFLOW command in the configuration file. It will then ignore XON/XOFF.

[38]Monitor mode is only available on the serial link as only the serial port can be defined as input to the PC.

Demo Editor

The DEMOEDT program is a self-contained text editor. It is designed to help create custom demonstration scripts. Like the CFG60 program it has context sensitive help. The [F1] key will display a help screen and [Alt-X] will exit the editor at any time.

Help

To get help at any time press F1, or select Help from the menu. In the Help window, use Tab or the mouse to select cross-references, which are highlighted. Click on the Index button to get a selectable list of all cross-referenced topics. Use [PgUp], [PgDn], the cursor keys, or the PgUp and PgDn buttons to move around within the Help text. The Prev button will take you to the previously-viewed Help screen. To exit Help, press [Esc] or click on the Quit button.

Editor Function Keys

Key	Normal	Ctrl	Shift	Alt
F1	Help			
F2	Start search	Replace		
F3	Search next	Toggle direction		
F4	Mark Start of block			
F5	Mark End of block			
F6	Mark word	Mark EOL	Mark BOL	
F7	Copy block to cursor position.			
F8	Move block to cursor position.			
F9	Insert []	Insert<>	Insert{}	
F10	Select Menu			
Enter	Insert line			
Home	Beg of line	Top of window		
End	End of line	Bottom of window		
Left	Char left	Word left		
Right	Char right	Word right		
Up	Up one line			
Down	Down one line			
PgUp	Prev screen	Top of file		
PgDn	Next screen	Bottom of file		
Ins	Toggle Insert / Over write	Copy block	Paste block	
Del	Delete char	Delete word	Delete to end of line	
BkSpace	Delete previous character			
Tab	Tab to next tab stop. (Insert spaces)	Move back to prev. Tab stop.		

Short Cut Keys

Key	Action
Alt-X	Quit editor
Alt-E	Open Edit Menu
Alt-F	Open File Menu
Alt-H	Open Help Menu
Alt-S	Open Search Menu
Alt-L	Load file
Alt-W	Save file
Alt-A	Save as
Alt-M	Mark Begin/End Block
Alt-C	Copy Block to Clipboard Buffer
Alt-P	Copy Clipboard Buffer to File
Alt-D	Delete line
Alt-K	Delete to end of line

Open File

Enter the name of a file, or a filespec including the standard DOS wild card characters. You will be able to select the file to be opened from a sorted list.

Save File As

Enter the name under which you would like to save the file being edited. You must enter a valid DOS filename, with or without a path.

Search for Text

Type in the search string that you wish to search for. If you are replacing, the replacement string field will also be enabled. The other four fields allow you to set search/replace options:

Direction	F = forward	B = backward
Case	Y = case sensitive	N = case-insensitive
Confirm	Y = confirm each replacement	N = replace unconditionally
Global	Y = continue after first replacement	N = stop after one replacement

New File

This command clears the edit window and lets you edit a new, unnamed file. If you already have a file in the edit window, and it has been changed since the last save, it will be saved before it is cleared out.

The editor will show the file name as "NEW.DMO". You can give it a real filename by using the Save-As command.

Block Operations

There are a number of block operations available from this menu:

Start block	Start marking at the cursor position
End block	End marking at the cursor position
Mark Word	Mark the current word
Mark To BOL	Mark from cursor to beginning of line
Mark To EOL	Mark from cursor to end of line
Move block	Move marked block to cursor position
Copy block	Copy marked block into "clipboard"
Paste block	Copy block from "clipboard" to cursor position
Del block	Delete marked block
Del EOL	Delete from cursor to end of line

Searching/Replacing

This menu gives you access to all three search/replace operations:

Find Prompts for a search string and performs search. You can also set options for case-sensitivity and search direction.

Replace Prompts for a search string and a replacement string and performs the procedure. You can set options for confirmation and global replacements, as well as case and direction.

Again Attempts to find the next occurrence of the search string. If the search string was not previously set, nothing happens.

Save File

This menu item saves the file being edited. You will be asked for confirmation before saving. If the file is not yet named, you will instead be prompted for a name under which to save the file.

Series 60 Diagnostics

Level 0 Diagnostics

The Series 60 diagnostics perform several system checks when a unit is powered on. The order of checks and the functions checked is as follows:

1.System Processor Function
2.System RAM
3.System ROM
4.EEPROM Validation
5.Print Processor Function
6.Configuration Validation
7.Key Pad Check
8.Normal Operation

If any system function is found to be nonfunctional, an error indication is displayed using the "Select" and "Alarm" indicators.

When the Series 60 is initially turned on, both the "Select" and "Alarm" lights will be on. As tests proceed the lights will be toggled as tests pass.

1. System Processor Function

2. System RAM
   If the processor and RAM are OK the "Select" light will go out.

3. System ROM
   If the ROM is OK the "Alarm" light will go out.

4. EEPROM validation
   There are two errors that can occur with respect to EEPROM operation, the EEPROM can be nonfunctional, or the data in it can be corrupted.
   - The EEPROM is nonfunctional

     If the EEPROM is nonfunctional the "Select" and "Alarm" lights will blink alternately. This is a hard failure. The EEPROM is either bad or not connected properly.
   - The EEPROM information is not correct.

     If the EEPROM information is corrupted but the EEPROM is functional, The "Select" and "Alarm" lights will blink with the "Alarm" light blinking twice as fast as the "Select" light. This can be corrected by reinitializing the EEPROM. The best way to do this is with the CFG60 Configuration program[39] (Remote Configuration). If the Configuration Program is not available the auto configuration function can be selected by pressing the SLIP and RECEIPT keys when the error code is being indicated. This will initialize the printer to the basic SLIP ONLY configuration. The manual configuration procedure defined below can then be used to configure additional functions and features.

5. Print Processor Function
   The print process is then checked and validated. There are two tests performed as part of this test.
   - The first is to determine if the communications link between the processors work.
   - If this test fails, both the "Select" and "Alarm" indicators will be on. (This is distinguished from a primary processor fault and/or a RAM failure by the previous test sequences having toggled the indicators.)

[39]Ithaca Peripherals Incorporated provides a configuration program as part of CFG60 that runs on a PC. This program interactively allows a Model 60 printer to be configured.

- The second test is to verify that the software in the printer processor is compatible with the software for the master.
- If this test fails, the "Select" and "Alarm" lights will both blink with the "Select" light blinking twice as fast as the "Alarm" light.

6. Configuration Validation

   At this point the system is assumed to be functional and the configuration and available features are read from the EEPROM and saved in System RAM for normal operation, manual configuration, and diagnostics operations.

7. Key Pad Check

   The key pad is then checked for keys being depressed. (It does not wait for a key, it just checks for any keys being down.) If no keys are active normal operation will begin. However, if a key is found to be depressed one of 3 special modes will be entered.

   - If the SELECT key is pressed the printer will enter Level 1 diagnostics.
   - If the SELECT and SLIP keys are both pressed the printer will enter manual configuration mode.
   - If the RECEIPT and JOURNAL keys are both pressed the unit will enter remote configuration mode.
   - If NO keys are depressed normal operation will begin.

8. Normal Operation

   Normal operation starts if all tests pass and no special functions are requested.

Level 1 Diagnostics

If the SELECT key is held during initial power on a self test diagnostics mode is entered. This mode provides six functions, to test and setup the printer. They are as follows:

1. Test Communications Interface
2. Configure Communications Interface
3. Enable Remote Configuration
4. Run Journal Test
5. Run Slip Test and Auto Sensor Adjust
6. Run Receipt Test

Test Communications Interface

This mode is entered by pressing and holding the select key at power-up. This will place the unit in diagnostics select mode. If the "SLIP" and "RECEIPT" keys are then pressed the unit will print the current configuration and enter test communications mode (HEX Dump).

This mode will print on the journal if the unit is configured with a journal, otherwise, it will print on the slip. If the slip station is used, a slip must be inserted.

To insert a slip place a sheet of paper on the slip table that is at least 4 inches wide. Slide the paper as far to the right as possible. When the slip is in position both the select and error lights will be lighted. Because the slip will be printed in reverse, it is of advantage to place the paper as far in the unit as possible. When the Slip is in position press the "SLIP" key and the current configuration will be printed on the slip.

As information is received the information will be converted to a HEX /ASCII format and printed after 8 characters are received. No translation is made; all information will be converted to HEX/ASCII and printed. If a carriage return is sent to the printer it will be translated to 0A in the HEX field and "." in the ASCII field.

The format is as follows:

```
54  68  69  73  20  69  73  20   This is
61  20  74  65  73  74  0D  0A         a test..
```

When the "SELECT" key is pressed the internal buffer is dumped and the diagnostics select mode is entered.

There are several indications of printer and host communications problems that can be deduced from this test.

If the printer is printing all 40 "@" symbols the parity is wrong or the number of bits is wrong.

If the printer is printing some Hex 40's "@" signs when it should be printing other characters, the parity is wrong, the baud rate is wrong, or the bit length setting is wrong.

If the printer prints out characters but they are wrong (like Hex C1 instead of Hex 41 "A") the printer is set for 8 bit data and the host is set for 7.

It the printer fails to print at all, the printer may be configured for parallel operation.

In most cases the print problems can be traced to the host and the printer not being configured in the same way.

NOTE: The Series 60 printer handles 7 bit "No Parity" slightly differently than a PC. A PC can send a 7 bit "No Parity" data field which the printer can not accept. If the PC is to send 7 bit "No Parity" it must be set for send 2 stop bits.

Journal Test

To run a journal test power on the printer while holding down the "SELECT" key. The select light will start to blink and the unit will be in Diagnostics select mode. If the "JOURNAL" key is pressed the unit will start a journal test. If the "Alarm" light starts to flash, the error indicated is the same as normal operation. The Interpreting Error Codes section of this document gives a list of normal alarm codes.

The journal test will continue until the journal paper is exhausted or the test is stopped with the select key. To stop the test at any time press and hold the "SELECT" key until the printer stops.

The test can be "Paused" by pressing and holding the "SLIP" key. The "JOURNAL" key will then feed journal paper one line for each press. To resume the test, press the "SLIP" key again or the "SELECT" key to stop the test.

If the RECEIPT key is pressed while the unit is printing, the print test pattern will be changed from a walking character test to a I/H/+/- test. This test is used to adjust the printer.

Receipt Test

To run a receipt test power on the printer while holding down the "SELECT" key. The select light will start to blink and the unit will be in Diagnostics select mode. If the "RECEIPT" key is pressed the unit will start a receipt test. If the "Alarm" light starts to flash, the error indicated is the same as normal operation. The Interpreting Error Codes section of this document gives a list of normal alarm codes.

The Receipt test will print a test receipt and wait for the receipt to be removed from the printer. The printer will then print another test receipt. Test receipts will continue to be printed until the receipt paper is exhausted or the test is stopped with the select key. To stop the test at any time, press and hold the "SELECT" key until the printer stops. When the test is stopped the last receipt will be cut and ejected.

If the RECEIPT key is pressed while the unit is printing, the print test pattern will be changed from a walking character test to a I/H/+/- test. This test is used to adjust the printer.

Slip Test, Sensor Calibration, and Vertical Alignment

To run a slip test, power on the printer while holding down the "SELECT" key. The select light will start to blink and the unit will be in diagnostics select mode. If the "SLIP" key is pressed the unit will enter slip test.

The slip test will start by turning out both the "Select" and "Alarm" lights. This is a sensor test mode. As a slip is inserted the "Alarm" light will light indicating that the front sensor has detected the slip. When the rear sensor detects the slip the "Select" light will be turned on.

The sensor test mode will also allow both slip and the journal paper sensors to be calibrated. By pressing the "JOURNAL" key in the sensor test mode, the printer will adjust the threshold levels used to identify presence of paper. To run this test all printer covers must be installed, the slip table must be clear, and if the printer has a journal, it must be properly loaded with paper. When the "JOURNAL" key is pressed both the ALARM and SELECT lights will flash once. If either light stays on; either one of the sensors is bad or has degraded, or there is some type of obstruction. If this occurs (and there is no obstruction) press the "SELECT" key and a degraded mode default threshold will be used, this may keep the printer operational until the sensor can be replaced.

The sensor test mode also allows adjustment of the vertical print alignment.. By pressing the "RECEIPT" key in the sensor test mode, the slip clamp will clamp on a slip and enter adjustment mode. Pressing the "SLIP" will print an adjustment pattern and the current adjustment. The "JOURNAL" key will decrease the adjustment and the "RECEIPT" key will increase the adjustment. The "SELECT" key will exit this mode and return to sensor test.

At any time when both front and back sensors, sense the slip, the slip printing test can be started by pressing the "SLIP" key. The slip will then be printed until the front sensor no longer senses the slip. The printing will then pause while the slip is fed forward until the rear sensor no longer senses the slip. At this time an end of slip message will be printed and the slip released.

The test can be "Paused" by pressing and holding the "JOURNAL" key. The "SLIP" key will then feed paper one line for each press. To resume the test press the "JOURNAL" key again. Press and hold the "SELECT" key to stop the test.

If the RECEIPT key is pressed while the unit is printing the print test pattern will be changed from a walking character test to a I/H/+/- test. This test is used to adjust the printer.

Configuration

Initial Power ON

The initial power cycle of a Series 60 diagnostics will find that the EEPROM is not valid. This will be indicated by the "Select" and "Alarm" lights blinking. The "Alarm" light will blink twice as fast as the "Select" light. This must be corrected by reinitializing the EEPROM with default values.

To initialize the EEPROM with default settings press the SLIP and RECEIPT keys when the error code is being indicated. This will set the unit description to a general description and configure a basic unit feature list. (NOTE: This Feature list may not match the true feature list) The configuration is as follows:

- Parallel Port Active
- Serial Port Inactive
- Baud, 8 Bit, No parity
- Slip Station Active
- Journal Inactive
- Receipt Inactive

This default configuration can be altered in two ways. The first is by using the Local configuration mode. The second is by using the Remote Configuration Program, CFG60[40]. To use the Remote Configuration program see the remote configuration section below and the CFG60 Users Guide.

Manual Configuration

The Series 60 can change its own configuration by pressing the "SELECT" and "SLIP" keys at power up or when it is in diagnostics mode.

When these keys are released the unit will enter one of two modes. If the unit is configured with a journal the journal will be used for configuration display. If no journal is available the slip station will be used. If the journal station is used the current configuration will be printed. If the Slip station is used a slip must be inserted.

To insert a slip place a sheet of paper on the slip table that is at least 4 inches wide. Slide the paper as far to the right as possible. When the slip is in position both the select and error lights will be lit. Because the slip will be printed in reverse it is of advantage to place the paper as far in the unit as possible. When the slip is in position press the "SLIP" key and the current configuration will be printed.

When the configuration is printed the paper will be fed forward enough to allow the configuration to be read.

The configuration mode is now ready to accept configuration changes. Each key and combination of keys will alter a configuration value. The keys will alter values as follows:

"SLIP" Serial or Parallel

This key will toggle between serial and parallel communications mode

"RECEIPT" Serial Mode

This key will cycle through the Serial mode options as follows:

[40]There are several configuration fields that can only be set by the remote configuration program. These fields are not required for proper printer operation.

8 bit No Parity
7 bit Even Parity
7 bit Odd Parity
7 bit No Parity[41]
8 bit Even Parity
8 bit Odd Parity

"JOURNAL" Baud Rate

This key will cycle through the baud rates available as follows:

19200, 9600, 4800, 2400, 1200, 600, 300

"SLIP + RECEIPT" Flow Control

This key toggles between XON/XOFF and Ready/Busy (DTR) flow control.

"JOURNAL + RECEIPT" Feature Select

These keys select the available features by cycling through the available configurations as follows:

Slip Station only
Slip and Journal Stations
Slip and Receipt Stations
Slip, Journal, and Receipt Stations

Any other combination will exit the mode if called from diagnostics or restart the mode if requested at power up.

If the unit is turned off during configuration, what ever configuration was last displayed will be saved in EEPROM.

The device description field can not be programmed from this mode. There is no way to enter alpha-numeric data. If this field is to be changed the remote configuration program CFG60 must be used.

Enable Remote Configuration

Remote configuration mode is a setup mode that allows a remote host to setup, display configuration information and test a series 60 printer.. This mode is designed to be operated by the CFG60 program running on a PC.

To enable remote configuration connect a PC through COM1 or COM2 to the Serial port on the Series 60 printer. (The internal printer configuration is not used in remote configuration to determine the port used for the configuration process. The serial port is always used.) Load the configuration program into the PC. Power on the Printer and hold the "JOURNAL" and "RECEIPT" keys during power up. After both the Select and Alarm lights go out. Refer to the CFG60 Users Guide for CFG60 operation.

It the printer is to be tested by CFG60 the parallel port should also be connected to the PC through LPT1 or LPT2. (The parallel port is not required for configuration)

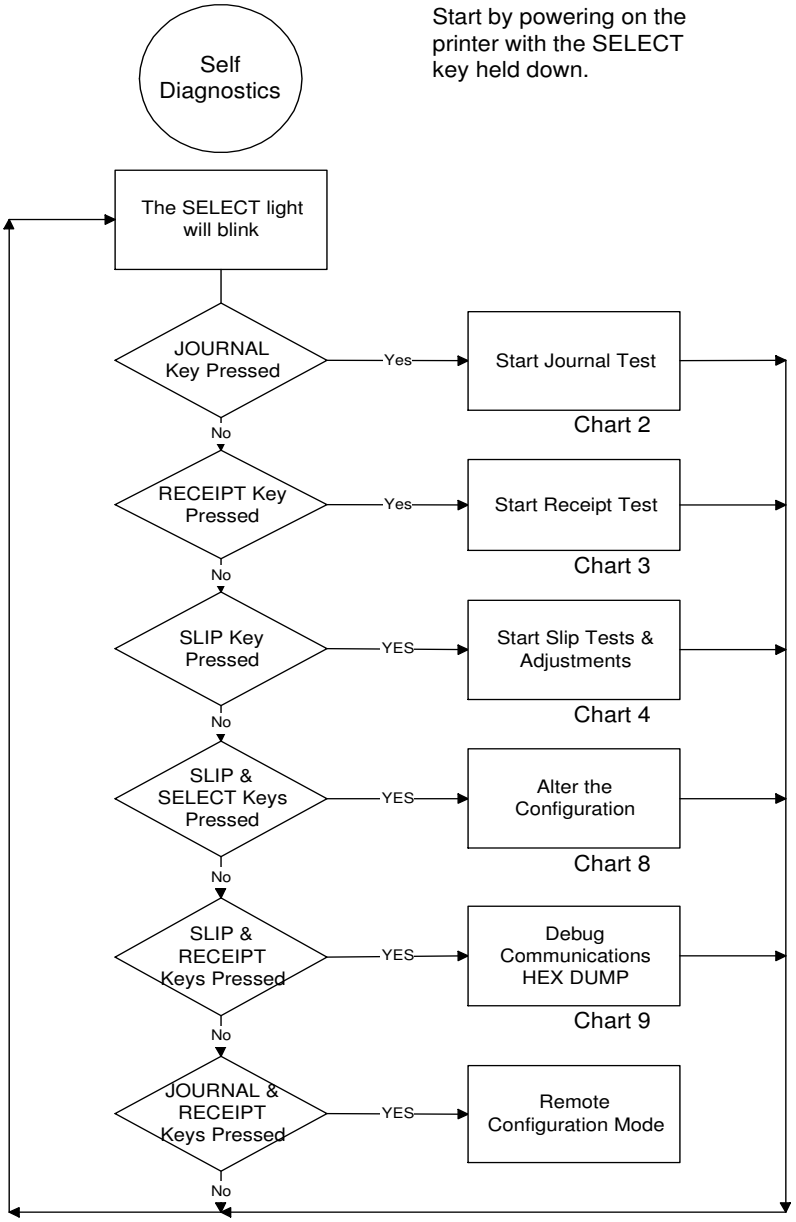
For more information on Remote Configuration see the CFG60 sections of this manual.

[41] 7 bit "No Parity" is not a true 7 bit mode. It is a 7 bit, don't care about parity. The parity bit must be present but is ignored by the printer. The host must be configured for 7 bit 2 stop bits.

Diagnostics Flow Chart

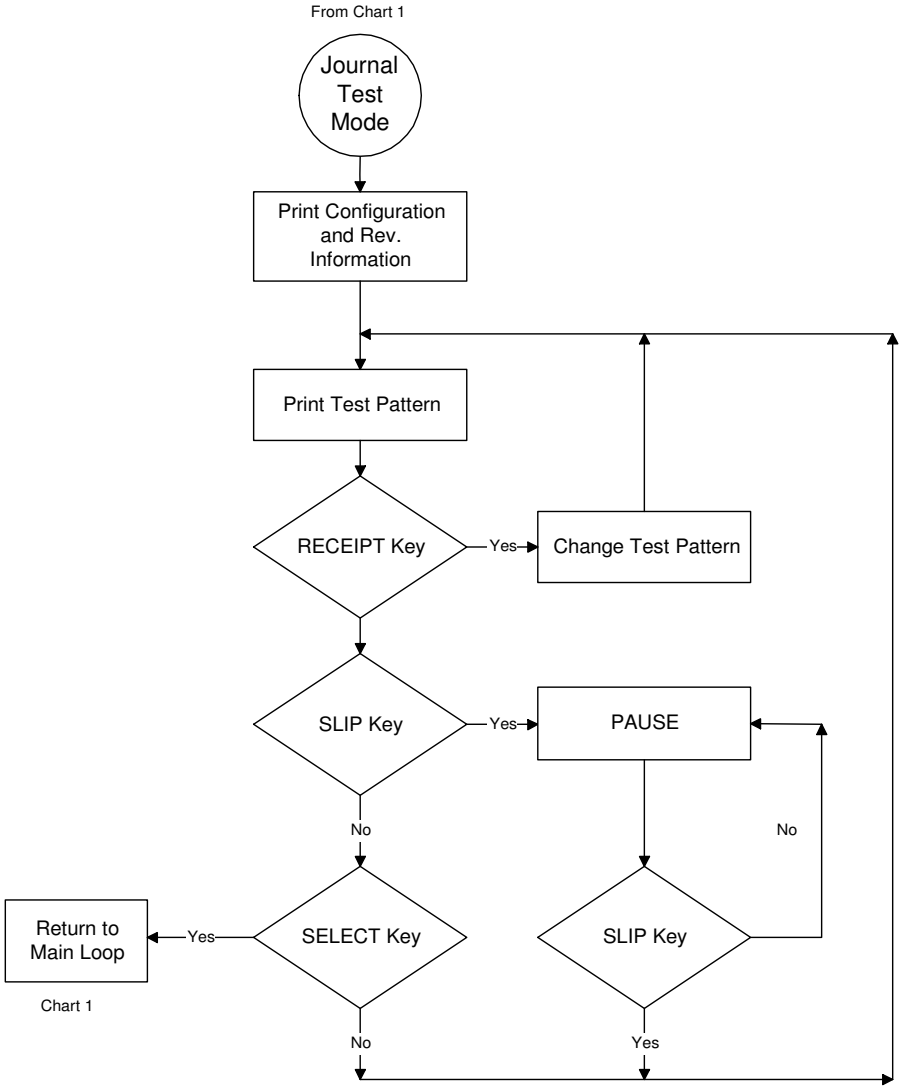
Diagnostics Mode

Chart 1



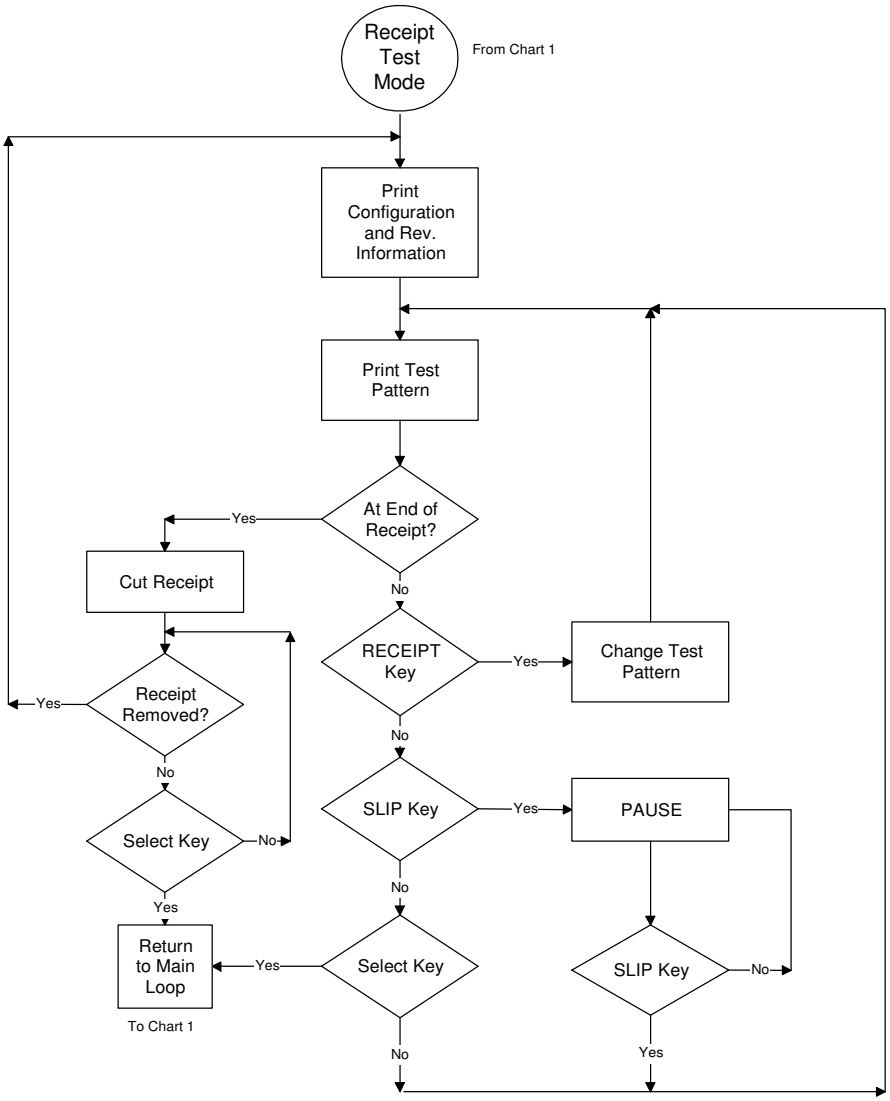
Journal Test Mode

Chart 2



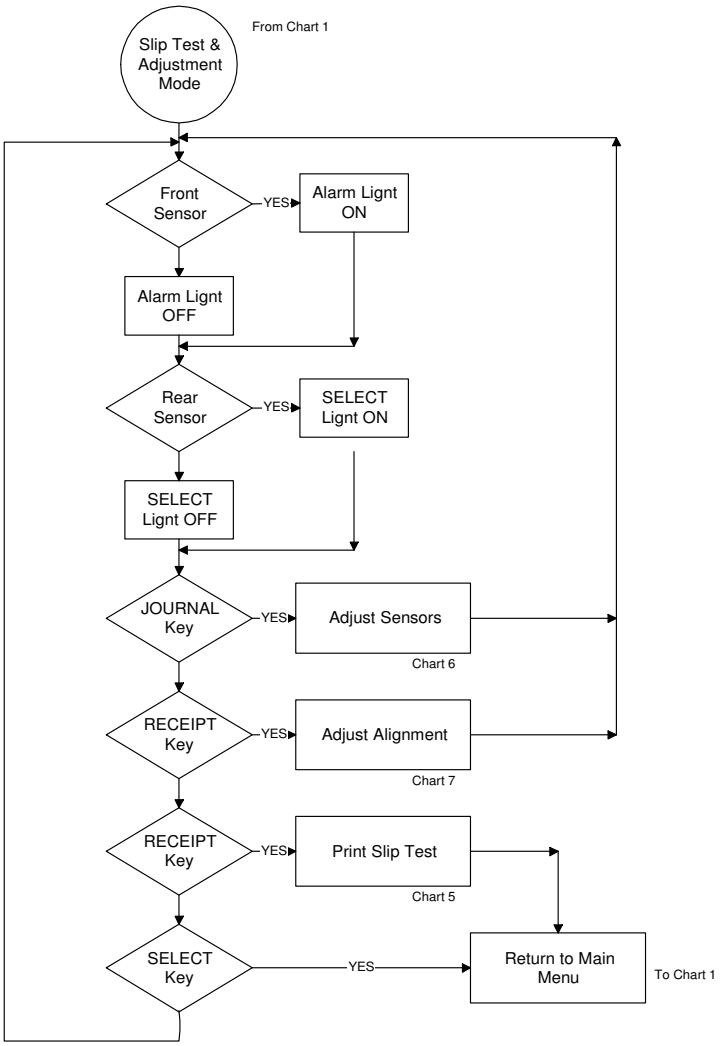
Receipt Test Mode

Chart 3



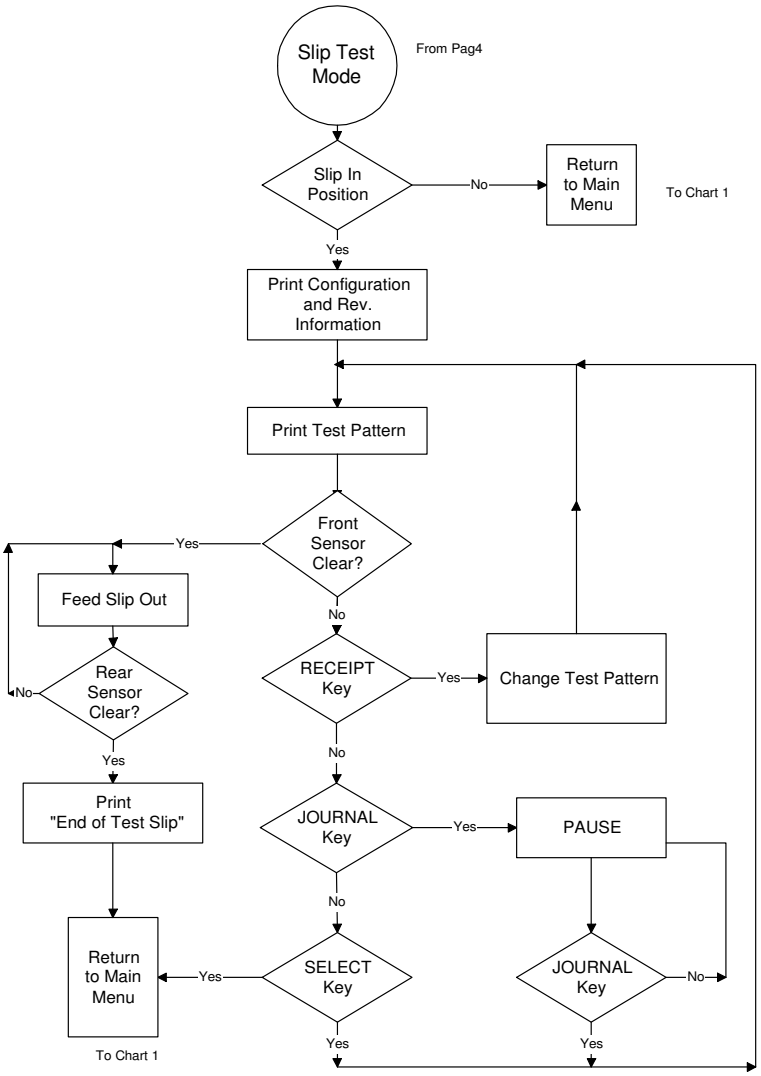
SLIP Test And Adjustment

Chart 4

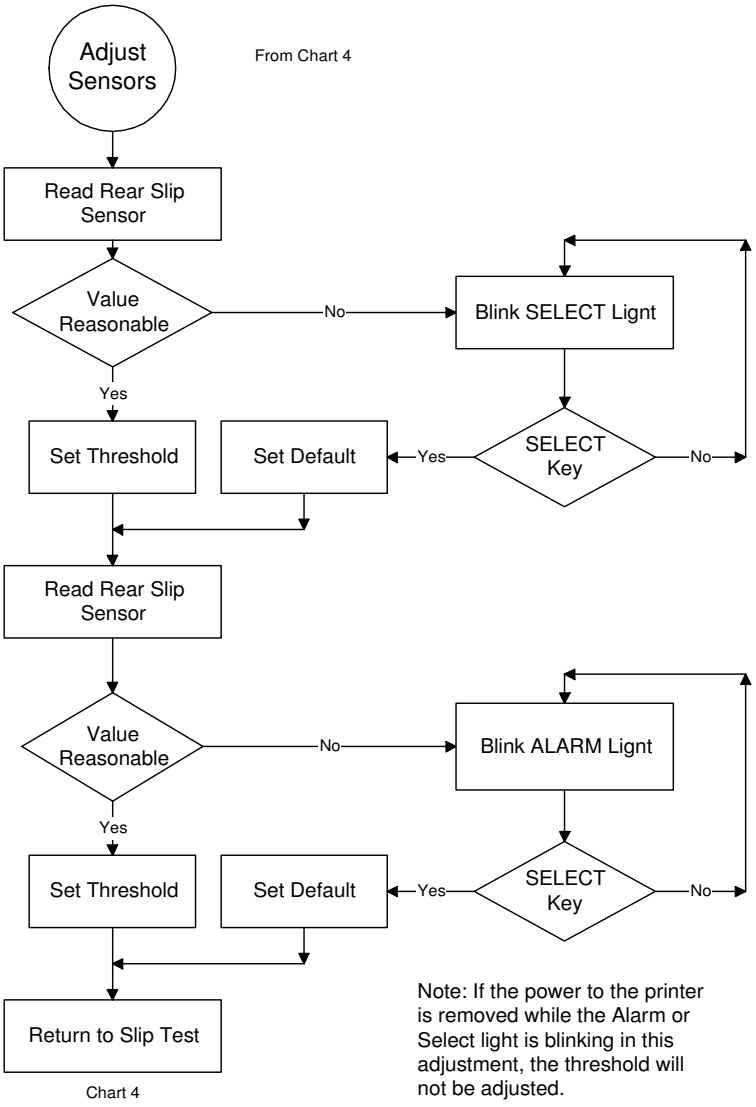


Slip Test Mode

Chart 5



Adjust Paper Sensors Chart 6



Note: If the power to the printer is removed while the Alarm or Select light is blinking in this adjustment, the threshold will not be adjusted.

Set Vertical Alignment

Chart 7

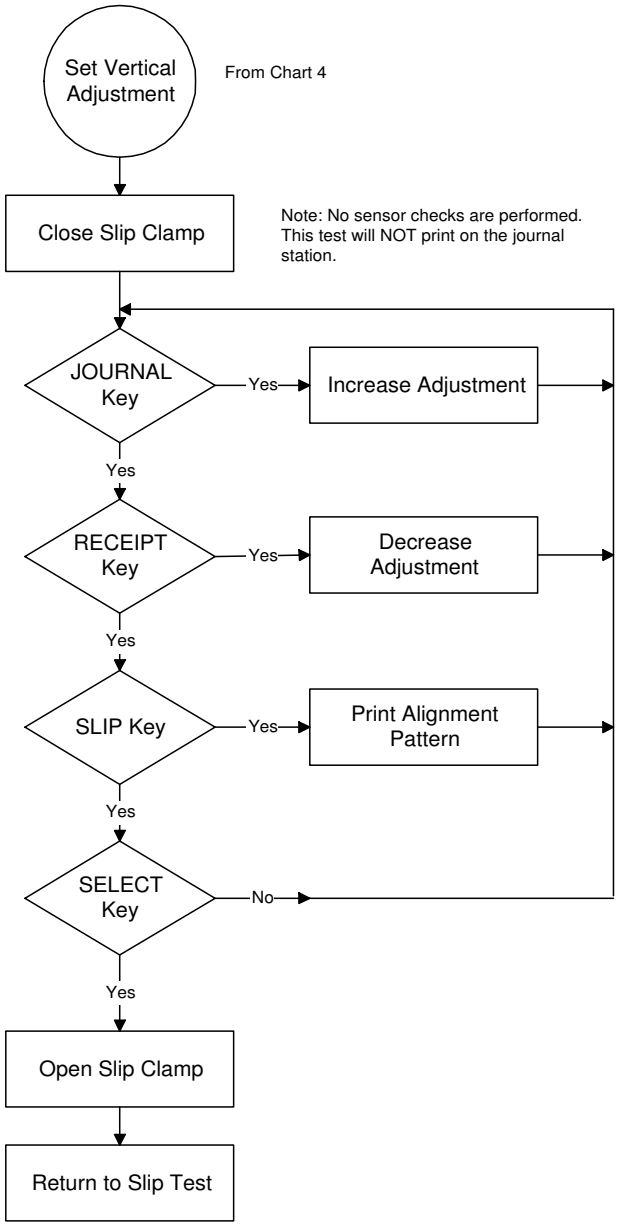
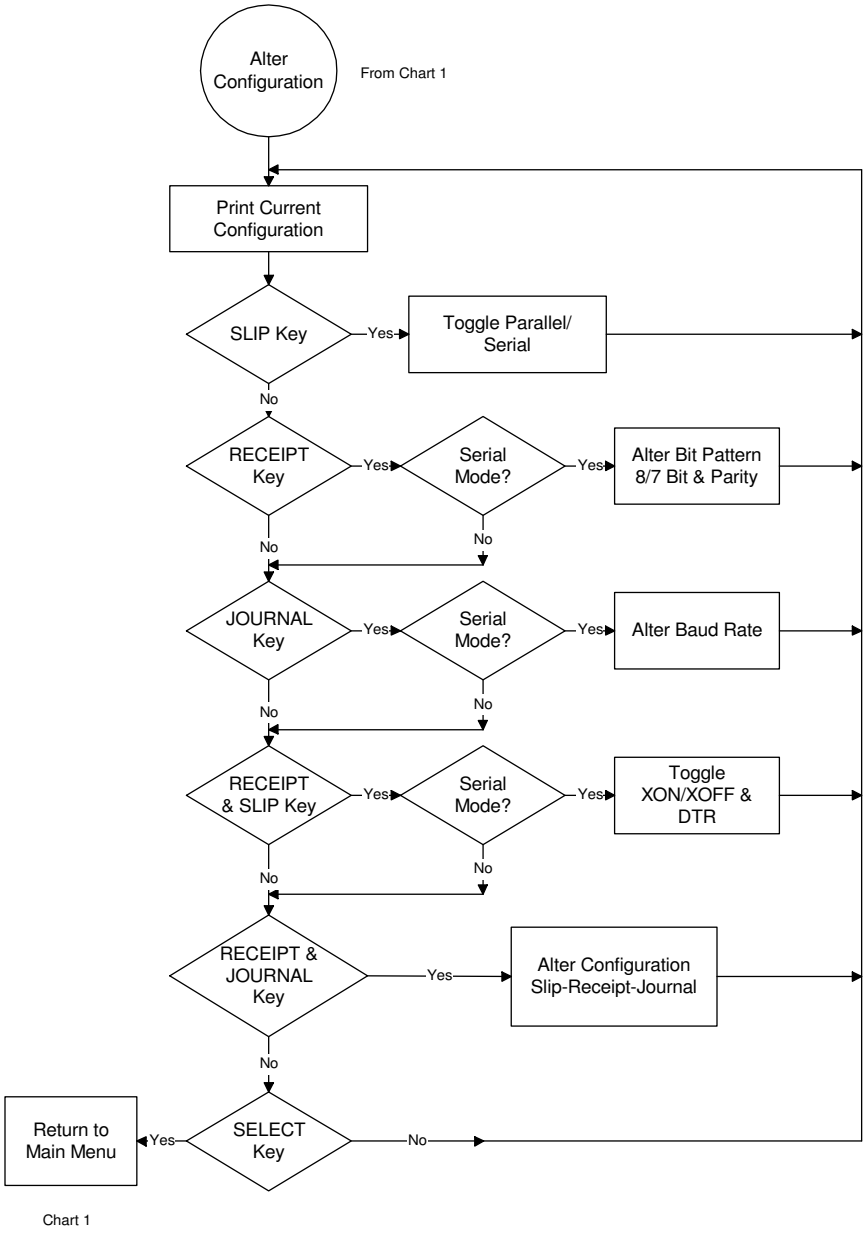


Chart 4

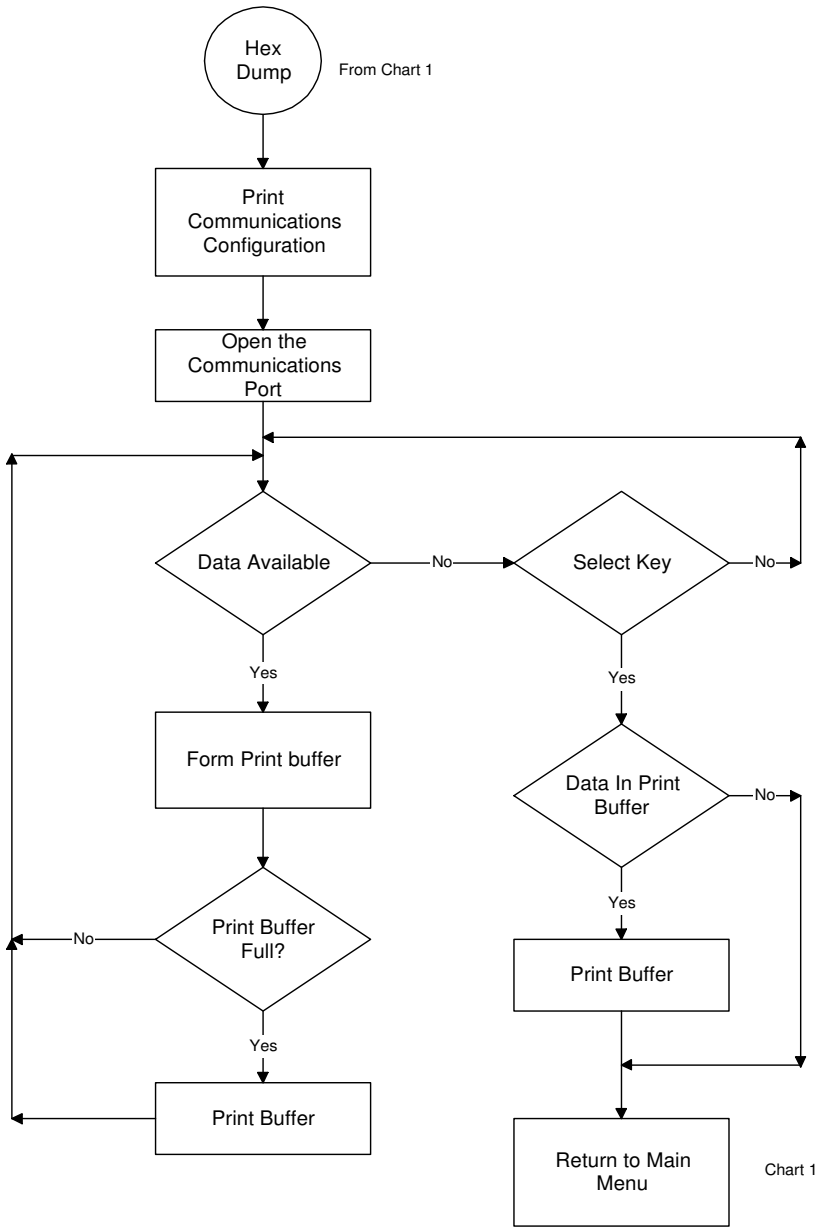
Change the Configuration

Chart 8



Debug Communications Hex Dump

Chart 9



Character Sets

Print Character Codes Set I

HEX	Dec	ASCII SET I
20	32	(sp)
21	33	!
22	34	"
23	35	#
24	36	$
25	37	%
26	38	&
27	39	'
28	40	(
29	41	)
2A	42	*
2B	43	+
2C	44	,
2D	45	-
2E	46	.
2F	47	/
30	48	0
31	49	1
32	50	2
33	51	3
34	52	4
35	53	5
36	54	6
37	55	7
38	56	8
39	57	9
3A	58	:
3B	59	;
3C	60	<
3D	61	=
3E	62	>
3F	63	?
40	64	@
41	65	A
42	66	B
43	67	C
44	68	D
45	69	E
46	70	F
47	71	G
48	72	H
49	73	I
4A	74	J
4B	75	K
4C	76	L
4D	77	M
4E	78	N
4F	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U
56	86	V
57	87	W
HEX	Dec	ASCII SET I
58	88	X
59	89	Y
5A	90	Z

5B	91	]
5C	92	\
5D	93	[
5E	94	^
5F	95	_
60	96	`
61	97	a
62	98	b
63	99	c
64	100	d
65	101	e
66	102	f
67	103	g
68	104	h
69	105	i
6A	106	j
6B	107	k
6C	108	l
6D	109	m
6E	110	n
6F	111	o
70	112	p
71	113	q
72	114	r
73	115	s
74	116	t
75	117	u
76	118	v
77	119	w
78	120	x
79	121	y
7A	122	z
7B	123	{
7C	124	|
7D	125	}
7E	126	~
7F	127	(sp)
80	128	*
81	129	*
82	130	*
83	131	*
84	132	*
85	133	*
86	134	*
87	135	*
88	136	*
89	137	*
8A	138	*
8B	139	*
8C	140	*
8D	141	*
8E	142	*
8F	143	*
HEX	Dec	ASCII SET I
90	144	*
91	145	*
92	146	*
93	147	*
94	148	*
95	149	*
96	150	*

97	151	*
98	152	*
99	153	*
9A	154	*
9B	155	*
9C	156	*
9D	157	*
9E	158	*
9F	159	*
0A0	160	á
0A1	161	í
0A2	162	ó
0A3	163	ú
0A4	164	ñ
0A5	165	Ñ
0A6	166	a
0A7	167	o
0A8	168	¿
0A9	169	Ú
0AA	170	¬
0AB	171	½
0AC	172	¼
0AD	173	¡
0AE	174	«
0AF	175	»
0B0	176	°
0B1	177	±
0B2	179	²
0B3	179	³
0B4	180	´
0B5	181	µ
0B6	182	¶
0B7	183	·
0B8	184	¸
0B9	185	¹
0BA	186	º
0BB	187	»
0BC	188	¼
0BD	189	½
0BE	190	¾
0BF	191	¿
0C0	192	À
0C1	193	Á
0C2	194	Â
0C3	195	Ã
0C4	196	Ä
0C5	197	Å
0C6	198	Æ
0C7	199	Ç
HEX	Dec	ASCII SET I
0C8	200	È
0C9	201	É
0CA	202	Ê
0CB	203	Ë
0CC	204	Ì
0CD	205	Í
0CE	206	Î
0CF	207	Ï
0D0	208	Đ
0D1	209	Ñ
0D2	210	Ò

0D3	211	Ó
0D4	212	Ô
0D5	213	Õ
0D6	214	Ö
0D7	215	×
0D8	216	Ø
0D9	217	Ù
0DA	218	Ú
0DB	219	Û
0DC	220	Ü
0DD	221	Ý
0DE	222	Þ
0DF	223	ß
0E0	224	α
0E1	225	β
0E2	226	Γ
0E3	227	π
0E4	228	∑
0E5	229	σ
0E6	230	µ
0E7	231	τ
0E8	232	Φ
0E9	233	Θ
0EA	234	Ω
0EB	235	δ
0EC	236	∞
0ED	237	Φ
0EE	238	ε
0EF	239	∩
0F0	240	≡
0F1	241	±
0F2	242	≥
0F3	243	≤
0F4	244	⌠
0F5	245	⌡
0F6	246	÷
0F7	247	≈
0F8	248	°
0F9	249	•
0FA	250	·
0FB	251	√
0FC	252	η
0FD	253	²
0FE	254	■
0FF	255	(sp)

* Note: Characters from 128 through 159 (80H - 9FH) are not printable in character set I.

Print Character Codes Set II

HEX	Dec	ASCII SET II
20	32	(sp)
21	33	!
22	34	"
23	35	#
24	36	$
25	37	%
26	38	&
27	39	'
28	40	(
29	41	)
2A	42	*
2B	43	+
2C	44	,
2D	45	-
2E	46	.
2F	47	/
30	48	0
31	49	1
32	50	2
33	51	3
34	52	4
35	53	5
36	54	6
37	55	7
38	56	8
39	57	9
3A	58	:
3B	59	;
3C	60	<
3D	61	=
3E	62	>
3F	63	?
40	64	@
41	65	A
42	66	B
43	67	C
44	68	D
45	69	E
46	70	F
47	71	G
48	72	H
49	73	I
4A	74	J
4B	75	K
4C	76	L
4D	77	M
4E	78	N
4F	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U
56	86	V
57	87	W

HEX	Dec	ASCII SET II
58	88	X
59	89	Y
5A	90	Z
5B	91	]
5C	92	\
5D	93	[
5E	94	^
5F	95	_
60	96	`
61	97	a
62	98	b
63	99	c
64	100	d
65	101	e
66	102	f
67	103	g
68	104	h
69	105	i
6A	106	j
6B	107	k
6C	108	l
6D	109	m
6E	110	n
6F	111	o
70	112	p
71	113	q
72	114	r
73	115	s
74	116	t
75	117	u
76	118	v
77	119	w
78	120	x
79	121	y
7A	122	z
7B	123	{
7C	124	|
7D	125	}
7E	126	~
7F	127	(sp)
80	128	Ç
81	129	ü
82	130	é
83	131	â
84	132	ä
85	133	à
86	134	å
87	135	ç
88	136	ê
89	137	ë
8A	138	è
8B	139	ï
8C	140	î
8D	141	ì
8E	142	Ä
8F	143	Å

HEX	Dec	ASCII SET II
90	144	È
91	145	æ
92	146	Æ
93	147	ô
94	148	ö
95	149	ò
96	150	û
97	151	ù
98	152	ÿ
99	153	Ö
9A	154	Ü
9B	155	¢
9C	156	£
9D	157	¥
9E	158	Pt
9F	159	ƒ
0A0	160	á
0A1	161	í
0A2	162	ó
0A3	163	ú
0A4	164	ñ
0A5	165	Ñ
0A6	166	a
0A7	167	o
0A8	168	¿
0A9	169	Ú
0AA	170	¬
0AB	171	½
0AC	172	¼
0AD	173	¡
0AE	174	«
0AF	175	»
0B0	176	°
0B1	177	±
0B2	179	²
0B3	179	³
0B4	180	´
0B5	181	µ
0B6	182	¶
0B7	183	·
0B8	184	¸
0B9	185	¹
0BA	186	º
0BB	187	»
0BC	188	¼
0BD	189	½
0BE	190	¾
0BF	191	¿
0C0	192	À
0C1	193	Á
0C2	194	Â
0C3	195	Ã
0C4	196	Ä
0C5	197	Å
0C6	198	Æ
0C7	199	Ç

HEX	Dec	ASCII SET II
0C8	200	È
0C9	201	É
0CA	202	Ê
0CB	203	Ë
0CC	204	Ì
0CD	205	Í
0CE	206	Î
0CF	207	Ï
0D0	208	Đ
0D1	209	Ñ
0D2	210	Ò
0D3	211	Ó
0D4	212	Ô
0D5	213	Õ
0D6	214	Ö
0D7	215	×
0D8	216	Ø
0D9	217	Ù
0DA	218	Ú
0DB	219	Û
0DC	220	Ü
0DD	221	Ý
0DE	222	Þ
0DF	223	ß
0E0	224	α
0E1	225	β
0E2	226	Γ
0E3	227	π
0E4	228	∑
0E5	229	σ
0E6	230	µ
0E7	231	τ
0E8	232	Φ
0E9	233	Θ
0EA	234	Ω
0EB	235	δ
0EC	236	∞
0ED	237	Φ
0EE	238	ε
0EF	239	∩
0F0	240	≡
0F1	241	±
0F2	242	≥
0F3	243	≤
0F4	244	⌠
0F5	245	⌡
0F6	246	÷
0F7	247	≈
0F8	248	°
0F9	249	•
0FA	250	·
0FB	251	√
0FC	252	η
0FD	253	²
0FE	254	■
0FF	255	(sp)

ASCII Code Chart

HEX	Decimal	ASCII	Hex	Decimal	ASCII	Hex	Decimal	ASCII	HEX	Decimal	ASCII
00	0	NULL	20	32	(sp)	40	64	@	60	96	`
01	1	SOH	21	33	!	41	65	A	61	97	a
02	2	STX	22	34	"	42	66	B	62	98	b
03	3	ETX	23	35	#	43	67	C	63	99	c
04	4	EOT	24	36	$	44	68	D	64	100	d
05	5	ENQ	25	37	%	45	69	E	65	101	e
06	6	ACK	26	38	&	46	70	F	66	102	f
07	7	BEL	27	39	'	47	71	G	67	103	g
08	8	BS	28	40	(	48	72	H	68	104	h
09	9	HT	29	41	)	49	73	I	69	105	i
0A	10	LF	2A	42	*	4A	74	J	6A	106	j
0B	11	VT	2B	43	+	4B	75	K	6B	107	k
0C	12	FF	2C	44	,	4C	76	L	6C	108	l
0D	13	CR	2D	45	-	4D	77	M	6D	109	m
0E	14	SO	2E	46	.	4E	78	N	6E	110	n
0F	15	SI	2F	47	/	4F	79	O	6F	111	o
10	16	DEL	30	48	0	50	80	P	70	112	p
11	17	DC1	31	49	1	51	81	Q	71	113	q
12	18	DC2	32	50	2	52	82	R	72	114	r
13	19	DC3	33	51	3	53	83	S	73	115	s
14	20	DC4	34	52	4	54	84	T	74	116	t
15	21	NAK	35	53	5	55	85	U	75	117	u
16	22	SYN	36	54	6	56	86	V	76	118	v
17	23	ETB	37	55	7	57	87	W	77	119	w
18	24	CAN	38	56	8	58	88	X	78	120	x
19	25	EM	39	57	9	59	89	Y	79	121	y
1A	26	SUB	3A	58	:	5A	90	Z	7A	122	z
1B	27	ESC	3B	59	;	5B	91	]	7B	123	{
1C	28	FS	3C	60	<	5C	92	\	7C	124	|
1D	29	GS	3D	61	=	5D	93	[	7D	125	}
1E	30	RS	3E	62	>	5E	94	^	7E	126	~
1F	31	US	3F	63	?	5F	95	_	7F	127	(sp)

Character Mode Specifications

There are 4 character pitches and each pitch has the ability to print double wide. In addition each of the print stations have different size print fields. The following tables lists the capibilities of each print station with the various character pitches.

Station	Paper Width Inches	Print Zone Width	First Collumn Offset	Print Direction	Rotated Modes Available		
		Rotate		0°	90°	180°	270°
Slip	2.5-9.0	3.5	3.75	Left to Right	Yes	Yes	Yes
Receipt	3.25	2.8"	0.15	Right to Left	Yes	Yes	Limited
Journal	2.5	2.4"	0.1	Right to Left	No	Yes	No

Print Width and Rotation Features

First collumn offsets are calculated from the edge of the paper on the Receipt and journal and from the left side slip stop on the slip.

	Double Wide		Normal			Double Wide		
Pitch	Wide		Station			Station		
CPI[42]	CPI	DPI[43]	Slip	Receipt	Journal	Slip	Receipt	Journal
24	12	144	84	66	56	42	33	28
17.1	8.5	102.6	60	48	40	30	24	20
12		72	42	32	28	21	16	14
10		60	34	28	24	17	14	12

Print Pitch and Print Zone Size

[42]CPI - Characters Per Inch

[43]DPI - Dots Per Inch

Appendix A

CFG60 Selection Keys

Menu Movement Key.	Action
[Left Arrow]	moves selection bar to item left.
[Right Arrow]	moves selection bar to item right.
[Up-Arrow]	moves selection bar to item upwards.
[Down-Arrow]	moves selection bar to item downwards.
[Enter]	selects the item that the selection bar is on. If selected item has a sub-menu attached, then processing of that menu will begin.
[Home]	moves selection bar to upper-leftmost item.
[End]	moves selection bar to lower-rightmost item.
[Esc]	Exits Menu and returns to the root menu

Appendix B

CFG60 Configuration Command Summary.

COM x	Select COM 1 through 4
NOLPT	Select NO Parallel Port
LPT x	Select LPT 1 or 2
LPTADR Address	Select LPT port address[44] in hex
SERIAL	Serial Configuration
PARALLEL	Parallel Configuration
BAUD baud *	19200, 9600, 4800, 2400, 1200, 600, 300 are valid for baud Example: BAUD 9600
8BN *	8 bit No parity
8BE *	8 bit Even parity
8BO *	8 bit Odd parity
7BN *	7 bit No parity
7BE *	7 bit Even parity
7BO *	7 bit Odd parity
SERIES xx	Series 61, 62, 63 and 64 are valid
XON *	Xon/Xoff Flow Control
XOFF *	Xon/Xoff Flow Control
DTR *	Use DTR for Flow Control
NOFLOW	No Flow Control in Serial Test
LOCKSN	Allow Serial Number to be reentered
BARCODE	Use barcode reader for serial number input
RESTART	Reset printer after Configuration
SENSOR	Allows CFG60 to Auto adjust the printer sensors during test.
TEST	Run printer test after configuration
LEVEL0	Run Level 0 diagnostics after configuration
PORTTST	Run Parallel port tests as part of level 0 (requires parallel and serial connections)
EDITOR path\name.exe	Select a custom editor for demo edits. Specify the complete path and name of the editor. Include any flags. Example EDITOR C:\DOS\EDIT.EXE
SWAPMODE x	What memory to use for program swapping 0 Auto Select 1 use EMS only 2 use XMS only 3 use disk only (Use environment variable TEMP for the path)
PARDEMO	Pre select parallel port for demos
SERDEMO	Pre select serial port for demos
LIFETEST fname.dmo	Names an alternate file "fname.dmo: of the life test demo file. lifetest.dmo is used as a default.
MECHADJ	Allow Mechanical Adjustment
NOECHO	Forces the demo processor to default to no echo

[44]Some PC have Printer port addresses that do not follow standard PC conventions. If this is the case use the LPTADR to specify the address.

Appendix C

Configuring Serial Ports

The CFG60 Program supports COM1-COM4. The CFG60 program uses Serial port interrupts. COM1 and COM3 must be on IRQ 4 and COM2 and COM4 must be on IRQ3. If a mouse is connected to COM1, CFG60 can not use COM3 as they share interrupts.

The following is the PC standard Serial port configurations:

COM1	3F8H	IRQ4
COM2	3E8H	IRQ3
COM3	2F8H	IRQ4
COM4	2E8H	IRQ3

Appendix D

Configuring Parallel Ports

The CFG60 program will work with LPT1 or LPT2 ports. the following are the PC standards for parallel ports:

LPT1	378H	IRQ2
LPT2	278H	IRQ7

NOTE: CFG60 does not use the interrupts on the parallel port.

If your PC does not use a standard PC parallel port address, the address of your port can be specified in the CFG60.CFG file with a LPTADR command.

LPTADR 3BC

Would specify 3BCH[45] as the base address of the LPT port. See your PC owners manual for additional information.

[45] 3BCH is used by some PC intended for networks. This address is for the local printer.

Appendix E

Configuring CFG60 for specific PC's

The CFG60 program supports VGA/EGA color monitors as a default. In some cases it will be desirable to use the CFG60 program in other environments.

When CFG60 starts it searches your PC and tries to determine what monitor you have, whether you have a mouse installed, and if you have an enhanced keyboard. In some cases you may wish to override what CFG60 finds. The CFG60.INI file is used to do this. The Default file looks something like this:

TcxlInt=Off	If you don't like blink attributes set TcxlInt to "On".
TcxlCur=On	If you don't want CFG60 to restore your original cursor position set TcxlCur to "off".
TcxlBrk= On	Disables Ctl-Break and Ctl C processing
TcxlMem=On	Initialize the memory subsystem.
TcxlKey=On	If you have an enhanced keyboard and don't want CFG60 to use it set TcxlKey = "off".
TcxlMou=On	If you have a mouse and don't want CFG60 to use it set TcxlMou to "off".
TcxlAtrMapIni=3,A000	Sets the Attribute map (Do not change!).
TcxlAtrMapSet=0	If you have a lap top computer with VGA display and don't like the way colors are displayed, set TcxlAtrMapSet = 3. 1 will emulate a Mono display and 2 Will emulate B/W display.

It is unusual that the CFG60.INI file will change for anything except a Laptop PC VGA display.

If you change the CFG60.INI file you must also make the same change in the DEMOEDT.INI file. (You can copy CFG60.INI to DEMOEDT.INI if you wish.)

Appendix F

Demo Command Summary:

[NUL]	0x00	[FF]	0x0C	[CAN]	0x18
[SOH]	0x01	[CR]	0x0D	[EM]	0x19
[STX]	0x02	[SO]	0x0E	[SUB]	0x1A
[ETX]	0x03	[SI]	0x0F	[ESC]	0x1B
[EOT]	0x04	[DEL]	0x10	[FS]	0x1C
[ENQ]	0x05	[DC1]	0x11	[GS]	0x1D
[ACK]	0x06	[DC2]	0x12	[RS]	0x1E
[BEL]	0x07	[DC3]	0x13	[US]	0x1F
[BS]	0x08	[DC4]	0x14		
[HT]	0x09	[NAK]	0x15		
[LF]	0x0A	[SYN]	0x16		
[VT]	0x0B	[ETB]	0x17		

Appendix G

Control Command Summary:

{REM}	Disregard the rest of this line(comment)
`	Disregard the rest of the line (comment)
{PAUSE:xx}	Pause Demo for xx Seconds
{RV}	Reverse the following text
{STOP}	Stop the demo for 2 Min. or any key
{FRONT}	Wait for a slip and display status (front sensor only)
{SENSOR}	Wait for a slip and display status (both sensors)
{ECHO}	Echo the following text to the display and stop
{RESET}	Reset Printer (Parallel mode only)
{DO:file}	Read demo file: "file.dmo"
{GRAPHIC:file}	Read a graphic file "file.gph"
{A=:xx}	Sets A equal to xx
{A+:xx}	Adds xx to A
{A-:xx}	Subtracts xx from A
{A.}	Prints A free format
{A.:x}	Prints A in a fixed format of x digits with leading zeros. (x can be 2 to 7)
{B=:xx}	Sets B equal to xx
{B+:xx}	Adds xx to B
{B-:xx}	Subtracts xx from B
{B.}	Prints B free format
{B.:x}	Prints B in a fixed format of x digits with leading zeros. (x can be 2 to 7)
{RPT:xx}	Repeat the rest of the line xx times.
{DATE:f}	Insert the current date in the specified format. f .....Format f .....Format 0.....December 3, 1988 (Default) 1.....3 Dec 88 2 ..... 12-3-88 3..... 12/3/88 4 ..... 3/12/88 5..... 12/03/88
{TIME:f}	Insert the current time in the specified format. f .....Format f .....Format 0..... 16:30:57.89 1 ..... 16:30:57 2..... 4:30 PM 3 ..... 4:30p 4.....4:30 5 ..... 04:30

Appendix H

Trouble Shooting the CFG60 Program

Program Locks Up

If CFG60 starts fine and then locks-Up after several operations, the FILES and BUFFERS commands in CONFIG.SYS is too small. FILES and BUFFERS should be at least 20. The Stack should also be expanded to 9,256.

If CFG60 is run from floppy, the floppy should not be removed while CFG60 is running. CFG60 will use the disk for temporary files.

CFG60 requires at least 300K of available memory. If there is not enough memory the program can lockup.

The interrupt on the Serial Interface is not correct.

CFG60 Runs very slowly

CFG60 is a Memory hog. If it runs out of normal memory it looks for XMS or EMS memory. If it can't find any additional memory it starts to use disk. It looks for an environment variable TMP or TEMP to specify a path for the DISK directory to use for expanding memory. If it can't find TMP or TEMP it used the default disk. If the default is the floppy disk, the performance is going to be very slow. To improve performance on a PC with a hard disk, define a TEMP path.

For example:

```
SET TEMP=C:\TEMP
```

If you have Windows 3.1 installed the SMARTDRV.EXE program provided by Microsoft will also improve CFG60 performance.

Defining EMS memory with the EMM386 program provided as part of DOS 5.0 will give CFG60 help as well.

CFG60 should run in 640K of memory on a 286 system, however it will be slow. This will not, however, prevent a printer from being configured.

In some cases when the program is accessing the floppy disk the program will appear to hang up. If the disk activity light is still flashing the program is working. The program swap to DEMOEDT is painfully slow if only a floppy drive is available. The active CFG60 program is rolled out and DEMOEDT is loaded.

Program starts, displays configuration information, and exits to DOS.

If a configuration error exists in CFG60.CFG, CFG60 will not run. The Display should show where the error is unless it has scrolled off the top window. Delete some commands from the end of the CFG60.CFG file until the Error is Displayed.

The CGF60 program only displays in Black and White.

The CFG60.MSG file is missing or defective. Restore the original file from the distribution disks.

The TcxlAtrMapSet in the CFG60.INI file must also be 0 to use a color display correctly.

CFG60 can not establish contact with the printer during configuration.

Verify that the serial interconnect cable is correct and correctly connected. (NOTE: the serial cable is not one to one) Also make sure that the proper PC COM port has been selected.

If the printer is not in auto configuration mode, CFG60 can not read its status. Press and hold the top two keys on the Printer keyboard (RECEIPT and JOURNAL) and power the printer on. Only the power light should be on. If any other lights are displayed it is an error message. Try pressing SLIP and RECEIPT keys (at the same time) to clear an EEROM error. If this clears the error turn the power off and try to enter remote configuration again.

If this fails, try powering the printer on in diagnostics mode (power on with the select key depressed.) If the select light is blinking press both Journal and Receipt keys. This should also enter auto configuration mode.

CFG60 does not display XOFF when the printer is off line.

When the printer uses XON and XOFF for flow control it will transmit XOFF when it goes off line.

If CFG60 is in "Test Serial Communications" mode it will display "XOFF Received" only if it is configured for XON/XOFF flow control. The Test configuration is defined when a printer configuration is defined. If no printer definition exists, it uses a default configuration which uses DTR flow control. The configuration can be changed with the Alt-P key.

Serial communication does not work or the mouse won't work in CFG60

If a Mouse is connected to COM1 it will interfere with CFG60, if CFG60 uses COM1 or COM3. CFG60 should be configured to use COM2 or COM4 if the mouse is on COM1 or COM3. A PS2 mouse connection uses a different interrupt and this problem should not occur.

CFG60 demo RV command stops at a \[character.

This is true the RV command does not know the difference between a \n for insert CRLF and a \[which means insert a [. You can not use escape delimiters in a RV segment.

The DEMO program over runs the printers print buffer

This can happen for a number of reasons.

1) The printer and CFG60 are using different protocols. Reading the configuration from the printer will set CFG60 to match the printer.

2) The NOFLOW option is set in CFG60.CFG. This option can be set to force CFG60 to ignore all flow control. This is primarily used in test modes. If however it is on during a demo operation it will prevent the DEMO from stopping for the printer.

Appendix I

Ordering Information

To order cables use the following order numbers:

10-2020 9 pin female to 9 pin female Serial Interconnect

10-2021 9 pin female to 25 pin female Serial Interconnect

10-2022 9 pin female to 25 pin male Serial Interconnect

253-9800007 25 pin male to 25 pin male Parallel Interconnect

Also available is a PcOS Series 60 Programmers Guide

All the above may be ordered by calling (607) 257-8901 and ask for sales department

or Fax an order to (607) 257-8922

You can also order by mail:

Send orders to:

Ithaca Peripherals Incorporated
20 Bomax Drive
Ithaca, New York 14850

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[CAN] Clear Print Buffer 34
[CR] New Line 9
[DC2] Set 10 CPI 16
[DC4] End One Line Double Wide 17
[ENQ] <1> Inquire Cash Drawer 1 Status 37
[ENQ] <10> Request Printer Reset 40
[ENQ] <11>Request Printer Power Cycle Status 40
[ENQ] <2> Inquire Cash drawer 2 Status 37
[ENQ] <3> Inquire Printer Buffer Status 38
[ENQ] <4> Inquire Journal Paper Status 38
[ENQ] <5> Inquire Front Sensor Status 38
[ENQ] <6> Inquire Rear Sensor Status 38
[ENQ] <7> Inquire Printer Ready Status 39
[ENQ] <8> Set Printer Input OFF 39
[ENQ] <9> Set Printer Input OFF 39
[ENQ] <n> Inquire Printer Status 37
[ESC] - <0> End Underline 26
[ESC] - <1> Begin Underline 26
[ESC] r <3> Rotate 270 Degrees 22
[ESC] # <0> Begin Draft Mode 18
[ESC] \: Set 12 CPI 16
[ESC] [SI] Set 24 CPI 16
[ESC] ^ <n> Extended Diagnostics. 42
[ESC] | <n> Vertical Alignment 42
[ESC] 0 Set Line Space 27/216 11
[ESC] 1 Set Line Space 7/72 12
[ESC] 2 Enable Variable Line Spacing 12
[ESC] 3 <n> Set Line Spacing n/216 11
[ESC] 6 Select Character set 2 20
[ESC] 7 Select Character set 1 19
[ESC] A <n> Set Variable Line Spacing n/72 12
[ESC] b Load Slip to Top of Form 32
[ESC] D <n>1 <n>2 Set Horizontal Tab Stops 14
[ESC] d Feed 7 inches 10
[ESC] E Begin Emphasized Print 26
[ESC] e Feed 2 inches 10
[ESC] F End Emphasized Print 26
[ESC] f Load Receipt Paper 29
[ESC] G Begin Enhanced Print 26
[ESC] g Select Journal Station 29
[ESC] H End Enhanced Print 26
[ESC] h Load Slip to Top of Form 31
[ESC] I <1> Set Utility Print Mode 18
[ESC] I <2> Set Enhanced Print Mode 18
[ESC] I <3> Begin NLQ Print Mode 18
[ESC] i Load Slip to first line 30
[ESC] J <n> Fine Line Feed 9
[ESC] j Clamp on Slip 30
[ESC] K <n>1 <n>2 Print Single density Graphics 28
[ESC] k Feed to Mark 10
[ESC] l <n> Dual station Control 33
[ESC] L <n>1 <n>2 Print Double Density Graphics 28
[ESC] m Feed to End of Slip 11
[ESC] M Load Slip to first line 31
[ESC] N Load Slip to Top of Form 31
[ESC] n Set Feed Direction Back to Front 13
[ESC] o Set Feed Direction Front to back 13
[ESC] p <n> Set Left Margin 33
[ESC] Q Wait for print Que. 34
[ESC] q Wait in print Que. 34
[ESC] r <0> End of Rotated Print 23
[ESC] r <1> Rotate 90 Degrees 22
[ESC] r <2> Rotate 180 Degrees 22
[ESC] s <n> Set Rotated print line length 23
[ESC] S<0> Select Superscript 27
[ESC] S<1> Select Subscript 27
[ESC] T End Superscript or Subscript 27
[ESC] U <0> Begin Bi-directional Print 28
[ESC] U <1> Begin Unidirectional Print 28
[ESC] u <n>1 <m>1 Set Rotated print line spacing 24
[ESC] v Activate Receipt Cutter 29
[ESC] W <0> End Multi line Double Wide 17
[ESC] W <1> Begin One Line Double Wide 17
[ESC] x <n> Open Cash Drawer 35
[ESC] y <n> Feature Control 41
[ESC] Y <n>1 <n>2 Print Double Density Graphics 28
[ESC] z Open Slip Clamp 30
[HT] Horizontal Tab 14
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