OPERATOR'S
MANUAL

SooperSpooler®
INTELLIGENT PRINTER INTERFACE

MODEL SS-1000

BY

COMPULINK
CORPORATION

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

This equipment generates and uses radio frequency energy. If not
installed and used properly, that is, in strict accordance with the
manufacturer's instructions, it may cause interference to radio and
television reception.   This device has been tested and found to
comply with the limits for a Class B computing device in accordance
with the specification in Subpart F of Part 15 of FCC Rules, which
are designed to provide reasonable protection against such
interference in a residential installation.   However, there is no
guarantee that interference will not occur in a particular
application.

If this equipment does cause interference to radio or television
reception, which can be determined by turning the equipment off and
on, the user is encouraged to try to correct the interference by one
or more of the following measures:

1. Reorient the receiving antenna.
2. Relocate the computer with respect ot the antenna.
3. Separate the computer from the reciever
4. Plug the computer into a different outlet so that computer
    and receiver are on different branch circuits.

If necessary, you should consult your dealer or an experienced
radio/television technician for additional suggestions. You 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, Stock No.
004-000-00354-4.

Warning: This equipment has been certified to comply with the
limits for a Class B computing device, pursuant to Subpart J of Part
15 of FCC Rules.   Only computers and printers certified to comply
with the class B limits may be attached to this device.   Operation
with non-certified equipment is likely to result in interference to
radio and TV reception.

WARNING

HIGH VOLTAGE EXISTS INSIDE THIS UNIT
THE CASE SHOULD ONLY BE OPENED BY A QUALIFIED PERSON!

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1.   INTRODUCTION.

1.1 Welcome...

Thank you for selecting the SooperSpooler by Compulink Corporation. You
have purchased a high quality, extremely useful product that will save you
hours of time while increasing your printing power. Please read through
this manual carefully to aid you in installing your SooperSpooler and to
instruct you in its many features. If you have any further questions or
comments, please feel free to write Compulink at any time for a prompt,
knowledgable reply.   In any communications with Compulink, please state
your name, address, and your SooperSpooler model number, serial number,
and options.

1.2 Registration

As soon as you receive your SooperSpooler, fill out and mail the
registration card.   You must be a registered owner in order to receive
notice of firmware or hardware updates.   You may also elect to receive
information on new Compulink products by checking the appropriate block on
the card.   You are not required to fill in all the information shown; you
may list only your name and address if you desire.   Be assured that your
registration will not be used for outside "junk" mailing lists.

1.3 Legalities

The material in this document is for informational purposes only and is
subject to change without notice.   Compulink Corporation assumes no
liability with respect to the use of or for any damages that may result
from the use of any information contained in this manual.   All rights
reserved.   Reproduction or use without express written permission, in any
manner, is prohibited.

All software contained in the ROM is copyrighted by Compulink Corporation.
Duplication of this software, in whole or in part, is strictly prohibited.

PLEASE SEE THE FCC RADIO FREQUENCY INTERFERENCE STATEMENT LOCATED ON THE
INSIDE FRONT COVER.

2. SPECIFICATIONS AND THEORY OF OPERATION

2.1 Overview of SooperSpooler Features

Your SooperSpooler Model SS-1000 is a Z-80 microprocessor controlled,
intelligent printer interface. Its basic function is to accept data very
rapidly from a host computer and feed that data to a printer at the
printer's data acceptance rate. This eliminates the necessity of waiting
for your printer to complete printing before the computer may be used.

The SooperSpooler will also accept data from, or output data to, other
computer related devices. Examples would include accepting data from a
phone modem and outputting to a printer or using the SooperSpooler to
"spool" data between a computer and a phone modem. With the serial
option, the SooperSpooler also will act as a parallel to serial or serial
to parallel translator.

The base model contains 16K bytes of RAM, one parallel input port and one
parallel output port. A serial option is available which provides two
additional ports, serial input and output. A memory expansion option is
available which increases the memory to 62K bytes. 2K bytes of ROM contain
the operating firmware. A two digit numeric display indicates the amount
of data stored in the buffer memory.

In addition to the hardware spooling capability, many intelligent features
are incorporated to ease the job of printing. Pagination with software
selectable header, page numbering, page size, and lines per page may be
enabled. Print formatting allows independent control of left and right
margins, and indentation of carryover lines. Memory saving space
compression may be enabled. Many of the interface parameters may be
changed by hardware or software. A self test routine is built in. Note
that the default of all of these features is "OFF" so that your data will
not be altered in any way as it passes through the SooperSpooler unless
specifically desired.

2.2 Theory of Operation

2.2.1 General Operation

The heart of the SooperSpooler intelligent printer interface is the Z80
CPU microprocessor. Under control of the program contained in a 2K x 8
bit (2048 byte) type 2716 EPROM (Erasable, Programmable Read Only Memory),
it controls all data input, output and handshaking as well as the
"intelligent" features of the SooperSpooler. It examines each character
received and determines whether to store the character in the buffer or to
change the configuration of the SooperSpooler. As the printer is ready to
accept another character, the CPU retrieves the next character from the
buffer, decides whether to output the character as is, modify the
character, add more characters to the output, or further change the
configuration of the SooperSpooler.

The Z80 is capable of directly addressing up to 64K (64 x 1024 = 65536 bytes) of memory. The SooperSpooler is set up so that the EPROM is addressed between 0 and 7FFH (hexadecimal). The 16K (16384 bytes) of random access memory (RAM) in the base model is addressed between C000H and FFFFH. 256 bytes of this memory is used for scratchpad memory for the Z80, storing such things as the present system configuration and top of page header as well as saving variables required by the CPU in order to execute the program stored in the EPROM. As explained later there are an additional 100 bytes that, under normal conditions, are not available for storage of characters sent to the SooperSpooler, leaving a total of 16028 bytes for storage of data for printing. The optional memory expansion board contains an additional 48K of memory, addressed between 0 and BFFFH. Since the first 2048 bytes, addressed between 0 and 7FFH overlap the EPROM memory addresses, this part is not accessible for storage of data. With the memory expansion board, there is a total of 63132 bytes available for data storage.

The Z80 can also address up to 256 input/output ports. In the base model, 6 ports are used for the following functions:

1. Parallel input data port from computer.
2. Parallel output data port to printer.
3. Output to BUFFER STATUS display.
4. Output to SPACE COMPRESSION and PAGE indicators.
5. Input ports to "read" the configuration switches, printer status and front panel switches.

With the optional RS-232 serial interface board, four more ports are used for data to and from the computer and the printer, control and status of the USARTs (Universal Synchronous Asynchronous Receiver Transmitter).

When the SooperSpooler is first turned on or whenever the hardware reset switch on the rear panel is depressed, the Z80 CPU (and the 8251 USARTS, if the optional serial board is installed) is (are) cleared by a master reset signal. The Z80, under control of the ROM program, then initializes the SooperSpooler as follows:

1. Disable interrupts, set Z80 interrupt mode and set the stack pointer.
2. Read the configuration switches and set up all default values.
3. If the serial board is installed, set the serial transmission parameters according to the configuration switches on the serial board. Initialize the serial input handshaking line and send DC1 to the computer serial port.
4. Determine the system memory size and set pointers for input and output data to the start of the buffer memory (lowest memory address).
5. Initialize the parallel input port by reading the input data port and output an ACKNLG* pulse to the computer parallel port.
6. Check for closure of the PAGE pushbutton switch. If it is depressed, then flash the PAGE indicator to inform the user that the single sheets mode has been selected. No printer output will occur while the PAGE indicator is flashing. The PAGE pushbutton must be depressed again in order to enable printer output.

After this initialization procedure, the processor interrupts are enabled,
allowing data to be received from the computer. The ROM program directs
the CPU to perform the following steps:

1. If the buffer is empty, then the CPU will temporarily disable
   interrupts and check for closure of either the SPACE COMPRESSION or
   PAGE pushbutton switch. If both are pressed, then the self test
   routine is immediately performed. If either switch is pressed
   individually, then the mode corresponding to the depressed switch is
   toggled on or off. Processor interrupts are reenabled after polling
   the SPACE COMPRESSION and PAGE pushbutton switches.

2. If the buffer is not empty, then the next character is read from the
   buffer and whatever action is required on that character is
   performed. If the character is not a control sequence leadin
   character or a space count (with space compression enabled), then the
   CPU will output the character exactly as stored in the buffer to
   either the parallel or serial printer output port. If the character
   is a space count then the CPU will output that number of spaces to
   the printer. If the character is part of a control sequence, then
   the configuration of the SooperSpooler is modified according to the
   remaining characters in the control sequence. The buffer RESET
   switch is polled during this period, and if it is pressed, the input
   and output buffer pointers are reset to the start of memory. The
   BUFFER STATUS display is continuously updated as characters are
   printed.

If a character is sent to the SooperSpooler by way of either the parallel
or serial input port and the CPU interrupts are enabled, the processor
will immediately start the character input procedure. Several things may
occur in this routine:

1. If the buffer is full, handshaking is performed with the host
   computer to let it know that the SooperSpooler cannot accept data.

2. If space compression is enabled and a space is sent, then the CPU
   starts a polled input routine, counting the number of spaces received
   and storing the count in the buffer with the most significant bit
   (MSB) = 1. All other characters received when space compression is
   enabled are stored in the buffer with the MSB = 0. The polled input
   continues until either a non-space character is received or the
   number of consecutive spaces exceeds 127, at which time the space
   count (and the following character, if not a space) is stored in the
   buffer and the processor interrupts are reenabled. During this
   time, printer output is suppressed.

3. If a control sequence leadin character is received, the processor
   polls the input port until the control sequence is completed. With
   some exceptions, all control sequences are stored in the buffer for
   action to be taken after any data currently in the buffer is sent to
   the printer. Since space compression requires alteration of the input
   data, the space compression control sequence changes the method of
   data storage as soon as it is received. The control sequences for
   self-test and reset cause the SooperSpooler to perform these actions
   immediately, even if there is data stored in the buffer. Printer
   output is suppressed during the polled input routine.

4. All other characters received with space compression disabled are
   stored in the buffer exactly as received.

During the interrupt driven input routine, the BUFFER STATUS display is
updated after every 256 characters.

During the polled input routines for space compression and control
sequences, the buffer status is not checked. Since there is a possibility
of a control sequence being started when the buffer is nearly full, the
buffer full status is set when 100 bytes remain in the buffer. This
allows the complete set of control sequences to be sent to the
SooperSpooler under software control when the buffer is nearly full. As
soon as the control sequences are transferred, the buffer status will be
set to the full state and handshaking set so that no more data can be
transferred until the buffer is ready.

When the buffer full status is set, the SooperSpooler will not accept any
more data until there are at least 1024 bytes available in the buffer
(including the 100 bytes mentioned in the preceding paragraph).

The maximum input data rate (parallel input) is approximately 3000
characters per second. If the output from the computer is fast enough to
exceed this rate, then the processor will be interrupted as soon as
interrupts are enabled and no printer output will occur until the input
rate either slows down or stops. Input data rates slightly less than the
maximum will allow some printer output but the output data rate will be
much slower than normal while input continues.

2.2.2 Parallel Input/Output Port Operation

The SooperSpooler parallel input and output ports are compatible with all
Centronics compatible printers using a 36-pin Amphenol 57-series or
equivalent connector. Printers using other types of connectors may be
compatible if the data and handshaking lines are of the proper polarity
and meet the minimum timing requirements as follows. TTL signal levels
are used in this interface and the data lines are positive logic (logic 1
> 2.0 volts, logic 0 < 0.8 volts).

Parallel input from the computer may be run without handshaking if the
data rate is less than 2500 characters per second (no less than 400
microseconds between characters). However, any data sent after the buffer
is full will be lost. Handshaking to the computer may be accomplished by
use of either the BUSY line (pin 11) or the ACKNLG* line (pin 8) on the
36-pin receptacle. If the BUSY line is used, the computer must sample
this line and not send data when the line is at the logic 1 level. This
line goes high immediately following the leading edge of the STROBE*
signal. If ACKNLG* is used, the computer must wait for the receipt of the
ACKNLG* pulse from the SooperSpooler before sending another character.
The duration of the ACKNLG* pulse is approximately 10 microseconds. This
pulse is sent after the SooperSpooler has accepted the character. When a

character is sent to the SooperSpooler parallel input port, the data lines (pins 2-9) must be stable for a minimum of 1 microsecond before the STROBE* pulse is sent, and must be held for a minimum of 1 microsecond after STROBE* goes to the high state. The minimum duration of the STROBE* pulse is 1 microsecond. (See parallel port timing diagrams - Appendix A).

The following printer status lines are set to the indicated levels on the computer parallel input port:

PIN	Signal	Description	Logic level
12	PE	Printer out of paper	0
13	SLCT	Printer selected	1
32	FAULT*	Printer error	1

The printer output port utilizes the following lines for handshaking and control:

PIN	Signal	Description	Logic level
11	BUSY	Printer busy	0
12	PE	Printer out of paper	0
32	FAULT*	Printer error	1

All lines must be at the logic levels shown in order for the SooperSpooler to output data to the printer. If your printer does not have some of these then those that are not used may be left open circuited if logic 1 is required or shorted to ground if logic 0 is required.

The timing of the data lines and STROBE* lines for the printer parallel output port is shown in Appendix A.

2.2.3 Serial Input/Output Port Operation

There are three handshaking protocols supported by the SooperSpooler, selected by configuration switch S1-1 as follows:

S1-1	Protocol
OFF	Hardware (DTR line - pin 20) or software (DC1/DC3)
ON	Software (ETX/ACK)

The hardware handshaking involving the DTR line is similar in operation to the printer BUSY handshaking used in the parallel interface. The DTR line is set to the positive EIA level (approximately +12 volts) when the SooperSpooler is ready to accept data, and to the negative EIA level (approximately -12 volts) when data cannot be accepted.

The SooperSpooler will not output data to the printer unless pin 20 is at the positive EIA level (must be greater than +3 volts). This applies even if software type handshaking is being used.

The two software handshaking protocols function as follows:

The DC1/DC3 (also known as XON/XOFF or control-Q/control-S) protocol is similar to the hardware handshaking protocol in that the output device (SooperSpooler to computer or printer to SooperSpooler) initiates the handshaking. When the printer is ready to accept data, it sends an ASCII character DC1 (11 hexadecimal, 17 decimal) to the SooperSpooler. When it is not ready, it sends an ASCII DC3 (13 hexadecimal, 19 decimal) to the SooperSpooler. Likewise, the SooperSpooler sends these characters to the computer for the same purpose.

The ETX/ACK protocol differs in that the input device initiates the handshaking. The computer will send a block of data (say 128 characters) to the output device (printer or SooperSpooler), followed by an ASCII ETX (3) (end of text character). The output device will respond with an ASCII ACK (6) (acknowledge character) when it can accept more data.

Using the ETX/ACK protocol, the SooperSpooler will send an ACK character to the computer only if there are at least 1024 bytes available in the buffer. If the number of characters sent in the block by the computer is greater than 1023, then some characters may be lost.

When an ETX character is received by the SooperSpooler, it is stored in the buffer. After the ETX is sent to the printer, the SooperSpooler waits for the printer to return an ACK character. The SooperSpooler does not initiate the ETX protocol by itself, using instead the ETX character provided by the computer. If it is desired to use a parallel output computer to send data to the SooperSpooler, and have the SooperSpooler output to a serial printer using the ETX/ACK protocol, some provision will have to be made in the computer software for supplying the ETX character in the parallel output at least every 1023 bytes.

2.2.4 Simultaneous Inputs from Two Computers

The SooperSpooler may be connected to two input devices and to two output devices. The output device (serial or parallel) may be selected either by the configuration switch or by a software control sequence. The device selected for input will depend entirely upon the timing of the input signals. The parallel input is given the highest priority in order to maximize speed. If the parallel input is driven at a rate exceeding the maximum rate that the SooperSpooler can accept data, then any input to the serial port will be lost, as no handshaking will be provided for the serial port. If the parallel input is driven at a rate slower than the SooperSpooler maximum rate, then any simultaneous input from the serial port will be mixed with input from the parallel port, creating ambiguous data. If it is desired to connect two input devices to the SooperSpooler then any arbitration between the two devices is left to the user.

2.3 Specifications

2.3.1 Main Processor

Processor	Z-80
Clock Frequency	1.8432 MHz
Memory	16K bytes RAM standard, expandable to 62K (356 bytes reserved for system use) 2K ROM firmware control code

2.3.2 External Controls and Indicators

Reset Pushbutton (front panel)	"Soft reset". Resets text buffer to empty. Previously set parameters are not reset.
Reset Pushbutton (rear panel)	* "Hard reset". Resets all parameters to power-up condition.
Page Pushbutton	* Enables automatic pagination. Indicator LED lights when enabled
Space Compression Pushbutton	* Enables space compression function. Indicator LED lights when enabled.
Self Test Pushbuttons	* Pressing both the above pushbuttons enables the self test routine.
Single Sheets	* Enabled by holding the page button in during turn-on or "Hard" reset
Buffer Status Readout	Continuous display of amount of text in buffer (in kilobytes)
Power Switch	Main power line switch

2.3.3 Internal Switches

I/O Baud Rate (6 switches)	110,150,300,600,1200,2400,4800,9600 Baud
Character length	Select 7 or 8 data bits
Number of stop bits	Select 1 or 2 stop bits
Parity Enable	Enable or disable parity bit
Parity check	Select odd or even parity bit
Serial protocol select	DC1/DC3 or ETX/ACK
Printer output	* Select parallel or serial output
Input CR/LF Set	Select whether computer outputs CR only or CR/LF at end of line
Output CR/LF Set	* Select whether printer requires CR only or CR/LF to advance paper
Form Feed type	* Select ASCII FF or multiple line feeds to advance paper to top of form

* = Feature is also software selectable

2.3.4 Software Selectable Functions

Space Compression	# Enable or disable
Pagination	# Enable or disable
Page Length	1 to 127 lines
Printed lines per page	1 to 127 lines
Header Printing	Enable or disable
Header input	Input header up to 70 characters
Page Numbering	Enable or disable
Single Sheet Printing	# Enable or disable
Formatting	Enable or disable
Left Margin	Column 1 to 127
Right Margin	Column 10 to 255
Indentation	Column 1 to 127
Printer output	# Parallel or Serial output
CR/LF Set	# Select whether printer requires CR only or CR/LF to advance paper
Form Feed type	# Select ASCII FF or multiple line feeds to advance paper to top of form
Redefine FF (input)	0 to 31 (default = 12 (ASCII FF))
Redefine FF (output)	0 to 31 (default = 12 (ASCII FF))
Redefine ESC Character	ASCII 0 to 31 (default = 28 (ASCII FS))
Self Test	# Start self test procedure
Reset	# Restore power up default parameters

2.3.5 I/O Ports

PARALLEL PORTS (standard on all units)	
Interface	8-bit data compatible with Centronics
Handshaking & status lines	BUSY, ACKNLG*, PAPER EMPTY, FAULT*
Maximum Data Rate	3000 Characters per second
Connectors	36-pin Centronics Compatible (input = receptacle, output = plug)

SERIAL PORTS (optional addition)	
Interface	RS-232C
Data rates	110,150,300,600,1200,2400,4800,9600 baud (Each port independently switch selectable)
Character length	7 or 8 data bits
Number of stop bits	1 or 2 stop bits
Parity select	Even, odd or no parity
Handshaking	Hardware and/or Software handshaking
Connectors	Input = DB-25S receptacle Output = DB-25P plug

= Feature is also hardware selectable

2.3.6 General Specifications

Power Requirements   105-135 VAC, 60 Hz Standard, 20 Watts Max
                                       Other Inputs available by special order
Size (H x W x D)   3.1 x 10.3 x 8.6 Inches (7.8 x 26.2 x 21.8 cm)
Case   Anodized aluminum
Weight   4 lb, 12 oz (2.2 Kg)
Operating Temperature   50 to 104 deg F   (10 to 40 deg C)
Storage Temperature   32 to 140 deg F   (0 to 60 deg C)

Product data is subject to change without notice

3.   INSTALLATION

3.1 Initial Inspection

This unit was carefully inspected both mechanically and electrically at
the factory before shipment. It should be in perfect operating condition
upon receipt.   If your SooperSpooler appears to have been damaged in
transit, immediately file a claim with the carrier. If the unit does not
function properly, return it to your dealer (or to Compulink if you
purchased factory direct) with a full description of the problems
encounterred. Please read the sections on interface problems and cabling
(3.6 to 3.6.3) before deciding you have a defective unit. Most problems
usually are the result of errors in interconnection and can be resolved by
double checking the cabling.

3.2 Power Requirements

The standard SooperSpooler Model SS-1000 is designed to be operated from a
power source of 105 to 130V, 60 Hz AC. Power dissipation is approximately
15 Watts. A 1/4 Amp slo-blow fuse is located internally. A spare fuse
and an Allen wrench are included should replacement become necessary. The
power cord and plug use a standard three conductor grounding arrangement.
Other input power requirements are available upon special order.

3.3 Grounding Requirements

Your SooperSpooler is equipped with a three prong grounding type plug.
Proper grounding is necessary to insure protection of the user from
hazardous electrical shock, to minimize electromagnetic interference, and
to protect your unit from static discharges. Do not attempt to defeat the
purpose of the ground!

3.4 Environmental Requirements

This unit will operate reliably at temperatures normally found in the home
or office. As it does dissipate around 15 watts of power during normal
operation, some precaution must be taken to insure an adequate air flow
around the unit to prevent overheating. One-half inch of free air space
on all sides is adequate. The operating temperature specification is 50
to 104 deg F (10 to 40 deg C), and the storage temperature specification
is 32 to 140 deg F (0 to 60 deg C).

3.5 Configuring to Your Application

Inside your SooperSpooler are configuration switches that must be set per
your application.   These switches are accessible through a port on the
back of your unit.   One block of 5 switches, S1, contain the primary
configuration switches and another block of 10 switches, S2, contain the
configuration switches for the optional serial board.

Each switch is numbered from left to right with position number one on the
left end.   Pushing the switch away from you, toward the front of the unit,
sets the switch in the "ON" position, pulling the switch toward the back
of the unit sets the switch in the "OFF" position.   The switches are
sometimes stiff so be sure to use enough force to move the switch fully to
the desired position.   Any instrument with a small hook on one end is
suitable for moving the switches; a bent paper clip works well.   Be sure
the power is turned off before attempting to change any of the switches.

Only the baud rate switches on the serial option board are checked
continuously during operation;   the SooperSpooler will sense any other
switch changes only upon power up or "hard" reset.

3.5.1 Primary Configuration Switches

The primary configuration switches (S1) perform the functions as follows.
Set each switch to the position which corresponds to your application.

Position #1   Serial Handshaking Select

                OFF = XON/XOFF and hardware handshaking
                ON = ETX/ACK handshaking

                Used only if you have the serial option installed.   IF YOU
                DO NOT HAVE THE SERIAL OPTION, THE POSITION OF THIS SWITCH
                IS UNIMPORTANT.   If you do have the serial board installed,
                set the switch to the handshaking you require.   If you
                can't determine which handshaking to select, set the switch
                in the "OFF" position for now.   If your SooperSpooler does
                not accept or output data properly when you first try it
                out, move the switch in the other position and try it
                again.

Position #2   Output Port Select

                OFF = Output is directed to the serial port
                ON = Output is directed to the parallel port

                Selects which port outputs the data from the SooperSpooler
                to the printer.   If you do not have the serial option, the
                switch should be in the "ON" position.

Position #3   Form Feed Type

               OFF = Output multiple line feeds to advance paper
               ON = Output form feed character to advance paper

               Some printers will not advance the paper automatically upon
               receipt of a form feed character and require multiple line
               feeds to achieve the top of form function.   If your
               printer will act upon a form feed character, set this
               switch to "ON", otherwise set it "OFF" to achieve proper
               pagination.   If you don't know which form feed type you
               require, set this switch to "ON" for now.   If you find
               during operation that this eliminates the form feed
               function, move the switch to "OFF" and try it again.

               If you wish to set a form length other than the default of
               66 lines (see page formatting, Section 4.2.3.4), this
               switch must be set to "OFF" to allow your SooperSpooler to
               calculate and output the correct number of single line
               feeds required to reach the top of the non-standard form.

Position #4   Computer Line Feed Select

               OFF = Computer outputs carriage return and line feed at end
                     of line
               ON = Computer outputs carriage return only at end of line

               Some computers only output a carriage return at the end of
               a line and expect the printer to add the line feed while
               other computers output both a carriage return and a line
               feed.   Set the switch to the configuration that matches
               your computer.   If you don't know whether your computer
               outputs a line feed or not, set this switch to "OFF" for
               now.   If this inhibits line spacing during operation, reset
               this switch to "ON".

Position #5   Printer Line Feed Select

               OFF = Printer requires carriage return and line feed to
                     advance paper
               ON = Printer requires carriage return only to advance paper

               Some printers will automatically add a line feed to every
               carriage return, others will perform a line feed only when
               a line feed character is received. Set this switch to the
               configuration that matches your printer.   If you can't
               determine which way your printer handles line feeds, set
               this switch to "OFF" for now and reset it to "ON" if this
               inhibits line spacing during operation.

               If your printer operates normally when connected directly
               to your computer, then positions 4 and 5 of S1 should be
               set to the same position.

3.5.2 Serial Option Configuration Switches

The serial option configuration switches (S2) set the data rates and data
format to match that of your computer and printer. IF YOU DO NOT HAVE THE
SERIAL OPTION INSTALLED, YOU MAY SKIP THIS SECTION. Set each switch to
the position that matches your configuration.

Positions 1, 2, 3, 4, 5, 6   Input and Output Baud Rate

> Switch positions 1, 2, and 3 are for setting the output
> baud rate and positions 4, 5, and 6 are for the input baud
> rate. Set each switch to give the baud rate as determined
> by the chart below. These switches must be set properly to
> assure proper operation.

Baud Rate Select Chart

Position (output)	1	2	3	
Position (input)	4	5	6	Baud Rate
	OFF	OFF	OFF	110
	ON	OFF	OFF	150
	OFF	ON	OFF	300
	ON	ON	OFF	600
	OFF	OFF	ON	1200
	ON	OFF	ON	2400✕
	OFF	ON	ON	4800
	ON	ON	ON	9600

Position #7   Character Length

> OFF = 8 data bits
> ✕ON = 7 data bits

> This switch sets the number of data bits in each character
> for both input and output. For most applications this will
> be 8 data bits (Switch set "OFF").

Position #8   Number of Stop Bits

> ⌐OFF = 1 stop bit
> ON = 2 stop bits

> Set this switch for the number of stop bits you require,
> both input and output. For most applications this will be
> 1 stop bit (Switch set "OFF").

Position #9   Parity Bit Enable/Disable

                OFF = Parity bit disabled
                ON = Parity bit enabled

                Set this switch to "ON" if a parity bit is required. As
                most applications do not require a parity bit, this switch
                will normally be set to the "OFF" position. The
                SooperSpooler will output a parity bit if enabled, but does
                no parity checking on the input.

Position #10   Parity Type

                OFF = Even parity
                ON = Odd parity

                Set this switch to the parity type you require. If the
                parity bit is disabled (the most likely condition), then it
                does not matter how this switch is set.

CCS - 9600 BAUD
Spooler - IN = 9600 BAUD
           OUT - 1200 BAUD
Diablo 1200 BAUD   1900

    1   2   3
  off ON ON

    4   5   6
  off ON ON

3.6 Interfacing to Your Computer and Printer

When making any connections, be sure that your computer, printer, and
SooperSpooler are turned off. If your cables are supplied by your dealer
or by Compulink, you simply plug them into the appropriate matching
connectors on the back of the unit. If you are providing your own cables,
double check your work to make sure all signals are connected to the
correct connector pins. Connector pinout diagrams and signal descriptions
are provided in appendix A of this manual.

The connectors are arranged in male-female pairs so that you may bypass
the SooperSpooler by simply plugging your computer and printer cables
together. In fact, before you plug your cables into your SooperSpooler,
it is recommended that you test them by plugging them together and
checking for proper printer operation. (This only works if you are
operating in a parallel-parallel or a serial-serial configuration.)

When installing the connectors, make sure they are mated securely and
completely. Improperly seated connectors are a common source of errors.

3.6.1 The Interface Problem

A severe lack of standardization in the printer industry has made it
almost impossible to provide cables and/or connectors that would handle
interconnections for any reasonable number of specific applications. If
your equipment uses the standard 36 pin Centronics type parallel
interface, you should have no difficulties as this interface has become
sort of a standard in the microcomputer industry and it is the one used in
the SooperSpooler. However, there are myriads of other interfaces, both
parallel and serial, that may be completely different from any standard.
If you experience problems in getting your SooperSpooler to operate
properly, it most likely is a problem with the interface cables.

3.6.2 Parallel Port Cables

The parallel ports use the standard 36 pin Centronics type connectors and
pinout. If your printer uses this interface, you only need to unplug the
cable from your printer, insert it into the connector labeled "COMPUTER"
on the back of the SooperSpooler, and add a cable between the connector
labeled "PRINTER" and your printer. A standard cable is available from
Compulink for this purpose.

If your printer uses some other type of connector and/or pinout, you must
use cables made specifically for your application. Your dealer is the
best source for these cables. However, if you desire to build your own
cables, Compulink will provide mating parallel connectors for the
SooperSpooler at a nominal charge.

3.6.3 Serial Port Cables

The optional serial ports use standard DB-25 connectors and the pinout
conforms to the EIA RS-232 standard. You probably only have a 50-50
chance that your printer pinout matches that of the SooperSpooler so it is
very important to be sure that all data and handshaking signals are
properly connected. Again, your dealer is the best source for cables
particular to your application.

3.7 Initial Operation

With the configuration switches set and the cables installed, you are now
ready to check the operation of your SooperSpooler. Plug it in and turn
it on along with your computer and your printer. It is usually a good
idea to press the "hard" reset button on the back of the unit to clear any
unwanted characters that may have been erroneously generated by computer
turn-on. The Buffer Status Readout will display "00" indicating that the
buffer is empty.

Press and release the Space Compression button. The Space Compression LED
should now be lit. Press and release the Page button and the Page LED
should light. Press each again to turn them off.

Press both the Space Compression and the Page buttons simultaneously.
This will initiate the Self Test procedure. Refer to Section 4.1.7 for a
description of this function. If you get no printout or an incorrect
printout (extra or non-existent linefeeds), double check your cabling
and/or your configuration switch settings.

Send several lines of text from your computer to your printer in the same
fashion you would without the SooperSpooler. The printer should
immediately begin printing and control of your computer should return to
you before the first line is half printed (unless you have a very fast
printer). Note that the Buffer Status Readout changed from "00" to "01"
indicating the presence of 0 to 1K bytes of text in the buffer. When the
printer has completed it's job, the buffer will return to "00". Again, if
your printout has extra or missing line feeds, you may need to modify your
configuration switch settings.

After the successful completion of these initial tests, your SooperSpooler
is now ready to take control of your printer, freeing your computer to
perform activities more profitable or enjoyable to you.

4.   OPERATIONAL FEATURES

4.1 External Controls and Indicators

Following is a description of each of the external controls and
indicators. Note that some of the functions are also software enabled.
Becoming familiar with these features will help you make full use of the
SooperSpooler's capabilities.

4.1.1 Power Switch

The power switch is located on the far left side of the front panel. This
switch controls the main 115VAC power into the SooperSpooler. Turning
on this switch also initiates the "hard" reset sequence of events as
described in Section 4.1.8.

4.1.2 Buffer Status Readout

The Buffer Status Readout displays a continuously updated number that
represents the amount of internal memory being currently used. This
number actually is the 1 kilobyte block that is currently being filled or
emptied. Therefore, when the buffer is empty, the display will read "00",
when the buffer contains 1 byte to 1 kilobyte of data, the display will
read "01". The display will continue to add 1 to the count for every
additional 1 kilobyte in memory.

When the buffer is full, the display will read "16" for the 16K base model
and will read "62" if you have the memory option installed. If data is
still being received with the buffer full, the display will fluctuate
between the memory size and one less than the memory size as the
SooperSpooler will alternately receive and send data in one kilobyte
blocks until no more data is being received.

4.1.3 "Soft" Reset Pushbutton

The "Soft" Reset button is located on the front panel just to the right of
the Buffer Status Readout. Pressing and releasing this button only resets
the buffer condition to empty, as indicated by the Buffer Status Readout
displaying "00". Whatever data that may have been in the buffer is
deleted; no other software or hardware controllable parameters are
changed. This is handy for terminating an unwanted printout without
affecting formatting parameters previously set up.

4.1.4 Space Compression Pushbutton

The Space Compression pushbutton enables the space compression function in
the SooperSpooler. This function is selected by pressing and releasing
the button and is indicated as active by the Space Compression LED
directly above the button. When enabled, any group of spaces numbering
between 1 and 127 is compressed into a single byte. This allows much more
efficient use of memory with data that contains a significant amount of
spaces, such as columnar documents. The operation of this function is
completely transparent to the user except that much less memory is used
when storing data with a large quantity of spaces. This function is
turned off by again pressing and releasing the Space Compression
pushbutton.

The SooperSpooler internally sets bit 7 high in order to recognize the
space compression character, therefore if you desire to spool data that
uses any codes above 127, space compression must not be enabled. An
example of this would be the graphics characters used by some printer
manufacturers that use codes above 127.

The Space Compression button is only operative when the buffer is empty as
indicated by a "00" reading on the Buffer Status Readout.

This function is also software selectable.   See Section 4.2.2 for
information on how to enable by software.

4.1.5 Page Pushbutton

Pressing and releasing the Page pushbutton enables automatic document
pagination. The selection of this function is indicated by the lighting
of the Page LED located above the Page pushbutton. When enabled, this
function formats your data into pages using a physical page length and a
printed lines per page determined by values stored in the SooperSpooler.
These values are preset upon turn-on or "hard" reset to defaults of a page
length of 66 lines and a printed lines per page of 62. Therefore, when
pagination is enabled using the default values, the SooperSpooler will
print 62 lines just as they were received from your computer, but will
advance to the top of the next form before printing the next line. This
eliminates printing on the perforations of fan fold paper.

The Page button is only operative when the buffer is empty, as indicated
by a "00" reading on the Buffer Status Readout. The function may be
turned off by again pressing and releasing the Page pushbutton.

This function may also be software enabled, and the page length and lines
per page parameters may be changed by software. See Section 4.2.3 for
further information on software control of pagination.

4.1.6 Single Sheets

The Single Sheets function is enabled by holding in the Page pushbutton
while turning on the SooperSpooler or while pressing the "hard" reset
button on the back of the unit. To indicate that the Single Sheets mode
has been activated, The Page LED will flash until the Page button is
pressed again.   If pagination is also desired, pressing the Page button
again will enable this function exactly the same as if Single Sheets were
not enabled. This double pressing of the button must be done before any
text is sent to the SooperSpooler.

While in the Single Sheets mode, the SooperSpooler will stop your printer
and wait at the end of each page until the page button is pressed again.
The page LED will flash when the unit is in this waiting state.   This
allows you to print your document on single sheets of plain paper or
letterheads.

If the Single Sheets function is enabled without enabling pagination, this
assumes that the host computer will be providing form feed characters to
advance to the top of the next form.   If your computer outputs multiple
line feeds for the top of form function, the SooperSpooler has no way to
sense that a form feed is desired and the Single Sheets function will not
work.

The Single Sheets function is also software selectable.   See Sections
4.2.3 and 4.2.3.3 for information on how to enable by software.

4.1.7 Self Test

The Self Test function is a software check of the read only memory (ROM)
and the random access memory (RAM). Successful completion of this test is
a good indication that most functions of the SooperSpooler are operating
correctly.

This function is initiated by pressing both the Space Compression and the
Page pushbuttons simultaneously.   Your printer should immediately print
out the following:

                    SOOPERSPOOLER SELF TEST
                    ROM VERSION (current ROM version number)
                    ROM TEST: PASSED
                    RAM TEST: IN PROGRESS

The ROM test calculates a checksum of the total ROM and compares it to a
value stored in the ROM. If the two values do not match, the ROM test
will indicate "FAILED" (an unlikely occurence). During the RAM test, the
Buffer Status Readout will proceed from "11" to "88" indicating which pass
of the 8 memory test passes is being performed. The Space Compression and
Page LED's will alternately flash indicating respectively the write and
read portions of the test.

When the RAM test is successfully completed, the following will be printed:

                    RAM TEST: PASSED
                    SELF TEST COMPLETED

If the test determines that any of the RAM is defective, the numbers of the possibly defective integrated circuits are printed.

This function may also be software initiated. See Section 4.2.8 for information on how to enable by software.

4.1.8 "Hard" Reset Pushbutton

The Hard Reset pushbutton is located in the lower right hand corner of the back of the SooperSpooler. Pressing this button restores all parameters to power-up conditions: the Buffer Status is set to "00", space compression and pagination are disabled, and all formatting parameters are cleared and/or reset to the default parameters. All configuration switch settings are "read" and stored. This procedure is functionally identical to that performed upon turn-on.

This function may also be software initiated. See Section 4.2.1 for information on how to enable by software.

4.2 Software Controllable Features

Your SooperSpooler contains as standard many functions that are software
enabled or modifiable. Some of the software controllable features are
also hardware enabled and are so indicated as applicable.

Each software control sequence consists of a leadin character (default=28)
followed by one or more control characters determined by the particular
function being enabled or changed. The leadin character may be software
changed to any value between 0 an 31 if a conflict exists with the default
value of 28 (see Section 4.2.7). The word "leadin" in this manual refers
to the value assigned to this character.

The control sequence may be generated by whatever means you desire as long
as you remember that the leadin character is the only way your
SooperSpooler can recognize an control sequence and must precede each
sequence. In BASIC an control sequence leadin character might look like
this:

                          LPRINT CHR$(28);

This would be followed by whatever characters or codes that the desired
sequence requires. Note that each control sequence is ended with a
semicolon; this supresses the linefeed following the sequence. For the
ease of writing this manual, all references to the leadin character assume
that it is the default value - if you use another value for the leadin
character, substitute your value for the value of 28 as shown. If your
computer uses some statement other than "LPRINT" to send text to the line
printer, please substitute that statement as necessary. All parameters
that must be selected by the user are shown enclosed in brackets:
[parameter].

Some computers will not output certain values using the CHR$ function. For
example, one well known personal computer will not output the following
values: 0, 10, 11, 12, 13. If your equipment has this problem, add 128 to
any of the values used for page length, lines per page, left margin, or
overflow indentation. The SooperSpooler will subtract 128 from any values
received over 127 on these functions.

A short BASIC program listing is included at the end of this chapter that
will help in setting up and understanding the various software
controllable functions available.

Appendix C contains a quick reference sheet of the software control
sequences.

4.2.1 "Hard" Reset

    Format: LeadIn Z
    BASIC: LPRINT CHR$(28);"Z";

The "Hard" Reset control sequence restores your SooperSpooler to power-up
condition identical to pressing the "hard" reset button on the back of the
unit (see Section 4.1.8). As the first character of any data received
during the reset initialization period will be lost, it is recommended
that you delay sending any data to the SooperSpooler for at least one
millisecond after initiating "hard" reset.

4.2.2 Space Compression

    Format: LeadIn S[X]
    BASIC: LPRINT CHR$(28);"S[X]"
    Variables: X - "0"=Disable, "1"= Enable (default="0")

    Example: LPRINT CHR$(28);"S1"
                        Enables Space Compression and lights front panel LED

The Space Compression control sequence functions exactly as the Space
Compression pushbutton (see Section 4.1.4). Enabling or disabling this
function will light or extinguish the Space Compression LED just as if the
pushbutton were pressed. This control sequence may be buried in the data
being sent to the SooperSpooler and it will turn space compression on and
off as desired enabling the user to space compress some portions of a
document and not others.

4.2.3 Pagination

    Format: LeadIn P[X1][X2][X3][X4]
    BASIC: LPRINT CHR$(28);"P[X1][X2][X3][X4]";
    Variables: X1 - Pagination
                            "0"=Disable, "1"=Enable (default="0")
                        X2 - Header (see Section 4.2.3.1)
                            "0"=Disable, "1"=Enable (default="0")
                        X3 - Page Numbering (see Section 4.2.3.2)
                            "0"=Disable, "1"=Enable (default="0")
                        X4 - Single Sheets (see Section 4.2.3.3)
                            "0"=Disable, "1"=Enable (default="0")

    Example: LPRINT CHR$(28);"P1110";
                        Enables Pagination, allows printing of a header,
                        performs page numbering, does not stop after each
                        page. Lights Page LED.

The Pagination control sequence functions exactly as the Page pushbutton
(see Section 4.1.5). In addition to enabling pagination, this function
also checks to see if the Header or Page Numbering functions are enabled.

If either of these functions are enabled, enabling or disabling Pagination will also enable or disable these functions. This is true whether Pagination is enabled via the control sequence or the Page button. Single Sheets may be enabled independent of the pagination function.

This control sequence may be buried in the data being sent to the SooperSpooler and will turn pagination on and off as desired. Each time pagination is enabled or disabled the line and page counts are reset to 0. This allows the user to reset page and line counts on each of multiple documents that might be stored in the buffer.

The following four subsections describe the Header, Page Numbering, Single Sheets and Page Formatting Parameter functions in greater detail.

4.2.3.1 Headers

If both Pagination and the Header are enabled per section 4.2.3, a header of your choice will be printed at the top of each page. This header may be up to 70 characters long and should be composed of printable characters. Any characters beyond 70 are disregarded.

Inputting the header requires a special control sequence as follows:

```
Format:       LeadIn H [Header] ETX
BASIC:        LPRINT CHR$(28);"H[Header]";CHR$(3);
Variables:    Header - any string of up to 70 printable characters

Example:      LPRINT CHR$(28);"HSample Printout";CHR$(3);
              Stores in SooperSpooler's memory the header "Sample
              Printout" to be printed at the top of each page if
              enabled.
```

A header will be stored unchanged in memory until another header is input, a "hard" reset button is initiated, or the SooperSpooler is turned off.

4.2.3.2 Page Numbering

If Pagination, the Header, and Page Numbering are enabled per section 4.2.3, a page number will be printed at the top right corner of each page in the form:

<div align="center">Page XXX</div>

This number is incremented each time the paper is advanced to the top of the next form and is reset to 1 each time pagination is enabled or disabled. If only the page number is desired without a header, input a null header (this is the default condition).

In order for this function to be used, your computer must use the form feed character in order for the SooperSpooler to recognize that a top of form is desired.

4.2.3.3 Single Sheets

The Single Sheets function may be enabled by software per Section 4.2.3 or
by hardware per Section 4.1.6 and performs exactly the same in either
case. Please see Section 4.1.6 for information on the operation of the
Single Sheets function. Single Sheets may be enabled independent of any
other function.

4.2.3.4 Page Formatting

     Format: Leadin R[N1][N2][N3]
     BASIC: LPRINT CHR$(28);"R";CHR$([N1]);CHR$([N2]);CHR$([N3]);
     Variables: N1 - Physical Page Length (lines)
                     Select 1 to 127 (default=66)
               N2 - Printed Lines Per Page
                     Select 1 to 127 (default=62)
               N3 - Right Margin (Vertical column number)
                    ·Select 10 to 255 (default=80)

     Example: LPRINT CHR$(28);"R";CHR$(66);CHR$(50);CHR$(72);
                     Sets the page length at 66 lines, the printed lines
                     per page at 50, and the right margin at 72.

When pagination is enabled, the SooperSpooler will format your data into
pages using values for page length, printed lines per page, and right
margin that are stored in memory. These values may be independently
software changed within the limits shown. Initiating the "hard" reset
sequence or turning the unit off and on again will reset all values to the
default values shown. Disabling or enabling Pagination will not change
values previously stored in memory.

Note that the physical page length may be changed only if the multiple
line feed type of form feed is selected (switch S1, position 3 is "OFF").
Please see Section 3.5.1 for further information.

The printed lines per page quantity includes two spaces for the header
and/or page numbering, if enabled.

4.2.4 Line Formatting

Format: Leadin F[X][N1][N2][N3]
BASIC: LPRINT CHR$(28);"FX";CHR$([N1]);CHR$([N2]);CHR$([N3]);
Variables: X – "0"=Disable, "1"=Enable (default="0")
                     N1 – Left Margin (Vertical column number)
                          Select 1 to 127 (default=0)
                     N2 – Overflow Indentation (Vertical column number)
                          Select 1 to 127 (default=5)
                     N3 – Right Margin (vertical column number)
                          Select 10 to 255 (default=80)

Example: LPRINT CHR$(28);"F1";CHR$(10);CHR$(15);CHR$(70);
                     Enables line formatting, sets the left margin at
                     10, the right margin at 70, and the overflow
                     indentation at 15.

When the Line Formatting function is enabled, the left margin, the right
margin, and the overflow indentation may each be independently set via
software. Overflow indentation allows the user to specify the left margin
for the portion of a line that spills over to the next line because the
total line is longer then the specified printable line length.   This
function is particularly useful in making BASIC program listings easily
readable.

Pressing the "hard" reset button or turning the unit off and on again will
reset all values to the default values shown.   Disabling or enabling
Pagination will not change values previously stored in memory.

4.2.5 Change Configuration Switch Selected Items

Format: Leadin C[X1][X2][X3]
BASIC: LPRINT CHR$(28);"C[X1][X2][X3]";
Variables: X1 – Output port
                          "0"=Parallel port, "1"=Serial port
                     X2 – Printer line end requirement
                          "0"=CR only, "1"=CR/LF
                     X3 – Printer form feed requirement
                          "0"=ASCII FF, "1"=Multiple line feeds

Example: LPRINT CHR$(28);"C110";
                     Selects the serial output port, sends a carriage
                     return/line feed at the end of each line, and uses
                     the ASCII form feed character for the top of form
                     function.

Three of the items selected by the configuration switches may be changed
by software.   This allows the user to control more than one printer with
the SooperSpooler by switching the output between the parallel output port
and the serial output port (this assumes the serial option is installed).
Pressing the "hard" reset button or turning the unit off and on again will
reset all values to the values determined by the configuration switches.
See Section 3.5 for further information on the configuration switch
functions.

4.2.6   Redefine FF Character

        Format: Leadin D[N1][N2]
        BASIC: LPRINT CHR$(28);"D";CHR$([N1]);CHR$([N2]);
        Variables: N1 - Input form feed character
                                 Select 0 to 31 (default=12)
                             N2 - Output form feed character
                                 Select 0 to 31 (default=12)

        Example: LPRINT CHR$(28);"D";CHR$(7);CHR$(8);
                             Sets the input form feed character to decimal 7
                             and the output form feed character to decimal 8

Some printers and computers use a form feed character other than the
standard ASCII FF (12 decimal).   Others may use code 12 for some other
function.   This function allows the user to re-specify the form feed
character in order to circumvent this conflict. Pressing the "hard" reset
button or turning the unit off and on again will reset these values to the
default values shown.

4.2.7   Redefine Leadin Character

        Format: Leadin [N]
        BASIC: LPRINT CHR$(28);CHR$(N);
        Variable: N - New leadin character
                                 Select 0 to 31 decimal (default=28)

        Example: LPRINT CHR$(28);CHR$(2);
                             Changes the leadin character from 28 decimal to
                             2 decimal

This function allows the leadin character to be changed from decimal 28 to
any value between 0 and 31. This eliminates conflicts caused by a system
that uses 28 for another function.   Pressing the "hard" reset button or
turning the unit off and on again will reset this value to 28.

4.2.8   Self Test Routine

        Format: Leadin T
        BASIC: LPRINT CHR$(28);"T"

This control sequence initiates the Self Test Routine.   For full
information on the Self Test Routine, see Section 4.1.7.

4.3 Setup Program Listing

Following is a program listing written in Microsoft BASIC that will
greatly aid in setting the software controllable features of your
SooperSpooler.

```
10 CLS: CLEAR 200              :REM CLEAR SCREEN; 200 BYTES OF STRING SPACE
20 INPUT "DO YOU WANT TO CHANGE THE LEADIN CHARACTER"; A$
30 IF LEFT$(A$,1)="N" THEN LI$ = CHR$(28): GOTO 70
40 INPUT "ENTER ORDINAL VALUE OF NEW LEADIN CHARACTER (0 TO 31)"; LI
50 IF LI<0 OR LI>31 THEN GOTO 40 ELSE LI$ = CHR$(LI)
60 LPRINT CHR$(28); LI$       :REM CHANGE TO NEW LEADIN CHARACTER
70 FI$ = CHR$(12)             :REM FORM FEED (INPUT) CHARACTER
80 FF$ = CHR$(12)             :REM FORM FEED (OUTPUT) CHARACTER
90 SC$ = "0"                  :REM SPACE COMPRESSION OFF
100 PG$ = "0"                 :REM PAGINATION OFF
110 PH$ = "0"                 :REM PRINT HEADER OFF
120 PN$ = "0"                 :REM PAGE NUMBERING OFF
130 PS$ = "0"                 :REM SINGLE SHEETS FUNCTION OFF
140 PL$ = CHR$(66)            :REM PAGE LENGTH = 66 LINES
150 LP$ = CHR$(62)            :REM PRINT 62 LINES PER PAGE
160 CL$ = CHR$(80)            :REM 80 CHARACTERS PER LINE
170 H$ = ""                   :REM NULL HEADER
180 F$ = "0"                  :REM FORMATTING OFF
190 LM$ = CHR$(0)             :REM LEFT MARGIN = 0
200 OI$ = CHR$(5)             :REM OVERFLOW INDENTATION = 5
210 OP$ = "0"                 :REM OUTPUT TO PARALLEL PORT
220 PA$ = "0"                 :REM PRINTER REQUIRES CARRIAGE RETURN ONLY
230 PF$ = "0"                 :REM OUTPUT FORM FEED TO ADVANCE TO TOP OF FORM
240 CLS                       :REM CLEAR SCREEN
250 PRINT "C - CHANGE DIP SWITCH SELECTABLE ITEMS"
260 PRINT "D - DEFINE FORM FEED CHARACTERS"
270 PRINT "F - FORMATTING PARAMETERS"
280 PRINT "P - PAGINATION"
290 PRINT "S - SPACE COMPRESSION: ";: T$=SC$: GOSUB 1070
300 PRINT "T - START SELF TEST AND END PROGRAM"
310 PRINT "Z - RESET TO POWER UP PARAMETERS": PRINT
320 PRINT "O - OUTPUT PARAMETERS TO SOOPERSPOOLER"
330 PRINT "X - END PROGRAM"
340 GOSUB 1120
350 IF A$="C" THEN GOTO 530
360 IF A$="D" THEN GOTO 680
370 IF A$="F" THEN GOTO 760
380 IF A$="P" THEN GOTO 880
390 IF A$="S" THEN T$=SC$: GOSUB 1090: SC$=T$: GOTO 240
400 IF A$="T" THEN LPRINT LI$;"T": END
410 IF A$="Z" THEN LPRINT LI$;"Z": GOTO 10
420 IF A$="X" THEN END
430 IF A$<>"O" THEN GOTO 240
```

```
440 REM OUTPUT ALL PARAMETERS TO SOOPERSPOOLER
450 LPRINT LI$; "D"; CHR$(ASC(FI$)+128); CHR$(ASC(FF$)+128);
460 LPRINT LI$; "S"; SC$;
470 LPRINT LI$; "P"; PG$; PH$; PN$; PS$;
480 LPRINT LI$; "R"; CHR$(ASC(PL$)+128); CHR$(ASC(LP$)+128); CL$;
490 LPRINT LI$; "H"; H$; CHR$(3);
500 LPRINT LI$; "F"; F$; CHR$(ASC(LM$)+128); CHR$(ASC(OI$)+128); CL$;
510 LPRINT LI$; "C"; OP$; PA$; PF$
520 GOTO 240
530 CLS: PRINT"CHANGE DIP SWITCH SELECTABLE ITEMS": PRINT
540 PRINT "1 - OUTPUT TO: ";
550 IF OP$="0" THEN PRINT "PARALLEL"; ELSE PRINT "SERIAL";
560 PRINT " PORT"
570 PRINT "2 - PRINTER REQUIRES: ";
580 IF PA$="0" THEN PRINT "CARRIAGE RETURN ONLY"
        ELSE PRINT "CARRIAGE RETURN + LINE FEED"
590 PRINT "3 - OUTPUT: ";
600 IF PF$="0" THEN PRINT "FORM FEED"; ELSE PRINT "MULTIPLE LINE FEEDS";
610 PRINT " TO ADVANCE PAPER"
620 GOSUB 1110
630 IF A$="0" THEN GOTO 240
640 IF A$="1" THEN T$=OP$: GOSUB 1090: OP$=T$: GOTO 530
650 IF A$="2" THEN T$=PA$: GOSUB 1090: PA$=T$: GOTO 530
660 IF A$="3" THEN T$=PF$: GOSUB 1090: PF$=T$
670 GOTO 530
680 CLS: PRINT "DEFINE FORM FEED INPUT AND OUTPUT CHARACTERS": PRINT
690 PRINT "1 - FF (INPUT) (0 TO 31, DEFAULT = 3):"; ASC(FI$)
700 PRINT "2 - FF (OUTPUT) (0 TO 31, DEFAULT = 12):"; ASC(FF$)
710 GOSUB 1110
720 IF A$="0" THEN GOTO 240
730 IF A$="1" THEN INPUT "ENTER VALUE FOR FF (INPUT) (0 TO 31)"; FI
          : FI$=CHR$(FI)
740 IF A$="2" THEN INPUT "ENTER VALUE FOR FF (OUTPUT) (0 TO 31)"; FF
          : FF$=CHR$(FF)
750 GOTO 680
760 CLS: PRINT "FORMATTING PARAMETERS": PRINT
770 PRINT "1 - FORMATTING: ";: T$=F$: GOSUB 1070
780 PRINT "2 - LEFT MARGIN (0 TO 127, DEFAULT = 0): "; ASC(LM$)
790 PRINT "3 - OVERFLOW INDENTATION (0 TO 127, DEFAULT = 5): "; ASC(OI$)
800 PRINT "4 - RIGHT MARGIN (10 TO 255, DEFAULT = 80): "; ASC(CL$)
810 GOSUB 1110
820 IF A$="0" THEN GOTO 240
830 IF A$="1" THEN T$=F$ : GOSUB 1090: F$=T$
840 IF A$="2" THEN INPUT "ENTER LEFT MARGIN (0 TO 127)"; LM: LM$=CHR$(LM)
850 IF A$="3" THEN INPUT "ENTER OVERFLOW INDENTATION (0 TO 127)";OI
          : OI$=CHR$(OI)
860 IF A$="4" THEN INPUT "ENTER RIGHT MARGIN (10 TO 255)";CL: CL$=CHR$(CL)
870 GOTO 760
880 CLS: PRINT "1 - PAGINATION: ";: T$=PG$: GOSUB 1070
890 PRINT "2 - HEADER: ";: T$=PH$: GOSUB 1070
```

```
900 PRINT "3 - PAGE NUMBERING: ";: T$=PN$: GOSUB 1070
910 PRINT "4 - SINGLE SHEETS: ";: T$=PS$: GOSUB 1070
920 PRINT "5 - PAGE LENGTH (1 TO 127, DEFAULT = 66): "; ASC(PL$)
930 PRINT "6 - LINES PER PAGE (1 TO 127, DEFAULT = 62): "; ASC(LP$)
940 PRINT "7 - CHARACTERS PER LINE (10 TO 255, DEFAULT = 80): ";ASC(CL$)
950 PRINT "8 - ENTER NEW HEADER"
960 GOSUB 1110
970 IF A$="0" THEN GOTO 240
980 IF A$="1" THEN T$=PG$: GOSUB 1090: PG$=T$
990 IF A$="2" THEN T$=PH$: GOSUB 1090: PH$=T$
1000 IF A$="3" THEN T$=PN$: GOSUB 1090: PN$=T$
1010 IF A$="4" THEN T$=PS$: GOSUB 1090: PS$=T$
1020 IF A$="5" THEN INPUT "PAGE LENGTH, 1 TO 127 LINES";PL: PL$=CHR$(PL)
1030 IF A$="6" THEN INPUT "1 TO 127 LINES PER PAGE"; LP: LP$=CHR$(LP)
1040 IF A$="7" THEN INPUT "10 TO 255 CHARACTERS PER LINE"; CL: CL$=CHR$(CL)
1050 IF A$="8" THEN PRINT H$: INPUT "ENTER NEW HEADER "; H$
1060 GOTO 880
1070 IF T$="0" THEN PRINT "DISABLED" ELSE PRINT "ENABLED"
1080 RETURN
1090 IF T$="0" THEN T$="1" ELSE T$="0"
1100 RETURN
1110 PRINT: PRINT "0 - RETURN TO MAIN MENU"
1120 PRINT: INPUT "ENTER DESIRED CODE"; A$
1130 RETURN
```

PARALLEL INPUT CONNECTOR PINOUT

SIGNAL PIN	RETURN PIN	SIGNAL NAME	SIGNAL SOURCE	SIGNAL FUNCTION
1	19	STROBE*	Input Device	Data strobe pulse
2	20	DATA 1	"	Data bit 0
3	21	DATA 2	"	Data bit 1
4	22	DATA 3	"	Data bit 2
5	23	DATA 4	"	Data bit 3
6	24	DATA 5	"	Data bit 4
7	25	DATA 6	"	Data bit 5
8	26	DATA 7	"	Data bit 6
9	27	DATA 8	"	Data bit 7
10	28	ACKNLG*	SooperSpooler	Acknowledge of data received
11	29	BUSY	"	Low when spooler ready for data
12		PAPER EMPTY	"	None - Held low by SooperSpooler
13		SELECT	"	None - Held high by SooperSpooler
14		GND	"	Signal ground
16		GND	"	Signal ground
17		CHASSIS	"	Chassis ground
30		GND	"	Signal ground
32		FAULT*	"	None - Held high by SooperSpooler

PARALLEL OUTPUT CONNECTOR PINOUT

SIGNAL PIN	RETURN PIN	SIGNAL NAME	SIGNAL SOURCE	SIGNAL FUNCTION
1	19	STROBE*	SooperSpooler	Data Strobe pulse
2	20	DATA 1	"	Data bit 0
3	21	DATA 2	"	Data bit 1
4	22	DATA 3	"	Data bit 2
5	23	DATA 4	"	Data bit 3
6	24	DATA 5	"	Data bit 4
7	25	DATA 6	"	Data bit 5
8	26	DATA 7	"	Data bit 6
9	27	DATA 8	"	Data bit 7
11	29	BUSY	Output Device	Low when printer ready for data
12		PAPER EMPTY	"	High when printer is out of paper
14		GND	SooperSpooler	Signal ground
16		GND	"	Signal ground
17		CHASSIS	"	Chassis ground
30		GND	"	Signal ground
32		FAULT*	Output Device	Low indicates printer fault

NOTE: Any pins not specifically listed are not connected in the SooperSpooler.
See the back side of this page for a list of mating connectors.

The following is a list of some connectors that mate with the parallel input and
output connectors on the SooperSpooler printer interface.

Parallel Input from Computer

Connector description: 36-position ribbon-type plug, ball lock

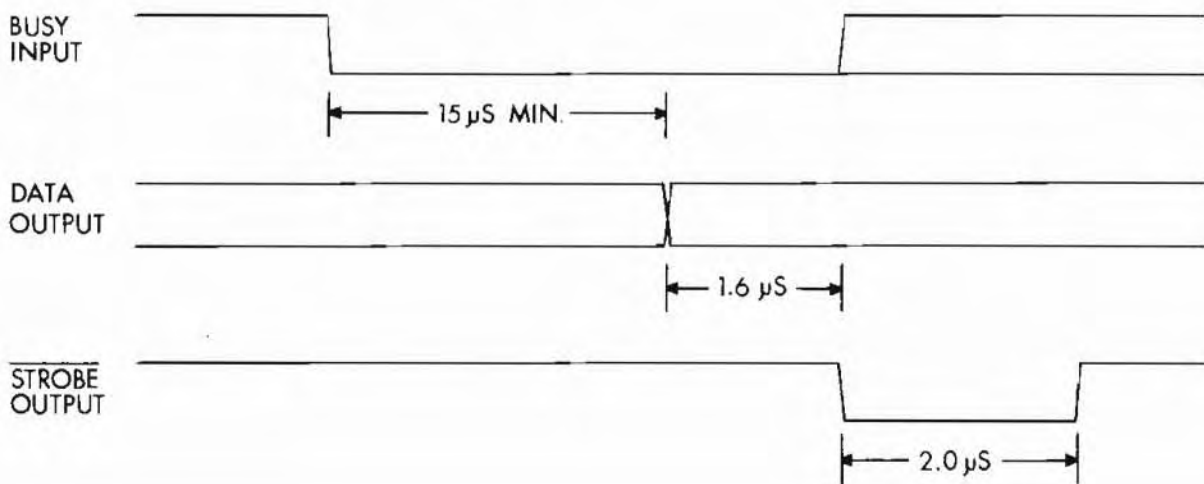| Manufacturer	Part Number	Description/application
AMP	552931-1	Insulation displacing contacts, 28 AWG flat ribbon cable.
AMP	552274-1 *	Insulation displacing contacts, 24 AWG round cable.
AMP	552470-1 *	Insulation displacing contacts, 26-28 AWG round cable.
AMPHENOL	57-30360	Solder tail contacts, 22-30 AWG round cable.

Parallel Output to Printer

Connector description: 36-position ribbon-type receptacle, screw lock.

Manufacturer	Part Number	Description/application
AMP	552834-1	Insulation displacing contacts, 28 AWG flat ribbon cable.
AMP	2-552275-1 *	Insulation displacing contacts, 24 AWG round cable.
AMP	2-552475-1 *	Insulation displacing contacts, 26-28 AWG round cable.
AMPHENOL	57-60360	Solder tail contacts, 22-28 AWG round cable.

* These connectors also require a strain relief cover as follows:

Manufacturer	Part Number	Application
AMP	552073-1	Cable diameter = 0.290 to 0.340 in.
	552073-5	Cable diameter = 0.360 to 0.430 in.
	552073-6	Cable diameter = 0.430 to 0.500 in.

PARALLEL INPUT PORT TIMING

DATA
INPUT
0-7

1.0 μS
MIN.

1.0 μS
MIN.

STROBE
INPUT

1.0 μS
MIN.

BUSY
OUTPUT

15-375 μS

23 μS

ACKNLG
OUTPUT

9.8 μS
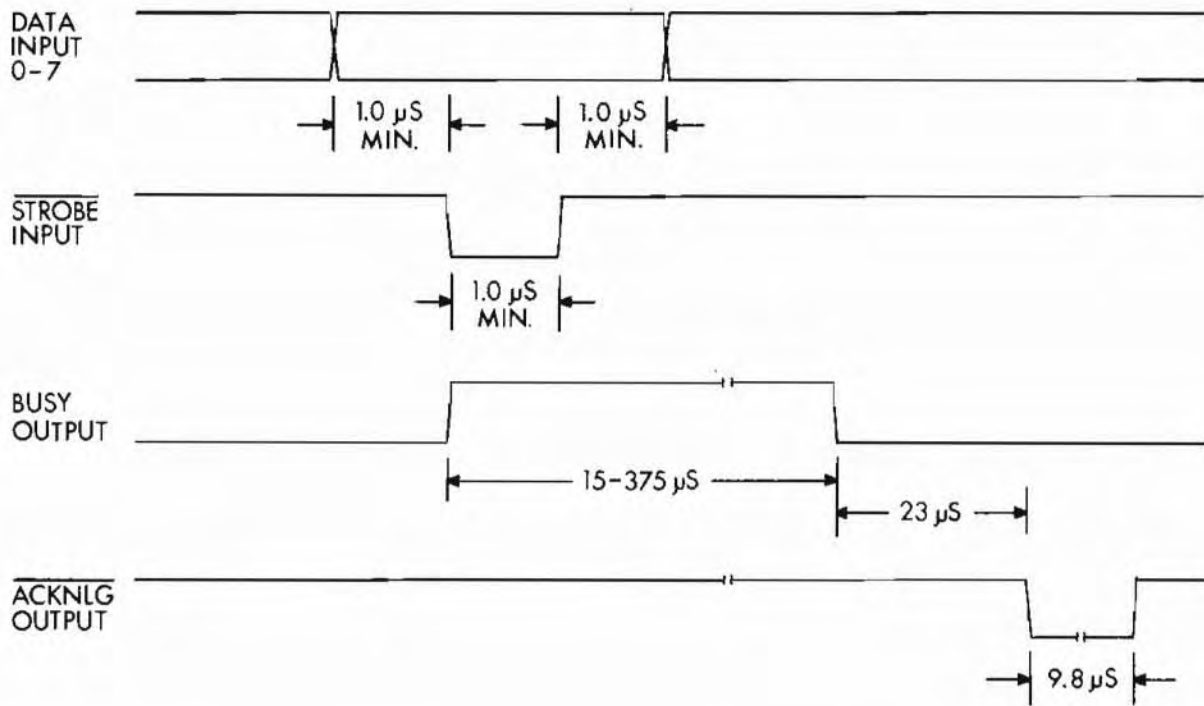
PARALLEL OUTPUT PORT TIMING

BUSY
INPUT

15 μS MIN.

DATA
OUTPUT

1.6 μS

STROBE
OUTPUT

2.0 μS

SERIAL INPUT CONNECTOR PINOUT
Type DB-25S (socket)

SIGNAL PIN	SIGNAL NAME	SIGNAL SOURCE	SIGNAL FUNCTION
1	FG	-----	Chassis ground
2	TD	SooperSpooler	Data output from SooperSpooler
3	RD	Input Device	Data from input device
4	RTS	SooperSpooler	Request to Send - Held high (on)
6	DSR	Input Device	Ready line from input device
7	SG	-----	Signal ground
20	DTR	SooperSpooler	Ready line from SooperSpooler

SERIAL OUTPUT CONNECTOR PINOUT
Type DB-25P (plug)

SIGNAL PIN	SIGNAL NAME	SIGNAL SOURCE	SIGNAL FUNCTION
1	FG	-----	Chassis ground
2	TD	Output Device	Data from output device
3	RD	SooperSpooler	Data output from SooperSpooler
5	CTS	"	Clear to Send - Held high (on)
6	DSR	"	Ready line from SooperSpooler
7	SG	-----	Signal ground
20	DTR	Output Device	Ready line from output device

NOTE: Any pins not specifically listed are not connected in the SooperSpooler.

CONTROL SEQUENCE QUICK REFERENCE CHART

Note: Each control sequence must be preceeded by the leadin code,
         ASCII FS = 28 decimal = 1C hex.

FUNCTION   CONTROL SEQUENCE

SPACE COMPRESSION. . . . ."SX"
                                                                 |
  "0"=Disabled, "1"=Enabled (default="0") _ _ _ _ _ _ _ _ _ _ _ _|

PAGINATION . . . . "PXXXX"
                                                             ||||
  "0"=Disabled, "1"=Enabled (default="0") _ _ _ _ _ _ _ _ _ _ _||||
  HEADER: "0"=Disabled, "1"=Enabled (default="0") _ _ _ _ _ _ _ _|||
  PAGE NUMBERING: "0"=Disabled, "1"=Enabled (DEFAULT="0") _ _ _ _ _||
  SINGLE SHEETS: "0"=Disabled, "1"=Enabled (default="0") _ _ _ _ _ _|

PAGE PARAMETERS. . . . ."R",n1,n2,n3
                                                              | | |
  n1 = PAGE LENGTH, LINES (1-127) (default=66) _ _ _ _ _ _ _ _| | |
  n2 = LINES PER PAGE (1-127) (default=62) _ _ _ _ _ _ _ _ _ _ _ _| |
  n3 = RIGHT MARGIN (10-255) (default=80) _ _ _ _ _ _ _ _ _ _ _ _ _ _|

INPUT HEADER . . . ."H",HEADER,ETX

FORMATTING . . . . "FX",n1,n2,n3
                                                    | | | |
  "0"=Disabled, "1"=Enabled (default="0") _ _ _ _ _ _| | | |
  n1 = LEFT MARGIN (1-127) (default=0) _ _ _ _ _ _ _ _ _ _| | |
  n2 = OVERFLOW INDENTATION (1-127) (default=5) _ _ _ _ _ _ _ _| |
  n3 = RIGHT MARGIN (10-255) (default=80) _ _ _ _ _ _ _ _ _ _ _ _ _|

CHANGE DIP SWITCH SELECTABLE ITEMS . . . ."CXXX"
                                                                 |||
  OUTPUT: "0"=Parallel port, "1"=Serial port _ _ _ _ _ _ _ _ _ _ _|||
  PRINTER REQUIRES: "0"=CR only, "1"=CR/LF at end of line _ _ _ _ _ _||
  OUTPUT: "0"=ASCII FF, "1"=Multiple Line Feeds _ _ _ _ _ _ _ _ _ _ _|

DEFINE . . . ."D",n1,n2
                                                               | |
  n1 = form feed character (input) (default=12) _ _ _ _ _ _ _ _| |
  n2 = form feed character (output) (default=12) _ _ _ _ _ _ _ _ _|

START SELF TEST PROCEDURE. . . . ."T"

RESTORE POWER UP DEFAULT PARAMETERS. . . . ."Z"

LEADIN CHARACTER (Default 28) may by changed by sending the current leadin
                 character followed by the new leadin character (0 to 31).

CONFIGURATION SWITCHES QUICK REFERENCE CHART

Primary Configuration Switches

SWITCH	FUNCTION	SETTINGS
S1-1	Handshaking	ON - ETX/ACK Serial handshaking
		OFF - XON/XOFF & Hardware serial handshaking
S1-2	Output Port	ON - Output to parallel port
		OFF - Output to serial port
S1-3	Pagination	ON - Output form feed to advance paper
		OFF - Output multiple line feeds
S1-4	Input LF Type	ON - Carriage return only at end of line
		OFF - Carriage return & line feed at end of line
S1-5	Output LF Type	ON - Carriage return only to advance paper
		OFF - Carriage return & line feed to advance paper

Optional Serial Board Configuration Switches

SWITCH	FUNCTION	SETTINGS
S2-1	Input Baud Rate	See chart below
S2-2	"	"
S2-3	"	"
S2-4	Output Baud Rate	"
S2-5	"	"
S2-6	"	"
S2-7	Character Length	OFF - 8 Data bits
		ON - 7 Data bits
S2-8	Stop Bits	OFF - 1 Stop bit
		ON - 2 Stop bits
S2-9	Parity Bit	OFF - Parity bit disabled
		ON - Parity bit enabled
S2-10	Parity Type	OFF - Even parity
		ON - Odd Parity

Baud Rate Select Chart

Position (output)	1	2	3	
Position (input)	4	5	6	Baud Rate
	OFF	OFF	OFF	110
	ON	OFF	OFF	150
	OFF	ON	OFF	300
	ON	ON	OFF	600
	OFF	OFF	ON	1200
	ON	OFF	ON	2400
	OFF	ON	ON	4800
	ON	ON	ON	9600