

**NC-2400 SYSTEM II
TAPE PREPARATION SYSTEM
USER'S GUIDE**

IMPORTANT

This manual supports software version 8.0
See Paragraph 3-14.

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NC-2400 SYSTEM II

I. INTRODUCTION

A Few Words About DSI and NC-2400 SYSTEM II

Data Specialties, Inc. (DSI), is a leading manufacturer of equipment for numerical control, tape preparation, and time-sharing. Designing and manufacturing its own equipment, DSI has produced over 25,000 punches in operation around the world. And now DSI has applied state-of-the-art technology to design the NC-2400 SYSTEM II.

The NC-2400 SYSTEM II is extremely versatile. It may be used for a wide range of applications in an NC shop.

o CNC Communications

CNC programs can be loaded into or pulled from virtually any machine tool, since the unit provides serial RS-232, TTY current loop and parallel (4070) interfaces.

o Manual Programming

Prepare, edit and duplicate machine tool tapes. The in-memory editor stores 400 feet of tape and provides the following features:

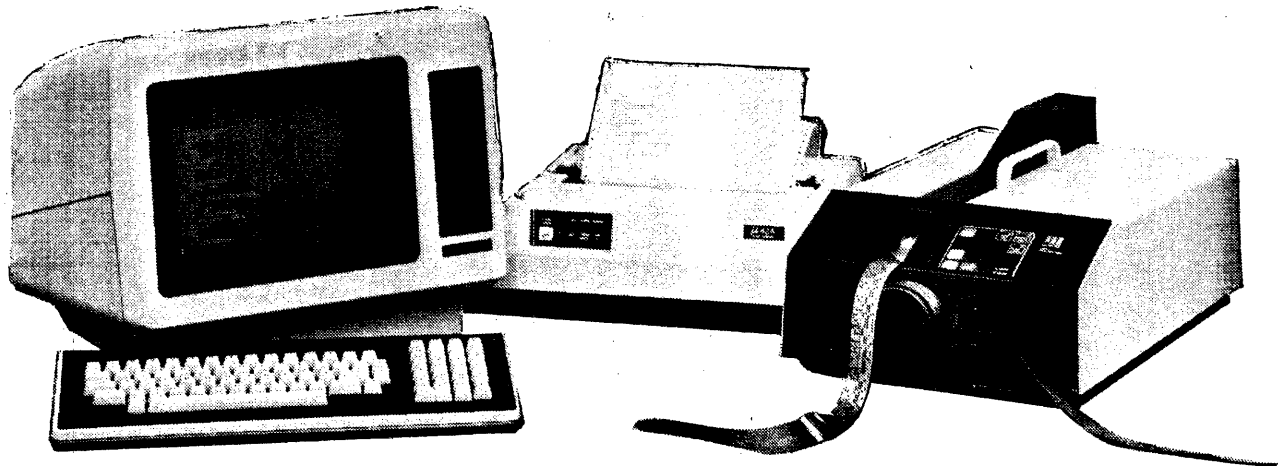
- Insertion and deletion of characters, blocks or whole sections of NC data
- Global search and replace
- Merge file
- Can cycles
- Mass substitution
- Resequencing
- Arithmetic calculations (offsets)
- Manreadables
- Automatic Block Numbering
- ASCII or EIA
- Programmable format
- Selectable leader and trailer
- Verification
- Checksum

o Time-Share Programming

Current loop and RS-232 ports are provided to allow connection to time-share services through a modem. EIA or ASCII tapes may be prepared when connected to a time-share system.

Let's Take a Little Closer Look...

The NC-2400 SYSTEM II is the most advanced tape preparation system in the DSI product line.



It includes an NC-2400 reader/punch with a microprocessor-based in-memory editor, a VDT, and a high-speed printer. Designed for the user who needs the most sophisticated equipment, SYSTEM II is one of the fastest, most powerful, and most flexible tape preparation units available in one low-cost package. Expanded editing and memory capacities come from a microprocessor computer, allowing NC/CNC programmers to prepare and edit tapes in memory.

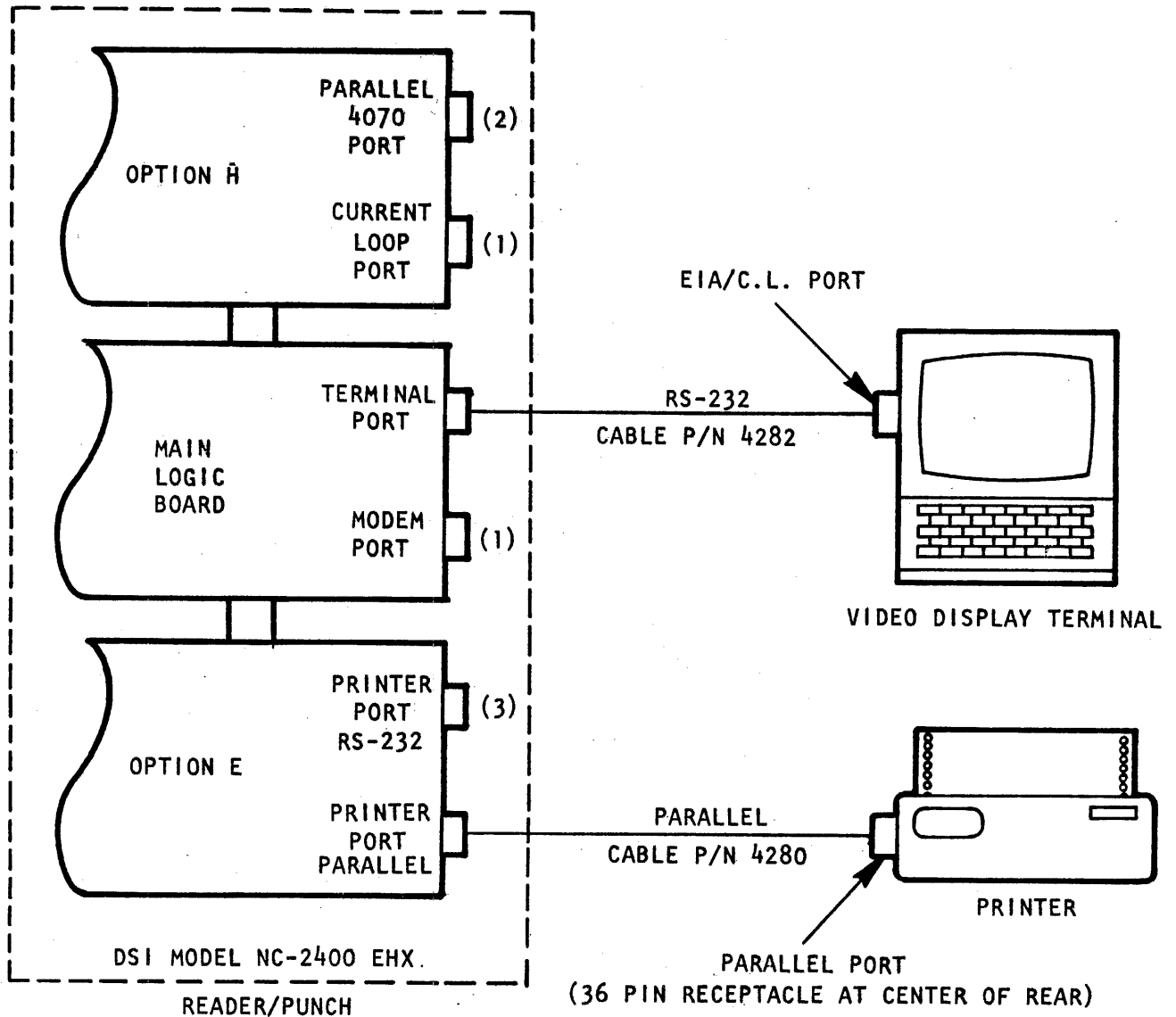
The NC-2400 SYSTEM II capabilities include:

- o Up to 75 cps punch, up to 240 cps read, up to 120 cps print.
- o Insertion and deletion of characters, blocks, or whole sections of NC data; global search and replace.
- o Store nearly 400 feet of tape in memory: Edit or make changes to the tape prior to punching. Merge all or parts of files to create new NC files.

- o Store repetitive pieces of software such as canned cycles and macros in memory. Recall and insert these files with one command to make the final tool tape.
- o Mass Substitutions: With a single command, change every occurrence of specified character(s) to another character(s).
- o Resequencing: The NC-2400 allows automatic resequencing of block numbers. Input the range to be resequenced, the alpha prefix of the block number, the starting the block number and the increment. The NC-2400 will do the rest.
- o Arithmetic Calculations: Perform mathematic tasks such as adding, subtracting, multiplying, and dividing without computer assistance.
- o Line Number Display: Reference line numbers are used to make all editing operations easier.
- o Man-readables: Enter useful information such as a part number, drawing number, and time of day, and it will appear on the tape leader in a human readable form.
- o Convert ASCII to EIA or vice-versa whenever you like, with or without printing.
- o Automatic Offset: Add, subtract, multiply, or divide any value from any dimension.
- o Programmable Format: Automatically puts all the NC terms in the proper order with the selected number of characters and the proper decimal location.
- o Selectable Leader and Trailer: From the keyboard, select the amount of nulls, deletes, and spaces required for the leader and trailer of the tape, and the NC-2400 SYSTEM will put them on automatically.
- o Verification: A checksum is calculated and displayed. This insures accurate tape reading and punching.
- o Ruggedized reader/punch to safely allow use on the shop floor.
- o Equipped with serial RS-232, TTY current loop, and Facit 4070 parallel interfaces; allowing the NC-2400 to be connected to almost every modern CNC control for program retrieval.

The System Block Diagram...

The block diagram shows the three major components, the interconnecting cables, and the three auxiliary ports.



NOTES:

1. Modem and current loop ports may be used to connect to time-share computer, in-house computer, or CNC control.
2. Parallel 4070 port may be connected to CNC controls.
3. The RS-232 printer port may be used in lieu of the parallel printer port for customers using their own serial printer.

II. SETUP

2.1 WHAT'S INCLUDED WITH YOUR SYSTEM?

- DSI Model NC-2400 EHX Reader/Punch
- Matrix Printer with ribbon and manual
- Video Display Terminal with manual
- AK-II Accessory Kit (P/N 4307).
- NC-2400 Installation/Operation Manual (Spec 3401).
- And, of course, this USER'S GUIDE

If you don't have one or more of these items, be sure to contact us or your dealer the proper equipment can be provided.

2.2 LET'S GET YOUR SYSTEM SET UP AND READY TO GO!

- A. Be sure all the components are connected as shown in the block diagram above.
- B. Load the printer with paper and ribbon as described in its instruction manual.
- C. Use Appendix V to set the DIP switches on the VDT before power-up. The reader/punch and printer have DIP switches that are pre-set at the factory.

2.3 READY TO POWER UP!

- A. BE SURE THE VOLTAGE AND FREQUENCY SWITCHES ARE SET PROPERLY. SEE APPENDIX V FOR DETAILS. FAILURE TO SET THESE PROPERLY MAY DAMAGE THE EQUIPMENT.

B. POWER UP SYSTEM

IT IS IMPORTANT TO FOLLOW THIS POWER UP PROCEDURE TO PREVENT SYSTEM MALFUNCTION.

1. Turn power on Printer and Video Display Terminal (VDT).
 2. Turn on the NC-2400 Reader/Punch.
- C. The @ should now be displayed on the VDT, the PUNCH LED should be illuminated on the reader/punch, the POWER AND SEL LEDs should be illuminated on the printer.

Check to see:

1. Punch LED is illuminated.
2. @ is displayed on the VDT.
3. Power and SEL LEDs are illuminated.

If the Prompt "CHECK PRINTER - ENTER LPON" appears, see Section 6 for more information on printer.

- D. Load tape in the punch. Place the tape on the plastic core, drop the roll into the punch, route the tape under the decoupler and present to the funnel at rear of the die block. Depress feed switch and slightly push tape forward. The tape should move through the die block with feed track punched.

IMPORTANT NOTE

There are dip switches located on the rear of the Video Display and under the cover of the reader/punch and printer. These switches must be set properly to insure that the components interact properly with each other. The dip switches positions are shown in Appendix V. If the SYSTEM does not function as described in this manual, check these switches before calling for service.

- E. The operator may respond to the @ with any one of the 27 commands that are listed in alphabetic order. Some of the commands have short forms which are shown in parentheses following the command. Some have multiple short forms; these are indicated with an *. These short forms are described in the manual.

CHANGE	(C)
CLEAR	
COMM	
CONFIG	
CREATE	
DELETE	(DEL)
DUP	
FLOAD	
ICAN	
INSERT	(I)
LIST	(L)
LP	
LPON	
LPOFF	
OFFSET	(O)
PUNCH	(*)
QOFF	
QON	
READ	(*)
RENUM	
RESEQ	(R)
TEST	
VER	
VERIFY	
VOFF	
VON	

The procedure for using all these commands will be described in the manual. A useful chart is provided in Appendix I that shows the format for using each command and a brief description of the function of each command.

2.4 SELF TEST

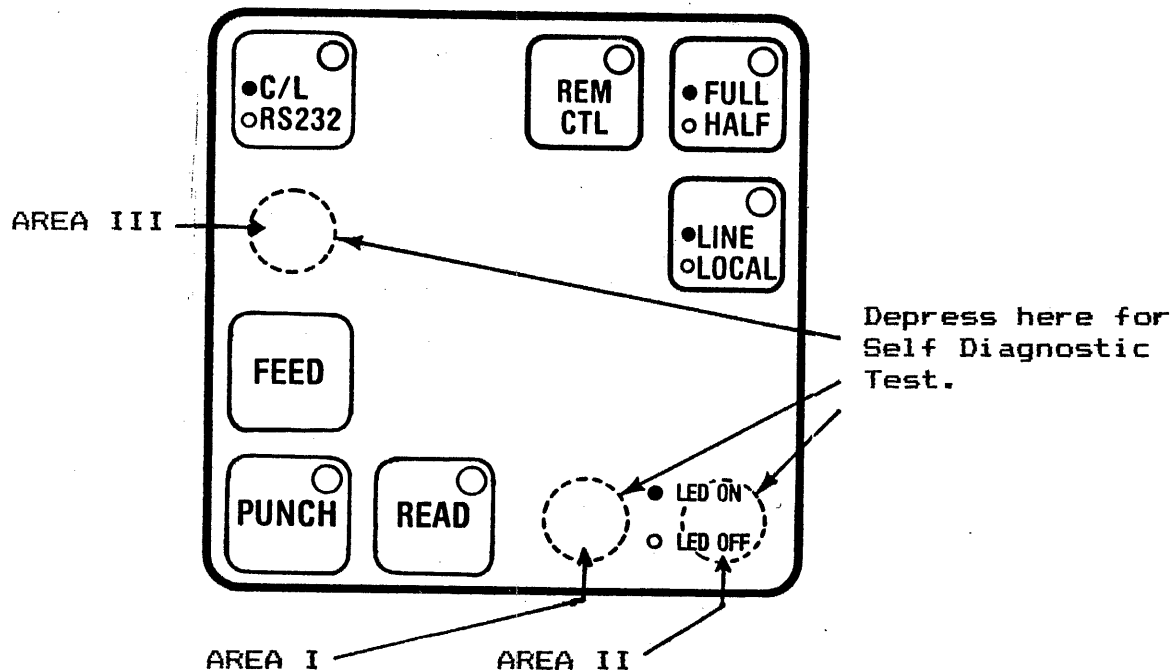
The NC-2400 System II reader/punch, VDT and high speed printer, each has built-in self test features.

The high speed printer will print out a continuous test pattern if the LINE FEED switch is held in on power up. For more details on this test and operating instruction, refer to the printer's USERS MANUAL, Section 4.2.4.

The VDT has a built in self test that is automatically performed on power up. If something should be wrong with the VDT, an error message will be displayed. These messages and a more detailed description are in the VDT's Video Display Terminal Reference Manual, Section 2.3.

The NC-2400 System II reader/punch has many built in features which the operator can perform. One test is an internal memory test that checks out the editor's memory. The memory test is performed through the VDT's keyboard by typing TEST. More information on this test is covered in this manual in Section 3-13. The reader/punch also has additional self tests for the punch and control panel LEDs. These tests are performed during power up by simultaneously pressing and holding down a certain combination of control panel switches.

The reader/punch has a simplified control panel as illustrated below. REM CTL, FULL/HALF, and LINE/LOCAL are not switches but act as indicators only.



Control Panel for NC-2400 System II Reader/Punch

Built into the unit are self-test routines which allow you to test the reader/punch. Simultaneous depression of certain control panel switches during power up (i.e. while the POWER switch is being turned on) will call up test routines.

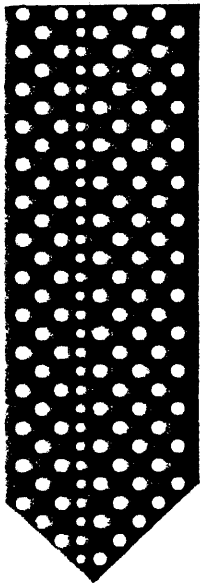
To call up diagnostic routines on the reader/punch, depress the control panel in the area where the specified switch would be located, or where special areas are marked in the figure above as dashed circles.

LED INDICATOR CHECK. Simultaneous depressing of AREA I and AREA II switches during POWER UP will test the LED indicator lights, they will all flash ON/OFF.

PUNCH CHECK. Three different test patterns may be punched (called up from the reader/punch memory). Again, by depressing certain switches during POWER UP.

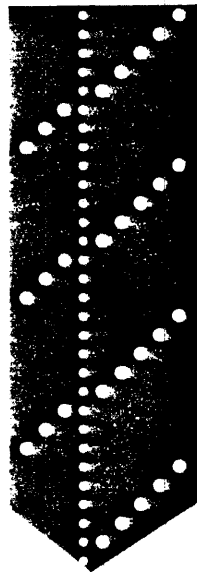
During Power Up Depress:

FEED
and PUNCH



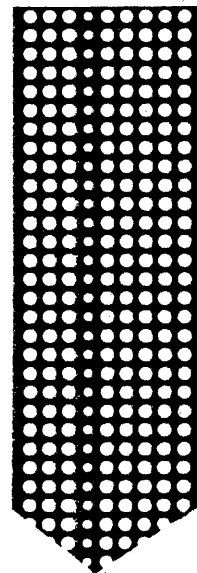
U*

AREA III
and PUNCH



RAMP

AREA III
FEED and PUNCH



RUBOUT

2.5 THINGS YOU SHOULD KNOW BEFORE YOU START PREPARING TAPES

Entering Commands - The user enters a command by entering its name, or the short form of its name, a SPACE between the command and the argument is required when an argument is necessary then any required arguments, and then a carriage return. The carriage return is required for normal termination of all commands.

C 100,10000 /G90/G91/<RETURN>

CR
Reguided editing
Space
Editing Line Argument
Separation
Beginning Line Argument
Space

- Sub-Commands - All the commands, with the exception of COMM, allow two sub-commands, 'ESC D' and 'ESC V'. The ESC character is called the command prefix and can be changed through the CONFIG command. These sub-commands have the following function.
- <ESC>D - Allows the user to delete an entire line without backspacing to the beginning of the line.
 - <ESC>V - Allows the user to view an entire line without terminating the line. This is useful if the user has backspaced several times and would like to see the resultant line.

NOTES:

1. The space between the <ESC> and the command character is included here only for clarity. The command does not have an embedded space and will not be treated as a command if one is typed in.
2. These sub-commands will be recognized only if they are the last two characters typed before the carriage return.

ABORT Character - Commands can be terminated in mid-execution by typing an ABORT character.

/ - Used with all commands except COMM. This character can be changed through the CONFIG command.

<ESC>E - Is used with the COMM command. The ESC is the command prefix character which is set through the CONFIG command. The embedded space is for documentaion clarity only and must not be typed in as part of the actual command.

The ABORT Character must be typed as the first character of input.

BACKSPACE - In most cases, it will be possible to use the BACKSPACE (CTRL H) to correct typing errors. This will not be true when connected to a time-share system which does not accept the BACKSPACE.

BREAK KEY - On occasion, the user may find that the SYSTEM has the wrong baud rate (parameter 11 in CONFIG) for the terminal being used. If that happens, set the terminal to 300 baud and tap the break key. The SYSTEM will shift to 300 baud so that the CONFIG command can be used to properly set parameter 11. The break key should not be used otherwise in normal operations. To break while in COMM mode, see Section 7-2 for procedure.

Battery Backup - The SYSTEM has a small internal battery which preserves CONFIG parameters and line after power down. This battery is recharged whenever the SYSTEM is turned on. It will run down after several weeks. Try to avoid allowing the battery to run completely dead, as this could shorten its useful life. Operate the SYSTEM at least 8 hours per month to ensure that the battery remains charged in good condition.

2.6 THE CONFIG COMMAND (XFIG alias)

The SYSTEM II may be customized to your particular application at hand as well as to particular hardware. This customization is accomplished by using the CONFIG command. There are 35 critical parameters, numbered 00-35, within the SYSTEM'S MEMORY. The SYSTEM is delivered with the parameters initialized to default values. In some cases, the default values will not be appropriate, so the user values will be maintained in the SYSTEM's memory by a small battery even after power down. If the battery runs down (this would take several weeks), the restart program will reinitialize the parameters to the default values when the SYSTEM is powered up and the following message will be displayed:

CONFIG DEFAULT

If you see this message, you know your battery has run down and your parameters have been reset to the default values. The format of the CONFIG command is:

CONFIG

Typing in this command will begin an examine and change process between the system and the user. The system will display each "parameter number " and its "value". The values are the hexadecimal equivalent of the ASCII characters. (See Appendix II - Section A for a complete chart of the charts). The system will sequence from "parameter number " 00 through 35.

There are four responses available to the user after each parameter has been displayed.

- <CARRIAGE RETURN> - The value displayed will be left unchanged, and the SYSTEM will display the next parameter and value. If all values have been displayed, the SYSTEM will return to the ready state, (Q).
- <NEW VALUE><CARRIAGE RETURN>-This will cause the old parameter value to be replaced with the new value. The SYSTEM will then display the next parameter and value or return to the ready state if all parameters have been exhausted, (Q).
NOTE: The new value must be two digits.
- /<CARRIAGE RETURN> -Immediately terminates CONFIG processing. This is the standard ABORT character and can be reset through parameter 03.
- ^<CARRIAGE RETURN> -Allows the user to go backwards through the parameter list.

A discussion of the individual parameters, their default values, and their functions will now follow.

PARAMETER NUMBER	DEFAULT VALUE	SYSTEM FUNCTION
00	28 (Left paren. The begin comment delimiter.
01	29)	Right paren. The end comment delimiter. This parameter could have the same value as parm 00. For example, set both parm 00 and 01 to "3C", a "<" symbol. Comments would now look like: N0025X28<NEW X VAL<Y0021M52 Both parameters 00, and 01 must contain an ASCII hex code.
02	1B ESC	Escape. The command prefix. This may need to be changed so that lines can be created which begin with an ESC. It may also need to be changed if it is necessary to send an ESC during the COMM command.

- 03 2F / Slash. The ABORT character. This may need to be changed if it is necessary to create lines that begin with a slash. If you accidentally set this to the character "C", you will have to use the XFIG alias of CONFIG.
- 04 OF
 ~~FF~~ This parameter is the number of spaces between each tab column. OF is the hexadecimal representation for 15.
- 05 25 %
 25 Percent. The file mark character. The first occurrence of this character, preceded by 5 nulls, spaces, or deletes on the tape, marks the end of the leader and man-readables. The first character of the first line of the tape will immediately follow.

NOTE: Regardless of the tape format, whether EIA or ASCII, always use the ASCII hex code for the desired file mark character.

- 06 ~~7D~~ OD CR ASCII End of Line string. Parameter 06 is the first character sent to the punch for the ASCII end of line string. Parameter 07 is the second, 08 is the third (if required) and 09 is the fourth (if required) select from any combination of CR's and/or LF's desired. In a COMM. keystroking the "Return" key will send this character string on-line.
- 07 ~~FA~~ OA LF
- 08 00
- 09 00

- 10 ~~FD~~ OD CR Reader ASCII End of Line String. This parameter is the character that indicates the end of a line. This parameter can be set to a CR or a LF character. The editor tape loading program Read looks for the character called out in parameter 10 to indicate the end of a line and before placing that line into memory. If the tape being read doesn't contain this character, it will not be read and data will not be placed in memory.
- ~~FA~~

Example: If the tape to be read only has LF characters at the end of each line, then parameter 10 must be set to a LF character (OA), in order to read the tape information into memory.

11

03

Delay/multi-chars. This parameter selects the tape playback mode for the COMM command. The second digit is the line protocol. It can be selected from the following list.

First Digit

This DIGIT must always be 0.

Second Digit

- 1 One line per X-ON, Full Duplex.
- 2 One line per X-ON with X-OFF, Full Duplex.
- 3 Host controls multiple characters/lines, Full Duplex.
- 5 One line per X-ON, Half Duplex.
- 6 One line per X-ON with X-OFF, Half Duplex.
- 7 Host controls multiple characters/lines, Half Duplex.

Example: Parm 11 = 07 selects Half Duplex, host controls multiple characters during playback. If par 14 = 02, data sent back by the SYSTEM will be converted to even parity before being sent on to the time-share system.

12

00

FAST COMM Selector. This parameter is a 2 digit selector used in the FCOMM command. This parameter is intended for future software enhancements in later versions. Standard factory setting is 00.

PARAMETER
NUMBER DEFAULT
 VALUE

13 32

→ 34

SYSTEM FUNCTION, CONT.

Baud rate selector. The first digit sets the baud rate for the terminal. The second digit sets the rate for the modem. If this parameter is changed, the SYSTEM will begin using the new rates after CONFIG is exited. The baud rate codes can be selected from the following table:

DIGIT (1ST OR 2ND) BAUD RATE

0	1200
1	4800
2	300
3	9600
4	600
5	1800
6	2400
7	110

The default value is for a 9600 baud terminal and a 300 baud modem.

NOTE: If the wrong baud rate is inadvertently selected, switch the terminal to 300 baud and hit the break key. The SYSTEM will shift to 300 baud so that you can go into CONFIG and set the baud rate to the correct value.

14 08

→ 08

ASCII parity/printer baud rate. The first digit of this parameter selects the parity for ASCII data. EIA data is processed with odd parity regardless of this digit. The second digit controls the baud rate of the "serial printer port", or selects the "Parallel Port Printer". The first digit is selected from the following:

0 Even Parity
4 Odd Parity
8 No Parity

The second digit can be selected from the table used with parm 13. If a "8" is entered as the second digit, then the parallel port printer is selected. Examples:

02 - Even Parity, 300 baud serial printer
40 - Odd Parity, 1200 baud serial printer
87 - No Parity, 110 baud serial printer
08 - Even Parity, Parallel Printer

NOTE: Any character which does not pass parity checking during reading of an EIA tape or COMM will be replaced with a back slash " \ ", either on the punched tape during COMM or in memory during reading of an EIA tape only.

15 ~~00~~
 00
 16 03

First Digit:

0 = Filters on. The character chosen in parameters 16 and 17 as well as deletes and nulls are filtered from the body of the tape.

8 = Filters off. No characters are removed from the body of the tape including deletes and nulls.

Second Digit:

0 = Queries for input and output tape format are active.

2 = Queries for tape format are deactivated. EIA input and output is assumed.

3 = Queries for tape format are deactivated. ASCII input and output is assumed

16 FF

Filter character chosen by user to be filtered.

17 FF

Filter character chosen by user to be filtered.

Nulls and rubouts are always filter (deleted) from input tapes when the Filter is "ON". Parameters 16 and 17 are used to establish two additional characters which can be filtered from input tapes. This process acts only on the body of the tape and not on the leader and trailer.

To filter a character or characters, set parms 16 and 17 to the ASCII hex code which corresponds to the character to be filtered regardless of the input tape format. If only nulls and rubouts are to be filtered, set parms 16, and 17 to FF.

18-25 00

ASCII/EIA conversion. These parameters are paired i.e., 18-19, 20-21, 22-23, 24-25 for the purpose of defining non-standard conversions for ASCII-to-EIA and vice versa. The first parm of each pair is an ASCII code and the second is what the user selects to be its EIA equivalent. When converting from one character set to another the SYSTEM first checks these parameters. If the character to be converted is present, its corresponding parameter is used in the conversion. If the character to be converted is not present, the standard ASCII/EIA conversion table is used. See Appendix II for ASCII and EIA characters and codes.

Example: ASCII 20 is usually converted to EIA 10 and vice versa. However, if parameters 18 and 19 are changed as follows:

Parm 18 = 17, Parm 19 = 6E

Then ASCII 20 will be translated to EIA 6E and vice versa.

26 00
3A

Hexadecimal value setting the page length for the line printer. Value 00 means that all lines on a page will be printed and no blank lines will be left at the bottom. If parameter 26 is not set 00, parameter 27 should be set 0C.

Example: Parameter 26 = 3A will cause 58 lines to be printed on a page, then the printer will form feed, skipping to the top of the next page.

27-35 00
27 - 0C or 0C
28 1E
29 1B
30 12
31 10
32 100
33 100
34 100
35 100

Line printer initialization message sent during LPON and LPOFF. See the printer instruction manual for a complete discussion of the values for these parameters.

Example: Set 27 = 1D for compressed character print of Hex = 29 decimal.

Set Up (Printer)

CONFIG parameter 26 through 35, these parameters are the initialization parameter for the printer. These parameters are sent during the "LPON" and "LPOFF" commands, from the NC-2400E to the printer.

These commands are sent only during LPON to program the PRINTER if you do not wish to use paging and condensing print or other printer function then all parameters 26 through 35 should be set to 00.

When the LPON command is used, a Top of Form code will be sent to the printer causing the printer to advance the paper to the top of the next page. The LPOFF command also causes the paper to be advanced to the top of the next page. The paper will advance only if parameters 26 and 27 have been programmed; if these two parameters are 00, the paper will not advance.

To program these parameters, you will need to follow a few simple instructions.

First parameter 26 must be programmed for the number of lines to be printed on a page. For standard 8 1/2 x 11 inch paper, parameter 26 will be set to 3A, which will cause 58 lines to be printed.

Second parameter 27 must be set to 0C if anything is programmed in parameter 26. This will cause the paper to advance to the top of the next page after the number of lines, as specified in parameter 26, are printed.

Third, the remaining parameters should have the necessary control or control code sequences to set the other printing parameters of your printer.

Example for OKIDATA printer:

Set up printer to print 58 lines with 16.5 characters per inch and 8 lines per inch. The following data should be put into CONFIG parameter 26 through 35.

PARAMETER	DATA	FUNCTION
26	3A	control code for System II to print 58 lines
27	0C	control code for OKIDATA top of form.
28	1D	control code for OKIDATA print 16.5 CPI
29	1B	control code sequence for OKIDATA
30	3B	printer to print 8 LPI
31	00	
32	00	
33	00	
34	00	
35	00	

III. USING THE VIDEO DISPLAY TERMINAL

This section will deal exclusively with keyboard input of a program, editing of the program, and a few associated commands. The commands will be described in detail together with their arguments and short form. A summary of these commands may be found in Appendix I.

The commands that will be covered in this section are:

- 3-1 CREATE - Key entry of a program.
- 3-2 LIST - Display program in memory on terminal.
- 3-3 INSERT - Insert lines into program.
- 3-4 CLEAR - Clears program from memory.
- 3-5 DELETE - Deletes line(s) from program.
- 3-6 CHANGE - Replaces old string with new string.
- 3-7 RENUM (RENUMBER) - Renumber lines.
- 3-8 RESEQ (RESEQUENCE) - Renumber block numbers.
- 3-9 ICAN - (INSERT CAN CYCLE) - Move part of program.
- 3-10 OFFSET - Apply math function.
- 3-11 QON and QOFF (QUALIFY) - Changes require user approval.
- 3-12 VON and VOFF (VERIFY) - Confirms change.
- 3-13 TEST - Self-diagnostic report.
- 3-14 VER (VERSION) - Version of software.

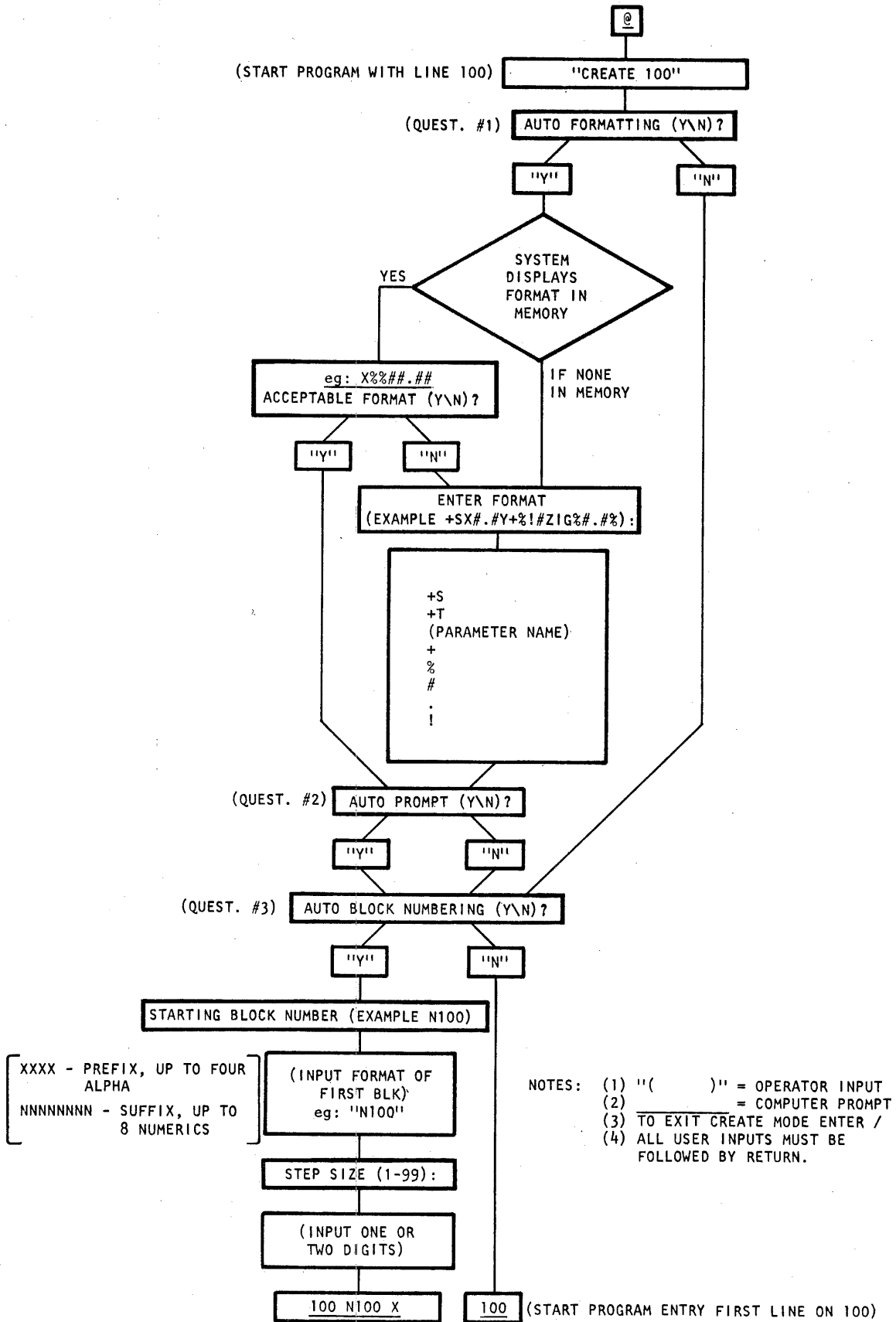
NOTE: If any command has **LINE1** OR **LINE2** as an argument, it will expect the following information.

LINE1 1-6 digits
 Not equal 0
 Not less than 0
 Letter B can be substituted to mean beginning or first line.
 Letter E can be substituted to mean ending or last line.

LINE2 1-6 digits
 Not equal 0
 Not less than 0
 Greater than LINE1
 Letter E can be substituted to mean ending or last line.

3-1 CREATE

This command is used to make an NC tape from the beginning. A flow chart (Fig 1) is shown on the next page which gives an overview of the process. The lines created by this command will be stored in memory until punched out by the punch command, at which time the format of the output tape will be specified. Punching a tape will not erase the program from memory.



CREATE A PROGRAM

FIGURE 1

XXXX - PREFIX, UP TO FOUR ALPHA
NNNNNNNN - SUFFIX, UP TO 8 NUMERICS

NOTES: (1) "()" = OPERATOR INPUT
(2) = COMPUTER PROMPT
(3) TO EXIT CREATE MODE ENTER /
(4) ALL USER INPUTS MUST BE FOLLOWED BY RETURN.

Modes of Creation

Typing in the CREATE command (see format below) will start a Question and Answer Session between the SYSTEM and the user to establish which of the following "modes of creation" are required:

- Automatic line formatting (Question #1)
- Automatic prompting (Question #2)
- Automatic block numbering (Question #3)

This Question and Answer Session will be discussed shortly. The format of the CREATE command itself:

CREATE LINE1

The meaning of its argument, LINE1, is the beginning line number of the lines being created. If there are lines of data already in memory, LINE1 can come after the last one or before it. If it comes before the last line, however, the new lines of code will replace any lines which already exist with the same line number (see last example in ICAN). The SYSTEM will increment the new lines by 100. When the buffer gets almost full (within 500 characters), the following message will be displayed:

MEMORY NEAR FULL

When the buffer is completely full, the SYSTEM will display:

MEMORY TOO FULL

If either of these messages comes out, the user should terminate the CREATE command, punch some or all of the lines currently in memory, delete lines just punched, and start the CREATE command again. Any line formats which were created for automatic formatting will be saved in a special section of memory and will not be deleted by this process. They will even be saved after power down for several weeks and need not be recreated.

The CREATE Question and Answer Session will proceed as follows:

QUESTION #1: AUTO FORMATTING (Y\N)?

The SYSTEM wants to know if the user wishes to use the automatic line formatting mode? The proper responses to this are:

N - No. The SYSTEM will proceed to Question #3.

Y - Yes. The SYSTEM will now proceed directly to "ENTER FMT" if there is not line format already saved in backup memory. If there is a line format, however, the SYSTEM will display it and ask the following question:

ACCEPTABLE FORMAT (Y\N)?

The SYSTEM is asking whether or not you approve the existing line format. Your response can be one of the following:

Y - Yes. The SYSTEM will proceed to Question #2.

N - No. The SYSTEM will now prompt you for a new line format by printing the following:

ENTER FORMAT (EXAMPLE +SX#.#Y+#!#ZIG%#.#%):

You can now create a new line format which has the following basic pattern:

<SEP> FORMAT FORMAT FORMAT FORMAT

<SEP> is a separator code which can be entered once at the beginning of the line format. It has the function of making lines of data more readable. The two <SEP> codes are:

+S This will cause the SYSTEM to put a space before each formatted parameter in the data.

+T This will cause the SYSTEM to put a tab before each formatted parameter in the data.

Each format is composed of the following parts:

XXXX+%%##D###%%

Each part has the following meaning:

XXXX - Parameter name. This can be up to 4 characters long and can be composed of alphabetic characters, numeric characters, and controls. It may not be composed of % # ! + . (period).

+ - Tells the SYSTEM to put an actual plus sign on positive numbers. This is an optional character and can be left out if a printed plus sign is not required.

%%%#### - Mask for the integer part of the parameter and its maximum length. Each % signifies a position from which zeros can be deleted, but only if they are leading zeros. The # signifies a position which cannot have any numbers masked out, even leading zeros. There are several things to keep in mind about this field:

1. Its size can be 1-8 character.
2. The % must come before the #.
3. You can have any number of % and #, up to 8.
4. The SYSTEM will not store more digits than this field allows. It will not truncate your big numbers, however, but will prompt you "TOO BIG" for input again.

D - Code for the location and print format of the decimal point. You can put one of two special characters here:

- . - Tells the SYSTEM to put a decimal point in the parameter it is creating.
- ! - Tells the SYSTEM to leave the decimal point out when it creates the parameter.

####%% - Mask for the fractional part of the parameter and specification of its length. This field is the same as the integer part mask with the following exception.

1. # must come before %.
2. % masks trailing zeros, not leading zeros.
3. If a fractional number is too small, the SYSTEM will store zeros.

A line format of up to 132 character can be created by typing a string of parameter formats. For example:

X+%#####.##%Y%%%##.%%ZIG+###!###

This line will control automatic formatting for the three variables X, Y, and ZIG. Once the line format has been created, the SYSTEM will proceed to Question #2, and once the Question and Answer Session is finished, the SYSTEM will begin formatting your input. See the section on "Input Mode" following Question #3 for a further discussion of how to input.

Line formats may also be entered by reading in a string format tape. These tapes may be read in by using the "FLOAD" command described in section 4-3. These tapes may be prepared by using the procedure described in section 5-3.

QUESTION #2 AUTO PROMPT (Y\N)?

What the SYSTEM wants to know is, do you want it to prompt you automatically for the parameters in your format list? The responses to this questions are:

YES - You want the SYSTEM to prompt you, one at a time, for the parameters in your format list. In the example created for Question #1 above, these parameters would be X, Y, and ZIG. See the section on "Input Mode" following question #3 to see how to respond to auto prompts.

NO - You do not want the SYSTEM to prompt for parameters, but prefer to type in a line with parameter names and expressions all at once. If the AUTO FORMAT has 10 different parameters but the user only has to input a few parameters on each line, then this question would normally be answered NO.

QUESTION #3 AUTO BLOCK NUMBERING (Y\N)?

What the SYSTEM would like to know is, do you want it to supply block numbers automatically at the beginning of each line? The responses to this question are:

N - No. The SYSTEM will proceed directly to input mode.

Y - Yes. The SYSTEM will now prompt you for the starting block number by printing:

STARTING BLOCK NUMBER (Example N100):

It expects a block number have the following format:

XXXXNNNNNNNNN

The parts of this block number are:

XXXX - An optional block prefix of 1 - 4 alphabetic characters and controls.

NNNNNNNN - Starting block number, 1 - 8 digits. This part of the block number is required.

Once the starting block number has been typed in, the SYSTEM will prompt:

STEP SIZE (1-99):

The required response is a 1- or 2-digit number which will be used to increment block numbers from line to line. A negative number for the increment is allowed. The SYSTEM is now ready for input.

INPUT MODE

During INPUT MODE, the user will enter lines into memory. These lines can have block numbers, parameters, expressions, and comments as the user desires. All this information can be typed in manually, or the SYSTEM can help by automatically creating block numbers, prompting for data, and formatting expressions. The extent to which the SYSTEM helps will be determined by the responses to the three questions above. There are six different types of prompting the user may observe, depending on the responses to those questions. Let us briefly state the six types of prompting before discussing them in greater detail. A separate section will follow on "Expressions". In brief, the six input prompts that the user will see are:

1. No formatting, no AUTO BLKS.
2. No formatting, with AUTO BLKS.
3. Formatting without parameter prompts, no AUTO BLKS.
4. Formatting without parameter prompts, with AUTO BLKS.
5. Formatting with parameter prompts, no AUTO BLKS.
6. Formatting with parameter prompts, with AUTO BLKS.

Let us take these six cases now and see first what the SYSTEM will print and then discuss what you can do.

CASE #1. NO formatting, no AUTO BLKS.

LINE1

This is the simplest type of input mode. The SYSTEM has printed the current line number in memory. Anything the user types in after that line number will be stored in memory exactly as it was typed.

CASE #2. No formatting, with AUTO BLKS.

LINE1 BLK#

The SYSTEM has printed the current line number in memory, followed by the automatic block number. Anything the user types in after the block number will be stored in memory, along with the block number, exactly as it was typed.

CASE #3. Formatting without parameter prompting, no AUTO BLKS.

LINE1

The SYSTEM has printed the current line number in memory. The user can now type in parameters and expressions for the line. The SYSTEM will take the expressions and convert them to the proper format as specified in the line format created during Question #1. If the user wishes to add a comment to the end of the line, or a parameter which was not included in the line format, type in <ESC><text> and the text will be appended to the end of the line exactly as it was typed in. A complete line typed in for the sample format in Question #1, plus a comment, might look like:

X 3/4 ZIG 1.5 Y 2/15 ESC M 98 COMMENT ADD M PARAMETER

It is not necessary to enter parameters and their expressions in the same order in which they appear in the line format.

CASE #4. Formatting without parameter prompts, with AUTO BLKS.

LINE1 BLK#

The SYSTEM has printed the current line number in memory and the latest block number. This case is exactly like Case #3 above, except that the block number will be stored in memory along with the parameters, expressions, and any comment which the user may type in.

CASE #5. Formatting with parameter prompts, without AUTO BLKS.

LINE1 X

The SYSTEM has printed the current line number in memory and the first parameter in the line format in Question #1. The user needs only to type in an expression, and the SYSTEM will convert it to the proper format and store it in the line along with the parameter name. The SYSTEM will cycle through all the parameters in the format and then display a blank line. At this time, the user can type in any comments or parameters which are not in the line format. Anything typed on the blank line will be appended to the line exactly as it was typed in. To skip a parameter, type carriage return (CR).

CASE #6. Formatting with parameter prompts, with AUTO BLKS.

LINE1 BLK# X

The SYSTEM has printed the current line number in memory, the latest block number, and the first parameter in the format list created in Question #1. The user should proceed exactly as he would for Case #5 above. The difference is that the block number will be stored at the beginning of the line.

Interrupt, CAN Cycles, VERIFY and QUALIFY

- CR** - A line is terminated by typing carriage return.
- <ESC>Q** - This sequence typed at the beginning of a line will interrupt input mode and start the CREATE Question and Answer Session again, starting from Question #1. Once the Question and Answer Sessions are over, input will begin at the line where it left off.
- This sequence typed anywhere else in a line will be interpreted as a comment.
- <ESC>ICAN** - Allows the input of CAN cycles while in INPUT MODE. When finished with the CAN cycle, the SYSTEM will be ready to input at the first line after the CAN cycle. See the section on ICAN for more complete discussion of what it can do.
- VON** - When VERIFY MODE is on (see command VON), the SYSTEM will echo every line as it is stored into memory.
- QON** - When QUALIFY MODE is on (see command QON), the SYSTEM will allow the user to approve each line before it is stored in memory. Type a space to approve the line. Anything else, including a CR, will cause the SYSTEM to redo the current line.

NOTE: VON and QON are often very helpful when using math expressions in place of actual data.

Expressions

If the user has selected automatic formatting, he can type in arithmetic expressions for his parameters and the SYSTEM will convert them to the format established in Question #1 before storing them in the line. If automatic prompting was not selected in Question #2, the user will enter parameters and expressions in the following way:

PARAMETER EXPRESSION PARAMETER EXPRESSION...PARAMETER EXPRESSION

Each parameter is a parameter name in the format list, and the expression following it will be evaluated and stored with it. If, on the other hand, the user selected automatic prompting for parameters, the SYSTEM will print the parameter name and the user will only have to type the expression. A session to create one line for the sample format in Question #1 might proceed as follows:

The SYSTEM will print	00100X
The user may type	2*3*(3.5+7)
The SYSTEM will print	Y
The user may type	4*(3+(8*2))
The SYSTEM will print	ZIG
The user may type	15/2.5-37
The SYSTEM will print	(a blank line)
The user may type	M 35 COMMENT ADD THE PARAMETER M

To skip any of the parameters in the format list, the user can type a carriage return.

The SYSTEM will evaluate the expressions as they are typed in and will insert them in the line after the proper variable name and in the specified format. If any of the evaluated integer parts are too large, the SYSTEM will tell you and ask that the expression be retyped. In the case of our example above, the result would look like:

```
X+0064.20Y76.0ZIG-031000M 35 COMMENT ADD THE PARAMETER M
```

Expressions are evaluated from left to right, from the innermost set of parenthesis to the outer. For example:

```
2*(3.5+7) = 21
2*3.5+7   = 14
```

The SYSTEM allows up to seven nested sets of parentheses. (((((((())))))) is the maximum and not the same as ()()()()()()(), which is only one level of nesting, even though there are seven pairs of parentheses.

3-2 LIST

This command allows the user to list lines from memory to the terminal. The three forms of the command are:

```
LIST LINE1,LINE2
L LINE1,LINE2
L <CARRIAGE RETURN> will list all lines in memory.
```

The arguments for this command are:

LINE1 - The beginning line to be listed.

, - Required separator if the second argument is typed in.

LINE2 - An optional argument denoting the last line to be listed.

NOTE: To pause during a list, tap the space bar. You can then either type in any character except space bar to terminate listing or tap the space bar again to resume listing.

3-3 INSERT

This command allows the user to insert lines into memory or to replace lines which already exist. There is a long and short form for this command. The formats of the INSERT command are:

```
INSERT LINE1 TEXT
I LINE1 TEXT
```

The arguments for this command are:

LINE1 - The line where text is to be inserted. If this line already exists, it will be replaced by the new line.

TEXT - The body of the line to be inserted.

3-4 CLEAR

The CLEAR command is equivalent to a system power up. It will erase everything in the SYSTEM memory except CONFIG parameters and line formats, this command is similar to POWER ON RESET. SLOAD program which have been read into memory will be erased, too. CLEAR will set "V" and "Q" Commands to OFF.

3-5 DELETE

This command is used to delete lines. It has both a long and short form. The DELETE command formats are:

```
DELETE LINE1,LINE2
DEL LINE1,LINE2
DEL <CARRIAGE RETURN> WILL DELETE ALL LINES
```

The arguments for this command have the following meaning:

LINE1 - The beginning line to be deleted.

, - A required separator if the LINE2 argument is used.

LINE2 - Optional argument specifying the last line to be deleted.

Examples:

```
DELETE 3,45  Deletes lines 3 through 45 inclusive
DELETE      Deletes all lines
DEL B       Deletes the beginning line only
DEL 70      Deletes line 70 only
DEL         Deletes all lines
```


This command works with the VON and QON sub-commands. In the case of VON, the line being deleted will be also listed. In the case of QON, the SYSTEM will print the line being deleted and a question mark "?". If the user wishes to delete the line, type a space. If the line is not to be deleted, type anything but a space.

3-6 CHANGE

The CHANGE command is used to change an existing string of characters to a new string of characters. The long and short forms of the CHANGE command are:

```
CHANGE LINE1,LINE2 /OLDSTRING/NEWSTRING/
C LINE1,LINE2 /OLDSTRING/NEWSTRING/
```

The arguments have the following meaning:

LINE1	The line where a search for the OLD STRING is to begin.
,	Required separator if LINE2 argument is typed in.
LINE2	An optional parameter which specifies the line, inclusive, where a search for the OLD STRING is to end.
/	Required delimiter surrounding the OLD STRING and the NEW STRING. This may be any character except a space. Also, for best results, do not use any character which appears either in the OLD STRING or the NEW STRING.
OLDSTRING	The OLD STRING of characters which is to be changed.
NEWSTRING	The NEW STRING of characters which is to replace the old string of characters.

This command will change every occurrence of OLDSTRING to NEWSTRING for every line in its search range.

This command will work with the VON and QON sub-commands. If VON is active, the SYSTEM will display the new line with its changes. If QON is active, the SYSTEM will display the old line with a question mark just beneath the part which is to be changed. If the user types a space, the change will be accepted. If anything else is typed, the change will not be accepted.

3-7 RENUM

This command renumbers all lines in memory. The first new line number will be 100 and all succeeding lines will be incremented by 100. At times, it is necessary to renumber so that many lines can be inserted between two lines which already exist. The format of this command is:

RENUM

EXAMPLE: You want to insert 150 lines between 300 and 400. You should first type in lines 301 through 399, RENUM, and then type your last 50 lines.

3-8 RESEQ

This command reorders block numbers. There are two formats of this command:

RESEQ LINE1,LINE2 KEEP,BLOXSTART INCREMENT
R LINE1,LINE2 KEEP,BLOXSTART INCREMENT

The arguments for this command are:

- LINE1** - The line where resequencing is to begin.
- ,** - Required separator if LINE2 is typed in.
- LINE2** - An optional parameter specifying the last line, inclusive, to be resequenced.
- KEEP** - KEEP/DELETE blocks code. Use one of the following codes:
 - K** - Keep all lines which do not have the block prefix(es) specified in the BLOX argument.
 - D** - Delete all lines which do not have the block prefix(es) specified in the BLOX argument.
- ,** - Required separator between KEEP and BLOX argument.
- BLOX** - An argument which lists the alphabetic prefixes of block numbers. There can be one or several block prefixes specified, separated by commas.
 - A,B,C** - Specifying all blocks beginning with either an "A", "B", or "C" should be resequenced.

- START** - New starting block number.
- INCREMENT** - Increment value to be used in resequencing, separated from the start argument by a space. This can be a 1 or 2 digit number, not negative and not zero.

The operation of this command is to resequence the block numbers on all lines from LINE1 to LINE2, inclusive, using the start value as the new first block value and incrementing subsequent blocks by the increment value. Lines containing blocks with the specified block prefixes can be kept or deleted as desired. Null lines will not be deleted.

- EXAMPLE:** RESEQ 10,20 K,N0010 10 Resequence all blocks having a prefix of "N". Start the search at line 10, go through line 20. New first block number is 0010, increment is 10. Keep all blocks which do not begin with "N" in resequence range.
- R 50,150 D,N0050 5 Resequence all blocks having a prefix of "N". Start the search at line 50, go through line 150. New first block number is 0050, increment is 5. Delete all blocks which do not begin with "N".

3-9 ICAN

Insert CAN cycle. What this command does is to take lines which already exist in memory and insert them somewhere else in memory. This is the command to use when trying to accomplish block moves or CAN cycle expansion. The format of this command is:

ICAN NUM1,LINE1

The arguments for this command mean:

- NUM1** - The CAN cycle number. There must be a line already existing in memory which has the form:

CAN <NUM1>

The SYSTEM will search memory until this line is found. <NUM1> should adhere to the following conventions:

- 1 - 4 digits
- Not 0
- Not less than 0

- , - Required separator between the two arguments.

LINE1 - The line where insertion of the CAN cycle is to begin. The SYSTEM will take each line following the CAN identifier and insert it starting at LINE1. If LINE1 already exists, it will be replaced. ICAN expects a CAN cycle group of lines to be terminated by an asterisk (*). ICAN increments the newly inserted lines by one. LINE1 must not be a line number which is in the CAN cycle itself. If it is, ICAN will print the error message "?" and terminate.

Consider the following ICAN example:

```
0010 CAN 5
00200 N0099X15Y28
00300 N0098G55Z60
00400 *
00500 N0075X40Y30
00600 N0076X25Y30
```

If we issue the command "ICAN 5,510", our results will be:

```
00100 CAN 5
00200 N0099X15Y28
00300 N0098G55Z60
00400 *
00500 N0075X40Y30
00510 N0099X15Y28
00511 N0098G55Z60
00600 N0076X25Y30
```

If we issue the command "ICAN 5,500", our results will be:

```
00100 CAN 5
00200 N0099X15Y28
00300 N0098G55Z60
00400 *
00500 N0099X15Y28
00501 N0098G55Z60
00600 N0076X25Y30
```

And if we issue the command "ICAN 5,599", our results will be:

```
00100 CAN 5
00200 N0099X15Y28
00300 N0098G55Z60
00400 *
00500 N0075X40Y30
00599 N0099X15Y28
00600 N0098G55Z60
```

Note the danger in the last example of CAN cycles which might overrun existing data. Line 600 has been replaced by line 300. If the user is not expecting this to happen, lines can be lost.

It is handy to have a tape with frequently used CAN cycles punched on it. The user can read this tape into memory at the beginning of an edit session and the CAN cycles can be used to create new NC tapes. The CAN cycle tape itself can be saved and reused with many different edit sessions.

3-10 OFFSET

This command allows the user to change a parameter value in a line (or lines) with an offset value. The operations performed on the parameter value can be either add, subtract, multiply, or divide. Zero suppress and decimal placement will be done automatically according to the format set in the line format from the CREATE command. If no line format exists, the OFFSET command will respond:

NO FMT. ENTER FORMAT (Example +SX#.#Y+#!#ZIG%#.#%):

See the section on line formats in the CREATE command to see how to develop a line format. This command will operate with the QON and VON sub-commands so that the user can selectively change parameter values and see the result immediately after the change is made. The OFFSET command will change only the first occurrence of a particular parameter in a line. There are two forms of the OFFSET command:

```
OFFSET LINE1,LINE2 PNAME OPERATOR VALUE
O LINE1,LINE2 PNAME OPERATOR VALUE
```

The arguments for this command have the following meaning:

- LINE1 - The line where offsetting is to begin.
- ,
- LINE2 - Optional argument specifying last line to be offset.
- PNAME - The name of the parameter. This can be 1 - 4 characters. They can be alphabetic, numeric, or controls, but they may not be % # ! + . (period).
- OPERATOR - The operation that is to be used in applying the offset value to the parameter value. This can be + -

* /

Multiply *Divide*

VALUE - The offset value. This is a number having the following format:

SNUM. NUM

Its parts mean:

- S - A sign character, either + or -. This character is not required if it is +.
- NUM - Integer part of the offset value. 1 to 8 digits.
- . NUM - Fractional part of the offset value. This is a 1 to 8 digit number, preceded by a decimal point.

For example:

OFFSET 10,50 ZIG * -3.3 Will search lines 10 through 50 for the parameter named ZIG. If any are found, their ZIG parameter value will be multiplied by -3.3 and the new value will be stored in the line.

3-11 QON AND QOFF

The QUALIFY-ON (QON) command turns on the QUALIFY MODE which is used with CHANGE, CREATE, DELETE, and OFFSET. When this mode is enabled, the SYSTEM will not take action on a line without the approval of the user. This is accomplished by displaying a question mark "?" underneath the part of the line to be changed (in the case of the CHANGE and OFFSET commands) or immediately after the line (in the case of CREATE and DELETE). After displaying the "?", the SYSTEM will wait for the user's response. If a space is typed, the line has been approved and the SYSTEM will take the appropriate action. If anything other than a space is typed, the SYSTEM will take no action. Typing the ABORT character will terminate the CHANGE, CREATE, DELETE, or OFFSET command altogether and return control to the SYSTEM.

The QOFF command turns off the QUALIFY MODE which is used with CHANGE, CREATE, DELETE, and OFFSET.

3-12 VON AND VOFF

VON turns on the special VERIFICATION MODE for the commands CHANGE, CREATE, DELETE, and OFFSET. When VON is issued, any line which is acted upon through one of these four commands will be displayed on the terminal.

Using the VON command provides a handy way to find all occurrence of a character string. Follow the sequence below to find all lines which contain "ZIG":

```
QOFF
VON
C B,E /ZIG/ZIG/
```

The SYSTEM will search each line, from beginning to end, and change each occurrence of "ZIG" to "ZIG", echoing each line as it is changed.

Since your old and new character strings are the same, the lines will be the same before and after the change, but the SYSTEM will have listed out for you each line with a ZIG in it.

VOFF turns off the VON mode.

3-13 TEST

Issuing this command will execute a SYSTEM self-diagnostic report which will give indications of the state of various internal components. The test is a hexadecimal bit count of each of the ROMs and a check of the RAM. An example of the report follows:

ROM1	ROM2	ROM3	ROM4	RAM
2374	E04E	3F1C	NONE	GOOD

SYSTEM II has 48K of RAM memory. It will take approximately 5 MINUTES to run the test. This test is not stopable by any command and VDT keyboard is locked out during test.

IMPORTANT: THIS TEST WILL REMOVE ANY PROGRAM STORED IN MEMORY.

3-14 VER

This command will display the version of SYSTEM software installed in your machine.

IV. LET'S INPUT FROM THE READER

This section deals exclusively with commands that involve the use of the tape reader. The commands will be described in detail together with their arguments and short form. A summary of these commands may be found in Appendix I.

The commands that will be covered in this section are:

- 4-1 READ and four short forms
- 4-2 VERIFY
- 4-3 FLOAD (FORMAT LOAD)

4-1 READ

This command reads a tape from the reader/punch into memory. If there are already lines in memory, it will append the new lines to the end. There are several forms of this command.

READ - Go through Question and Answer Session before reading
 RE - Read EIA
 REL - Read EIA and List
 RA - Read ASCII
 RAL - Read ASCII and List

Prior to entering any of the commands shown above, load the tape into the reader. The tape should be positioned so a minimum of one inch of tape is between the start of the program and the read head. It is acceptable to position the read head anywhere on the leader or man-readables as long as this condition is met. After closing the tape lid, depress the reader run switch. This will turn on the run LED, but the tape will not advance.

EOT or End of Tape during a READ command occurs when the SYSTEM II has read a 132 character without finding a carriage return. The maximum number of characters between two line terminators is 132 characters. When this condition is not met the SYSTEM II will stop the reader and issues the EOT prompt.

If the "READ" command is used, a three-part Question and Answer Session will follow as outlined below:

QUESTION #1 CODE OF TAPE IN READER (A=ASCII E=EIA)?

What is the format of the input tape? Respond with one of the following codes:

- E - EIA tape
- A - ASCII tape

NOTE: The issuance of this question is governed by CONFIG Para. No. 15. If the Second digit of this parameter is set to a "2" or "3", then this question will not appear.

QUESTION #2 DELETE COMMENTS (Y N)?

Shall comments on the incoming tape be deleted? Comments are characters between the comment delimiters established through parameters 00 and 01 in CONFIG. Respond with one of the following:

- Y - Yes, delete comments and their delimiters.
- N - No, do not delete comments.

QUESTION #3 PRINTOUT (Y N)?

Shall the SYSTEM list the tape at the terminal as it is being read in or printout a hard copy?

- Y - Yes, print a hard copy. If the command LPON has been issued, the hard copy listing will be sent to the line printer, but not the terminal.
- N - No, list on terminal.

.1m 10

Once these questions have been answered, the SYSTEM will proceed to read mode.

READ MODE

When the SYSTEM begins reading, it first skips over the leader and man-readables looking for a file mark (parameter 05 in CONFIG) which has been preceded by 5 nulls, spaces, deletes, or data link escapes. When the file mark is detected, it is displayed on the terminal and the input checksum is set to zero. The very next character after the file mark is taken to be the first character of data, and computation of the input checksum is begun. If any of the short forms of the READ command have been used, the SYSTEM will not delete comments.

If the tape is a large one, there is a possibility that your SYSTEM will not have enough memory to hold it all. In this case, the SYSTEM will display the following message:

MEMORY NEAR FULL

This means that there are about 500 characters of memory left. In this case, the user should edit what is in memory, punch it out on tape, delete the lines just

When the last segment of tape has been read into memory, the SYSTEM will skip over the trailer and print the checksum of the input tape. This checksum is an accumulation of every character on the tape, from the first character after the file mark to the last character of the last line. All comments, even if they were deleted during input, will be included in the checksum calculation. When the checksum is printed, compare it with the prerecorded checksum. If they are not the same, there has been an error while reading the tape, or the tape has been damaged since it was punched.

NOTE: It is very important not to manually move the tape in the reader if it is being read in segments. Let the SYSTEM move the tape.

4-2 VERIFY

This command is used to check tapes for punch errors or tape damage. Load the tape into the reader at least one inch prior to the start of the program, close the lid, turn on reader run switch, type "VERIFY". This will cause the SYSTEM to begin reading the tape. It will first look for a file mark. When one is found, it will print it on the terminal, zero the checksum, and begin reading the rest of the tape as data. It will read to the end of the tape, calculating a checksum which it will print when it is done in the following format:

INPUT CHECKSUM = NNNN

NNNN will be a 4-digit number and should match the checksum which has been recorded on the tape. If there is a difference, the tape may be damaged, or there may have been an error during reading or punching.

4-3 FLOAD

This command will load "line format parameter" tapes into memory. The procedure for preparing the tapes is described in section 5-3.

The new format should be loaded into memory prior to entering the "CREATE" mode. The procedure is as follows:

1. Load format tape into reader and turn on.
2. Type "FLOAD".
3. The SYSTEM will respond by printing the file mark character (CONFIG parameter 05- defaults to %) and then displaying the new line format.
4. The new format is now stored and will be retained even after power is turned off.

V. IT'S NOW TIME TO PUNCH OUR PROGRAM

This section deals exclusively with commands that involve the use of the tape punch. The commands will be described in detail, together with their arguments and short form. A summary of these commands may be found in Appendix I.

This section will describe the following commands and procedures:

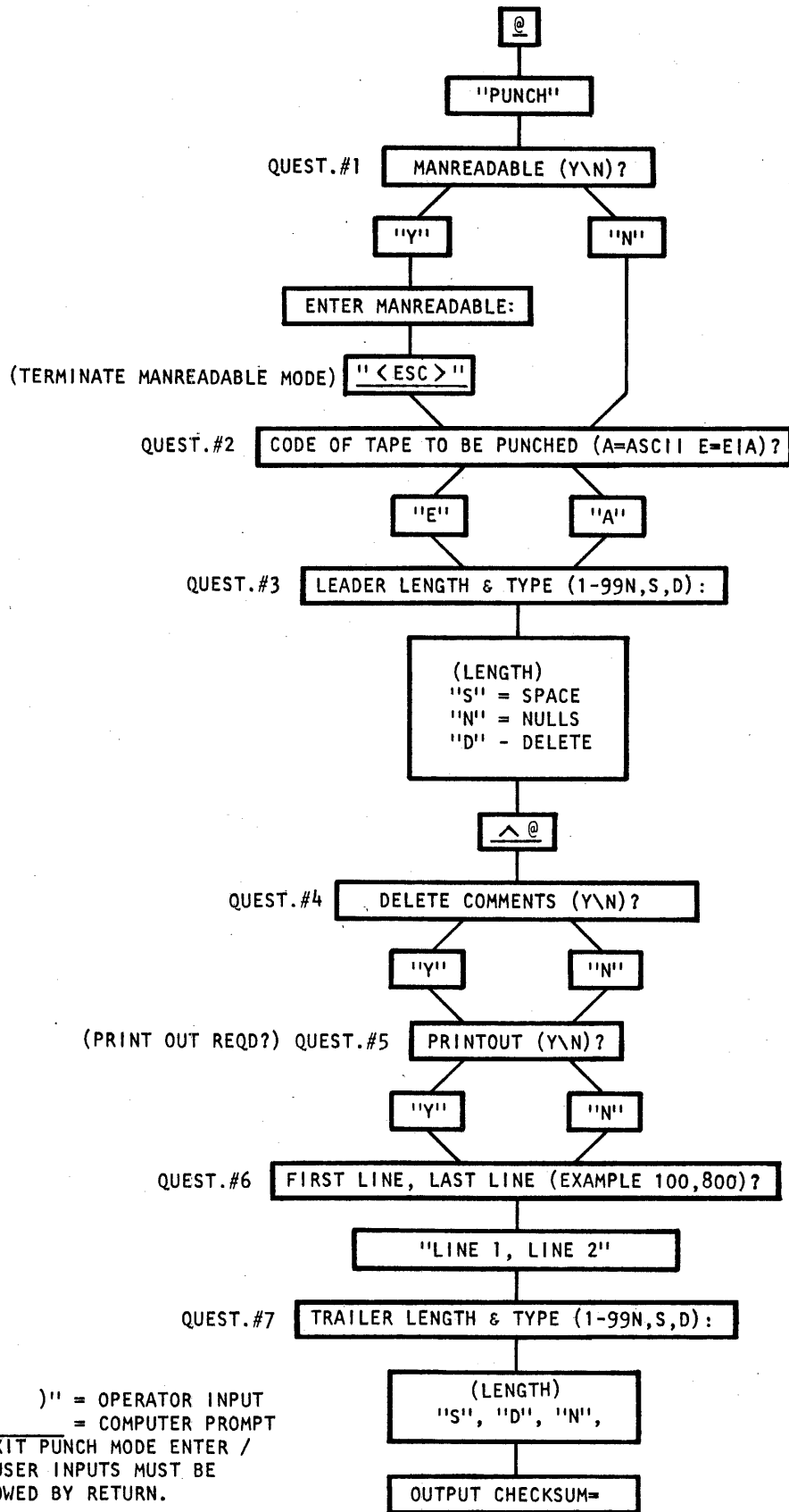
- 5-1 PUNCH and 13 short forms
- 5-2 DUP (DUPLICATE)
- 5-3 PREPARING PARAMETER FORMAT TAPES

5-1 PUNCH

Using the punch command causes lines in memory to be sent to the reader/punch. They will not be deleted from memory after they are sent. There are several short forms of this command:

PUNCH	- Punch with full prompting from the SYSTEM.
PM	- Punch man-readable.
PEL LT	- Punch EIA leader of length L, and type T.
PEL	- Punch EIA leader, prompt for length and type.
PED LINE1,LINE2	- Punch from LINE1 to LINE2 as EIA data.
PEDL LINE1,LINE2	- Punch from LINE1 to LINE2 as EIA data and list.
PET LT	- Punch EIA trailer of length L and type T.
PET	- Punch EIA trailer, prompt for length and type.
PAL LT	- Punch ASCII leader of length L and Type T.
PAL	- Punch ASCII leader, prompt for length and type.
PAD LINE1,LINE2	- Punch from LINE1 to LINE2 as ASCII data.
PADL LINE1,LINE2	- Punch from LINE1 to LINE2 as ASCII data.
PAT LT	- Punch ASCII trailer of length L and type T.
PAT	- Punch ASCII trailer, prompt for length and type.

The command "PUNCH" initiate a seven-part Question and Answer Session that is shown on Figure 2 on the next page. Detail of this session are shown below.



- NOTES: (1) "()" = OPERATOR INPUT
 (2) _____ = COMPUTER PROMPT
 (3) TO EXIT PUNCH MODE ENTER /
 (4) ALL USER INPUTS MUST BE FOLLOWED BY RETURN.

PUNCH A PROGRAM

FIGURE 2

QUESTION #1 MANREADABLE (Y\N)?

The SYSTEM wants to know if there are manreadables to be punched. The responses to this are:

- N - No. The SYSTEM will proceed to Question #2.
- Y - Yes. The SYSTEM will prompt for manreadables with ENTER MANREADABLE:
The user can now type in manreadables of whatever length is desired. The command prefix (see parameter 02 under CONFIG, Default to Escape) will terminate manreadable mode if it is the first character on the line.

QUESTION #2 CODE OF TAPE TO BE PUNCH (A=ASCII E=EIA)

The SYSTEM wants to know the output format of the tape. The response to this is one of the following:

- E - EIA
- A - ASCII

NOTE: The issuance of this question is governed by CONFIG Para. Number 15. If the first digit of this parameter is set to a "2" or "3", then this question will not appear.

QUESTION #3 LEADER LENGTH & TYPE (1-99N,S,D)?

How long in inches is the leader and what kind of character will it be? The user should respond with a 1- or 2-digit number and one of the following letters:

- S - Leader composed of spaces
- N - Leader composed of nulls
- D - Leader composed of deletes

When the leader has finished punching, the SYSTEM will punch a file mark, zero the checksum, print a file mark on the terminal and proceed to Question #4.

QUESTION #4 DELETE COMMENTS (Y\N)?

Should comments be deleted from the lines as they are being punched? The response should be one of the following:

- N - No. Leave comments in.
- Y - Yes. The SYSTEM will delete all characters between the comment delimiters (parameters 00 and 01 in CONFIG) and the comment delimiters themselves before punching.

QUESTION #5 PRINTOUT (Y\N)?

Shall the SYSTEM list the lines on the printer as they are being punched? Respond:

Y - Yes.

N - No.

If the LPON command has been issued, the listing will be sent to the line printer.

QUESTION #6 FIRST LINE, LAST LINE (EXAMPLE 100,800)?

Where shall punching begin and end? The SYSTEM expects the following:

LINE1,LINE2

LINE1 is required and is the beginning line to be punched.

LINE2 is optional, separated from LINE1 by a comma, and is the last line to be punched.

If all lines are to be punched just enter a Carriage Return and all lines will be punched out.

The SYSTEM will now begin punching the lines from LINE1 and LINE2 and accumulating the checksum.

QUESTION #7 TRAILER LENGTH & TYPE (1-99N,S,D)?

How long in inches is the trailer and what type of character should it be made of? The user should type in a 1- or 2-digit number and one of the following letters:

S - Trailer composed of spaces.

N - Trailer composed of nulls.

D - Trailer composed of deletes.

The SYSTEM will now punch the trailer and print the checksum in the following format:

OUTPUT CHECKSUM = NNNN

NNNN is a 4-digit number which is the accumulated checksum of the tape and should be recorded so that when the tape is read in or verified, its read-in checksum can be compared with the output checksum. The two should be the same. If they are not, there has been a read or punch error and the data read in will be incorrect. The user can either manually write the output checksum on the tape or use the "PM" command to punch it on the end of the tape as a manreadable.

The other commands in the list above perform suboperations of the "PUNCH" command. They do the following:

- PM - Punch manreadables. The SYSTEM will respond with the ENTER MANREADABLE: prompt and the user can then type in manreadables until he types in a command prefix (see parameter 02 under CONFIG, Defaults to Escape) as the first character of a line.
- PEL LT - Punch an EIA leader of length L (1 or 2 digits) and of type T (S, N, or D meaning spaces, nulls, or deletes). Punch a file mark and zero the checksum.
- PEL - Same as "PEL" above except let the SYSTEM prompt for the length and type of leader with Question #3 described above.
- PED LINE1,LINE2 - Punch an EIA tape from LINE1 to LINE2 in memory and accumulate a checksum. If LINE2 is not included, only LINE1 will be punched. Comments will not be deleted under this command. If the LINE1 to LINE2 argument is left off and a return is entered after the PED command, the entire program from beginning to end will be punched.
- PEDL LINE1,LINE2 - Same as "PED" above except that a listing is sent to the terminal.
- PET LT - Punch an EIA trailer of length L (1 or 2 digits) and of type T (S, N, or D meaning spaces, nulls, or deletes). The SYSTEM will print the output checksum when finished with the trailer, unless no data was punched before the trailer.
- PET - Same as "PET" above except let the SYSTEM prompt for the length and type of trailer with Question #5 described above.
- PAL LT - Same as "PEL LT" above except an ASCII leader is punched.
- PAL - Same as "PEL" above except an ASCII leader is punched.

- PAD LINE1,LINE2 - Same as "PED LINE1,LINE2" above except that an ASCII tape is punched.
- PADL LINE1,LINE2 - Same as "PEDL LINE1,LINE2" above except that an ASCII tape is punched.
- PAT LT - Same as "PET LT" above except that an ASCII trailer is punched.
- PAT - Same as "PET" above except that an ASCII trailer is punched.

The short forms of the PUNCH commands are especially useful when it is necessary to punch several groups of lines in memory which are not contiguous. The user can punch a leader, as many different groups of lines as desired, and then punch a trailer. The lines will not be deleted from memory until the delete command is issued.

5-2 DUP (DUPLICATE)

The DUP command is used to duplicate an existing tape, either exactly as it is or with optional changes. Entering the DUP command will initiate a Question and Answer Session between the SYSTEM and the user. The answers to these questions will determine what changes are to be made. To proceed, load the reader with the manreadables prior to the read head and turn on the reader and punch. Type "DUP". The Question and Answer Session will proceed as follows:

QUESTION #1 CODE OF TAPE IN READER (A=ASCII E=EIA)?

The SYSTEM wants to know the format of the input tape. The proper response to this question is:

- A - ASCII input
- E - EIA input

NOTE: The issuance of this question is governed by CONFIG Para. No. 15. If the second digit of this parameter is set to a "2" or "3", then this question will not appear.

QUESTION #2 CODE OF TAPE TO BE PUNCHED (A=ASCII E=EIA)?

The SYSTEM wants to know the format of the output tape. The responses are the same as for the first question.

If the user has an ASCII input tape and wishes to convert it to EIA, respond "A" to the first question and "E" to the second question, and it shall be done.

NOTE: The issuance of this question is governed by CONFIG Para. No. 15. If the second digit of this parameter is set to a "2" or "3", then this question will not appear.

QUESTION #3 DELETE COMMENTS (Y N)?

The SYSTEM wants to know whether to delete comments from the incoming tape. Comments are defined as the characters between the two comment delimiters established in parameters 00 and 01 of CONFIG. The responses to this question are:

- Y - Delete all characters within the comment delimiters and the comment delimiters themselves. Comments will not appear on the output page.
- N - Copy to all data, including comments, from the input tape to the output tape.

QUESTION #4 MANREADABLE (Y N)?

The SYSTEM wishes to know if the user wants a new manreadable on the output tape. The responses to this question are:

- Y - We want a new manreadable. The SYSTEM will now prompt the user for a new manreadable, which will completely replace the old manreadable from the input tape.
- N - Copy the manreadable from the old tape to the new tape.

NOTE: If the user specifies different input and output tape formats, the SYSTEM will prompt for a new manreadable and leader/trailer instead of asking Question #4. This is a consequence of being unable to tell when the manreadable stops and the leader starts.

5-3 PREPARING PARAMETER FORMAT TAPES

If you require several different formats and would like to easily change them, tapes can be prepared that store the line format information. This eliminates the need to key them in as described in section 3-1. The procedure is as shown below. Be sure the punch is on before you start the procedure.

PROMPT	RESPONSE
@	CLEAR
@	CREATE 100
AUTO FORMATING (Y\N)	N
AUTO BLOCK NUMBER	N
100	X+%%####.##Y%%%% ##.%%ZIG+###!###
200	/
@	PUNCH
MANREADABLE (Y\N)?	Y (SEE NOTE 3)
ENTER MANREADABLE:	FORMAT 1
ENTER MANREADABLE:	<ESCAPE>
CODE OF TAPE TO BE PUNCHED (A=ASCII E=EIA?)	A
LEADER LENGTH & TYPE (1-99N,S,D):	5N
DELETE COMMENT (Y\N)?	Y
PRINTOUT (Y\N)?	N
FIRST LINE, LAST LINE (EXAMPLE 100,800)	B,E
TRAILER LENGTH & TYPE (1-99N,S,D):	5N
OUTPUT CHECKSUM=	(SEE NOTE 4)
@	

NOTES:

1. All responses must be followed with "RETURN".
 2. The response to prompt 100 is only an example.
 3. The response to prompt MANREADABLE (Y\N)? may be "Y" or "N".
 4. The checksum will be calculated and printed to the right of OUTPUT CHECKSUM =
 5. The checksum may be punched into the tape by using the "PM" command. See Section 5-1.
- These tapes are read into memory with the "FLOAD" command that is described in section 4-3.

VI. THE HARDCOPY PRINTOUT

The SYSTEM has the ability to make a hardcopy printout of:

- A. All or part of a program stored in memory.
- B. A program while it is being read into memory.
- C. A program while it is being punched out.

6-1 POWER UP AND LPON

When the system is powered up, the LPON command automatically connects the system to the printer logic. If the printer is deselected, the following prompt appears on the VDT screen and the operator must then use the LPON command manually from the keyboard.

CHECK PRINTER - ENTER LPON

If this prompt should appear it means that there is a problem communicating between the SYSTEM and the printer. You should check the printer cable connection, check if there is paper in the printer and if the printer selected check SEL switch and LED. Any of these conditions can cause the prompt to appear.

Once the problem has been corrected the printer can use, but the LPON command must be used to connect the system software to the printer logic.

NOTE: Some additional care must be used when using a serial printer in place of the standard DSI parallel printer. If for some reason the printer is deselected when the SYSTEM is powered up, deselected usually means out of paper or SELECT switch is off, the SYSTEM will wait until the printer is selected before the @ prompt is issued. In the serial printer mode the prompt "CHECK PRINTER - ENTER LPON" is not displayed on the VDT.

6-2 LPON AND LPOFF

In order to prepare the printer to accept the program after using "COMM" or "LPOFF", the command "LPON" must be entered. This command connects the system software to the printer logic. To disconnect the printer from the system, use the command "LPOFF".

6-3 PRINTOUT ALL OR PART OF A PROGRAM IN MEMORY

Enter command LPON. If it was previously entered and not turned off with LPOFF, you need not reenter it now. Enter the following command for a hardcopy printout:

LP LINE1,LINE 2

LINE1 is the first line to be printed.
LINE2 is the last line to be printed.

If the entire program is to be printed, the following short forms may be used:

LP B,E

LP <CARRIAGE RETURN> will printout entire program in memory from beginning to end.

6-4 PRINTOUT WHILE PROGRAM IS READ IN

Be sure you have entered LPON and answer yes to Question #3 in section 4-1.

6-5 PRINTOUT WHILE PROGRAM IS PUNCHED

Be sure you have entered LPON and answer yes to Question #5 in section 5-1.

VII. WHAT ABOUT COMMUNICATION WITH A TIME-SHARE SYSTEM OR YOUR CNCs?

7-1 THE THREE INTERFACES

The SYSTEM provides three interfaces that allow the user to communicate to a wide range of electronic devices. The interfaces are:

- Serial RS-232
- TTY Current Loop
- Parallel (Facit 4070)

The serial RS-232 may be connected to a modem that will allow access to a time-share system or it may be used to locally or remotely communicate with a CNC. Connection to a CNC would allow the user to download programs or pull tapes. In essence, the user has a DNC hook-up.

The TTY current loop may be used in a similar fashion. However, it has the ability to send signals over a longer distance. A switch is provided on the reader/punch that allows the user to select RS-232 or TTY current loop. A different device may be connected to each port.

The parallel port can only be used with cables of 20 feet or less; thus, the user would normally disconnect the printer and video display terminal from the system and simply take the reader/punch to the CNC. The parallel port is receive only; thus, the user may only pull a tape from the CNC. Down loading is not possible.

7-2 THE "COMM" COMMAND

The COMM command allows the SYSTEM to link to remote equipment through the modem port (serial RS-232 OR TTY current loop).

The "COMM" command will affect the status of the printer. "COMM" disables the printer and when "COMM" is exited returning to the local mode a "LPON" command must be done before a printout can be obtained.

The "COMM" operation is affected by the following "CONFIG" parameters: 02, 06, 07, 08, 09, 11, 13, 14. See Section II, Setup.

E.
7-2 THE "COMM" COMMAND, cont.

NOTE: When using "COMM", the baud rate for the modem port is controlled by CONFIG parameter 13. The CONFIG parameter 11 will set up the modem port for FULL or HALF duplex operation. CONFIG parameter 11 also will select how the data is to be sent to the host computer using XON XOFF protocol. Example: when parameter 11 is set to 01, the data will be sent to the Host one line at a time, when an XON is received the data is not displayed on the screen since the system is set for FULL duplex. The parity of the data during "COMM" is controlled by CONFIG parameter 14, and can be set for ODD, EVEN, or NO PARITY.

The REM CTL LED is always off when in the COMM MODE, regardless of how CONFIG parameter 11 is programmed.

COMM

The first question from the System is:

COMMUNICATION CODE (A=ASCII E=EIA)?

The purpose of this question is to establish the format of the data coming from and to the host. Responses are:

E-This means that the data from and to the host is in EIA format. It will be converted to ASCII format by the SYSTEM before being stored in SYSTEM memory.

A-This means that the data from and to the host is in ASCII format. The SYSTEM will perform a parity check before storing it in memory.

7-2 THE "COMM" COMMAND, cont.

The user is now ready to communicate with the time-share system. Anything typed in will be sent to the time-share system for interpretation unless it is in the SYSTEM sub-command form. In order to communicate with the SYSTEM, the user must type in a command prefix (the ESC character, unless otherwise set by the CONFIG command) followed by one of the following sub-command letters:

SUB-COMMAND
 ___LETTER___

FUNCTION

- | | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B | Sends a 350-MS break to the time-share system. This is the SYSTEM equivalent to hitting the break key. Do not use the break key itself, since it will change the baud rate between the terminal and the reader/punch. |
| (ESC) E | ABORT ends the COMM command and returns the user to local SYSTEM processing. This is the only way to terminate COMM. |
| O | Turn off the record function. This will terminate the transmission of data from the time-share system to the SYSTEM memory. The SYSTEM responds to this sub-command by printing the number of the last line which has been recorded in memory. |
| P | Turn on the playback function. This sub-command will send lines which have been recorded in memory. The transmitted lines will be sent with ODD parity for EIA and with the parity set by parameter 14 in CONFIG for ASCII. The SYSTEM will question which lines are to be displayed. Your response will be the line numbers, using the standard line number conventions discussed in section 2.0. The SYSTEM will then display "PLAYBACK ON", the requested lines, and "PLAYBACK OFF". There are three way to terminate playback: |

7-2 THE "COMM" COMMAND, cont.

1. Let it send all the lines requested. At the end of data, playback will terminate by itself.
2. If the time-share system sends a READER-OFF character which is not followed within 30 seconds by a READER-ON character, playback will terminate.
3. Tap the space bar and then the ABORT character (see above).

There is also one way to pause during playback. Tap the space bar and it will pause. Tap the space bar again and it will resume playing back data.

{ESC}R

Turn on the record function. This will cause received lines of data to be recorded directly into SYSTEM memory. When this sub-command is entered, the SYSTEM will respond "RECORD ON @ LINE NUMBER". The line number in this message is the next available line in SYSTEM memory and is the starting point for storing the lines which are going to be typed in. If the memory is EMPTY, the Record Function will start entering data at line 200. Line numbers will be incremented by 100 as they are stored. To terminate the record function, type in ESC O, as previously described. The record function will terminate automatically when memory is nearly full.

NOTE: When recording ASCII data, parameters 6,7,8, and 9 must be set to match the data being recorded. When recording EIA data, each line must end with hex 80.

NOTE: During parity checking, odd parity for EIA data and according to CONFIG parameter 14 for ASCII, any character which has invalid parity will be replaced with a backslash.

APPENDIX I

INDEX OF COMMANDS

<u>LONG FORM</u>	<u>SHORT FORM</u>	<u>FORMAT</u>	<u>SECTION</u>	<u>FUNCTION</u>
CHANGE	C	CHANGE LINE1,LINE2 /OLD STRING/NEW STRING/	3-6	Change old string to new string in defined part of the program
CLEAR		CLEAR	3-4	Erase all programs from memory
COMM		COMM	VII	Turn on modem port
CONFIG		CONFIG	II	Used to tailor particular applications and particular hardware
CREATE		CREATE LINE1	3-1	Allows operator to key in program
DELETE	DEL	DELETE LINE1,LINE2	3-5	Used to delete lines in the defined part of the program
DUP		DUP	5-2	Used to make duplicates of existing tapes, exact or with optional changes
FLOAD		FLOAD	4-3	Load line format tape
ICAN		ICAN NUM1,LINE1	3-9	Takes lines which already exist in memory and inserts them somewhere else
INSERT	I	INSERT LINE1 TEXT	3-3	Used to insert or replace line in memory
LINE	L	LIST LINE1,LINE2	3-2	Used to list lines over range specified on the terminal
LP		LP LINE1,LINE2	6-2	Hardcopy printout over range specified (must issue LPON command first)
LPON		LPON	6-1	Turn on printer
LPOFF		LPOFF	6-1	Turn off printer
OFFSET	O	OFFSET LINE1,LINE2 PNAME OPERATOR VALUE	3-10	The following operations may be applied to a parameter over range specified,+,-,*,-/
PUNCH	SEE MANUAL	PUNCH (See manual for 13 other formats)	5-1	Sends lines in memory to punch
QOFF		QOFF	3-11	Turns off qualify mode
QON		QON	3-11	Turns on qualify mode
READ	SEE MANUAL	READ (See manual for 4 other formats)	4-1	Reads a tape into memory
RENUM		RENUM	3-7	Renums all lines in memory
RESEQ	R	RESEQ LINE1,LINE2 KEEP,BLOCKSTART INCREMENT	3-8	Reorders block numbers
TEST		TEST	3-13	Executes a self-test report
VER		VER	3-14	Displays version of the software
VERIFY		VERIFY	4-2	Reads tape and computes a checksum
VOFF		VOFF	3-12	Turns off VON
VON		VON	3-12	Turns on special verification mode

NOTE: All the commands above are responses to the @ prompt.

NOTE: A SPACE is required between the command and an argument for proper operation of that command.

APPENDIX I (continued)

ARGUMENTS OF COMMANDS

LINE1	First line where command should start, 1-6 digits, greater than 0,
LINE2	Last line that command should operate on, 1-6 digits, greater than 0,
B	Beginning of program, may be substituted for LINE1
E	End of program, may be substituted for LINE1 or LINE2
,	Separator
NUM1	The CAN cycle number (ICAN)
TEXT	Body of data to be inserted (INSERT MODE)
PNAME	Name of parameter. up to four characters--alphabetic, numeric or controls (OFFSET MODE)
OPERATOR	Operation that must be applied (+ - * /) (OFFSET MODE)
VALUE	Offset value (OFFSET MODE)
KEEP	Keep/Delete blocks code (RESEQ MODE)
BLOX	Alphabetic prefixes of block number (RESEQ MODE)
START	New starting block number (RESEQ MODE)
INCREMENT	Increment value (RESEQ MODE)

APPENDIX II

APPENDIX II is divided into four sections.

SECTION A The full ASCII character set with corresponding two-digit hex codes and paper tape hole patterns for even, odd, and no parity.

SECTION B The full EIA character set with corresponding two-digit hex codes and paper tape hole patterns for odd parity.

SECTION C The standard EIA-to-ASCII conversion table.

SECTION D The standard ASCII-to-EIA conversion table.

SECTION A

ASCII CHARACTER SET

ASCII CHAR	HEX	NO PARITY	EVEN PARITY	ODD PARITY
NUL	00	-----,----	-----,----	*-----,----
SOH	01	-----,---*	*-----,---*	-----,---*
STX	02	-----,--*-	*-----,--*-	-----,--*-
ETX	03	-----,---**	-----,---**	*-----,---**
EOT	04	-----,*.---	*-----,*.---	-----,*.---
ENQ	05	-----,*-*	-----,*-*	*-----,*-*
ACK	06	-----,***-	-----,***-	*-----,***-
BEL	07	-----,****	*-----,****	-----,****
BS	08	-----*,----	*-----*,----	-----*,----
HT	09	-----*,---*	-----*,---*	*-----*,---*
LF	0A	-----*,--*-	-----*,--*-	*-----*,--*-
VT	0B	-----*,---**	*-----*,---**	-----*,---**
FF	0C	-----*,*---	-----*,*---	*-----*,*---
CR	0D	-----*,*-*	*-----*,*-*	-----*,*-*
SO	0E	-----*,***-	*-----*,***-	-----*,***-
SI	0F	-----*,****	-----*,****	*-----*,****
DLE	10	---*-,----	*--*-,----	---*-,----
DC1	11	---*-,---*	---*-,---*	*--*-,---*
DC2	12	---*-,--*-	---*-,--*-	*--*-,--*-
DC3	13	---*-,---**	*--*-,---**	---*-,---**
DC4	14	---*-,*---	---*-,*---	*--*-,*---
NAK	15	---*-,*-*	*--*-,*-*	---*-,*-*
SYN	16	---*-,***-	*--*-,***-	---*-,***-
ETB	17	---*-,****	---*-,****	*--*-,****
CAN	18	---**,----	---**,----	*--**,----
EM	19	---**,---*	*--**,---*	---**,---*
SUB	1A	---**,--*-	*--**,--*-	---**,--*-
ESC	1B	---**,---**	---**,---**	*--**,---**
FS	1C	---**,*---	*--**,*---	---**,*---
GS	1D	---**,*-*	---**,*-*	*--**,*-*
RS	1E	---**,***-	---**,***-	*--**,***-
US	1F	---**,****	*--**,****	---**,****
SP	20	---*-,----	*--*-,----	---*-,----
!	21	---*-,---*	---*-,---*	*--*-,---*
•	22	---*-,--*-	---*-,--*-	*--*-,--*-
#	23	---*-,---**	*--*-,---**	---*-,---**
\$	24	---*-,*---	---*-,*---	*--*-,*---
%	25	---*-,*-*	*--*-,*-*	---*-,*-*
&	26	---*-,***-	*--*-,***-	---*-,***-
'	27	---*-,****	---*-,****	*--*-,****
(28	---*-*,----	---*-*,----	*--*-*,----
)	29	---*-*,---*	*--*-*,---*	---*-*,---*
*	2A	---*-*,--*-	*--*-*,--*-	---*-*,--*-
+	2B	---*-*,---**	---*-*,---**	*--*-*,---**

ASCII CHAR	HEX	NO PARITY	EVEN PARITY	ODD PARITY
,	2C	--*-.*-	*-*.*-	--*-.*-
-	2D	--*-.*-*	--*-.*-*	*-*.*-*
.	2E	--*-.**-	--*-.**-	*-*.**-
/	2F	--*-.***	*-*.***	--*-.***
0	30	--**-.---	--**-.---	*-**----
1	31	--**-.---*	*-**----*	--**-.---*
2	32	--**-.-*-	*-**--*-	--**-.-*-
3	33	--**-.**	--**-.**	*-**-**
4	34	--**-.*-	*-**-*-	--**-.*-
5	35	--**-.**	--**-.**	*-**-**
6	36	--**-.***	--**-.***	*-**-***
7	37	--**-.***	*-**-***	--**-.***
8	38	--***.---	*-***.---	--***.---
9	39	--***.---*	--***.---*	*-***.---*
:	3A	--***.-*-	--***.-*-	*-***.-*-
;	3B	--***.-**	*-***.-**	--***.-**
<	3C	--***.*-	--***.*-	*-***.*-
=	3D	--***.*-*	*-***.*-*	--***.*-*
>	3E	--***.**-	*-***.**-	--***.**-
?	3F	--***.***	--***.***	*-***.***
@	40	-*---.---	**---.---	-*---.---
A	41	-*---.---*	-*---.---*	**---.---*
B	42	-*---.-*-	-*---.-*-	**---.-*-
C	43	-*---.-**	**---.-**	-*---.-**
D	44	-*---.*-	-*---.*-	**---.*-
E	45	-*---.*-*	**---.*-*	-*---.*-*
F	46	-*---.**-	**---.**-	-*---.**-
G	47	-*---.***	-*---.***	**---.***
H	48	-*-*.---	-*-*.---	**-*----
I	49	-*-*.---*	**-*----*	-*-*.---*
J	4A	-*-*.-*-	**-*--*-	-*-*.-*-
K	4B	-*-*.**	-*-*.**	**-*-**
L	4C	-*-*.*-	**-*-*-	-*-*.*-
M	4D	-*-*.**	-*-*.**	**-*-**
N	4E	-*-*.***	-*-*.***	**-*-***
O	4F	-*-*.---	**-*----	-*-*.---
P	50	-*-*.---*	**-*----*	-*-*.---*
Q	51	-*-*.--*	**-*---*	-*-*.--*
R	52	-*-*.---*	**-*----*	-*-*.---*
S	53	-*-*.**	-*-*.**	**-*-**
T	54	-*-*.*-	**-*-*-	-*-*.*-
U	55	-*-*.**	-*-*.**	**-*-**
V	56	-*-*.***	-*-*.***	**-*-***
W	57	-*-*.***	**-*-***	-*-*.***

ASCII CHAR	HEX	NO PARITY	EVEN PARITY	ODD PARITY
X	58	-*-** .---	**--** .---	-*-** .---
Y	59	-*-** .--*	-*-** .--*	**--** .--*
Z	5A	-*-** .-*	-*-** .-*	**--** .-*
[5B	-*-** .-**	**--** .-**	-*-** .-**
\	5C	-*-** .*--	-*-** .*--	**--** .*--
]	5D	-*-** .*-*	**--** .*-*	-*-** .*-*
^	5E	-*-** .***	**--** .***	-*-** .***
_	5F	-*-** .***	-*-** .***	**--** .***
`	60	-**-- .---	-**-- .---	**-- .---
a	61	-**-- .--*	**-- .--*	-**-- .--*
b	62	-**-- .-*	**-- .-*	-**-- .-*
c	63	-**-- .-**	-**-- .-**	**-- .-**
d	64	-**-- .*--	**-- .*--	-**-- .*--
e	65	-**-- .*-*	-**-- .*-*	**-- .*-*
f	66	-**-- .***	-**-- .***	**-- .***
g	67	-**-- .***	**-- .***	-**-- .***
h	68	-**-* .---	**--* .---	-**-* .---
i	69	-**-* .--*	-**-* .--*	**--* .--*
j	6A	-**-* .-*	-**-* .-*	**--* .-*
k	6B	-**-* .-**	**--* .-**	-**-* .-**
l	6C	-**-* .*--	-**-* .*--	**--* .*--
m	6D	-**-* .*-*	**--* .*-*	-**-* .*-*
n	6E	-**-* .***	**--* .***	-**-* .***
o	6F	-**-* .***	-**-* .***	**--* .***
p	70	-***- .---	***- .---	-***- .---
q	71	-***- .--*	-***- .--*	***- .--*
r	72	-***- .-*	***- .-*	-***- .-*
s	73	-***- .-**	-***- .-**	***- .-**
t	74	-***- .*--	***- .*--	-***- .*--
u	75	-***- .*-*	-***- .*-*	***- .*-*
v	76	-***- .***	***- .***	-***- .***
w	77	-***- .***	-***- .***	***- .***
x	78	-**** .---	-**** .---	**** .---
y	79	-**** .--*	**** .--*	-**** .--*
z	7A	-**** .-*	-**** .-*	**** .-*
{	7B	-**** .-**	-**** .-**	**** .-**
	7C	-**** .*--	**** .*--	-**** .*--
}	7D	-**** .*-*	-**** .*-*	**** .*-*
~	7E	-**** .***	-**** .***	**** .***
DEL	7F	-**** .***	**** .***	-**** .***

SECTION B
EIA CHARACTER SET

EIA CHAR	HEX	ODD PARITY
NUL	00	-----,----
HT	3E	--***.**-
CR	80	*-----,----
DC2	4C	-*-**.*--
DC4	2F	--*-**.**
SP	10	----*-,----
!	6E	-**-*.**-
"	5D	-*-**.*-*
#	1C	---**.*--
\$	5B	-*-**.-**
%	0B	-----*.-**
&	0E	-----*.**-
'	3D	--***.*-*
(7A	-****.-*-
)	7C	-****.*--
*	0D	-----*.*-*
+	70	-***-,----
,	3B	--***.-**
-	40	-*-----,----
.	6F	-**-*.-**
/	31	--**-,---*
0	20	--*-,----
1	01	-----,---*
2	02	-----,.*-
3	13	---*-,.**
4	04	-----,*--
5	15	---*-,.*-*
6	16	---*-,**-
7	07	-----,***
8	08	-----*,----
9	19	---**,-*-
:	1A	---**,-*-
;	4F	-*-**.**
=	2A	---*-,.*-
?	6D	-**-*.*-*
@	1F	---**.**
A	61	-**-,---*
B	62	-**-,.*-
C	73	-***-,.-**
D	64	-**-,.*--
E	75	-***-,.*-*
F	76	-***-,**-
G	67	-**-,***
H	68	-**-,.*-,----

EIA CHAR	HEX	ODD PARITY
I	79	-****.---*
J	51	-*-*.---*
K	52	-*-*.---*
L	43	-*---.---*
M	54	-*-*.---*
N	45	-*---.---*
O	46	-*---.---*
P	57	-*-*.---*
Q	58	-*-*.---*
R	49	-*-*.---*
S	32	---*.---*
T	23	---*.---*
U	34	---*.---*
V	25	---*.---*
W	26	---*.---*
X	37	---*.---*
Y	38	---*.---*
Z	29	---*.---*
[2C	---*.---*
]	5E	-*-*.---*
~	4A	-*-*.---*
DEL	7F	*****.---

EIA	HEX	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
ASCII	HEX	00	31	32		34			37	38			25		2A	26	
ASCII	CHAR	NUL	1	2		4			7	8			%		*	&	
EIA	HEX	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
ASCII	HEX	20			33		35	36			39	3A		23			40
ASCII	CHAR	SP			3		5	6			9	:		#			@
EIA	HEX	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
ASCII	HEX	30			54		56	57			5A	3D		5B			14
ASCII	CHAR	0			T		V	W			Z	=		[DC4
EIA	HEX	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
ASCII	HEX		2F	53		55			58	59			2C		27	09	
ASCII	CHAR		/	S		U			X	Y			,		'	HT	
EIA	HEX	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
ASCII	HEX	2D			4C		4E	4F			52	7E		12			3B
ASCII	CHAR	-			L		N	O			R	~		DC2			;
EIA	HEX	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
ASCII	HEX		4A	4B		4D			50	51			24		22	5D	
ASCII	CHAR		J	K		M			P	Q			\$		']	
EIA	HEX	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
ASCII	HEX		41	42		44			47	48			2E		3F	21	
ASCII	CHAR		A	B		D			G	H			.		?	!	
EIA	HEX	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
ASCII	HEX	2B			43		45	46			49	28		29			7F
ASCII	CHAR	+			C		E	F			I	()			DEL

SECTION D
ASCII TO EIA CONVERSION TABLE

ASCII	HEX	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
EIA	HEX	00									3E				80		
ASCII	CHAR	NUL	SOH	STX	ETX	EDT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
ASCII	HEX	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
EIA	HEX			4C		2F											
ASCII	CHAR	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	VS
ASCII	HEX	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
EIA	HEX	10	6E	5D	1C	5B	0B	0E	3D	7A	7C	0D	70	3B	40	6B	31
ASCII	CHAR	SP	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
ASCII	HEX	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
EIA	HEX	20	01	02	13	04	15	16	07	08	19	1A	4F	2A		6D	
ASCII	CHAR	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
ASCII	HEX	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
EIA	HEX	1F	61	62	73	64	75	76	67	68	79	51	52	43	54	45	46
ASCII	CHAR	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
ASCII	HEX	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
EIA	HEX	57	58	49	32	23	34	25	26	37	38	29	2C		5E		
ASCII	CHAR	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
ASCII	HEX	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
EIA	HEX		61	62	73	64	75	76	67	68	79	51	52	43	54	45	46
ASCII	CHAR	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
ASCII	HEX	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
EIA	HEX	57	58	49	32	23	34	25	26	37	38	29			4A	7F	
ASCII	CHAR	p	q	r	s	t	u	v	w	x	y	z	{		}	~	DEL

APPENDIX III

CATALOG OF PROMPTS

MEMORY NEAR FULL	Data may be entered into memory through the keyboard, reader, or from remote sources. When the memory reaches the point where only 500 characters of space is available, this prompt is displayed. Data entry at this point should be stopped, if the source is the reader the system will stop it.
MEMORY TOO FULL	Prompt displayed when memory is full. Memory size is approximately 48,000 characters, which is equal to 400 feet of tape.
ACCEPTABLE FORMAT (Y\N)?	Is format stored in system proper for the tape you are preparing. Response: Y=Yes, N=No.
AUTO FORMATING (Y\N)?	Is automatic formatting required? Response: Y = Yes, N = No.
ENTER FORMAT (EXAMPLE +SX#.#Y+%#!#ZIG%#.#%):	Enter line format parameters. Response: +S, +T, parameter name, %, #, ., !, +SX#.#Y+%#!#ZIG%#.#%):
AUTO PROMPT(Y\N)?	Is automatic prompting required? Response: Y = Yes, N = No.
AUTO BLOCK NUMBERING?	Is automatic block numbering required? Response: Y = Yes, N = No.
STARTING BLOCK NUMBER (EXAMPLE N100)	Enter starting block number. Response: Up to 4 alphabetic and control prefix with up to 8-digit suffix.
STEP SIZE (1-99)	Enter increment between blocks. Response: Any interger between 1 and 99.
CODE OF TAPE IN READER (A=ASCII E=EIA)	Code of data being input? Response: A=ASCII E = EIA.
CODE OF TAPE TO BE PUNCHED (A=ASCII E=EIA)	Code of data being output? Response: A=ASCII, E = EIA.
DELETE COMMENT? (Y\N)?	Are comments to be deleted? Response: Y = Yes, N = No.
MANREADABLE (Y\N)?	Are manreadables to be punched? Response: Y = Yes, N = No.

APPENDIX III, cont.

ENTER MANREAD ABLE:	Enter manreadables. Response: Key in characters to be punched in tape. To exit mode type <ESC> as first character after prompt.
CONFIG DEFAULT	This message will appear at power-on if the battery has run down and the "parameters" have been reset to the default values.
LEADER LENTGH & TYPE (1-99N,S,D):	How long of a leader and what type is required? Response: Integer from 1 to 99 is the prefix. (Length in inches) suffix is choice of S = space, N = null, D = delete.
TRAILER LENGTH & TYPE (1-99N,S,D):	How long of a trailer and what type is required? Response: Same as leader above.
PRINTOUT (Y\N)?	Is a hardcopy printout required? Response: Y = Yes, N = No.
FIRST LINE, LAST LINE (EXAMPLE 100,800)?	What lines are to be printed? Response: First line number of the range and the last line number of the range separated by a comma (,). If first line is the start, a B may be substituted; and if the line is the end, an E may be substituted. eg: 100,800 B,E
TOO BIG	Prompt if data entered or expression calculated does not fit into defined format. eg: If X format is ##.##, the input 100 would be result in the prompt "TOO BIG".
INPUT CHECKSUM=	To the right of this prompt will be displayed the checksum of the input data.
OUTPUT CHECKSUM=	To the right of this prompt will be displayed the checksum of the output data.
?	When QUALIFY MODE is on; i.e., QON command has been entered. The ? will be displayed next to the action. If action is acceptable, press space bar. If not acceptable, press any other key.

APPENDIX IV

CATALOG OF SUB-COMMANDS

- <ESC>D Allows the user to delete an entire line without backspacing to the beginning of the line. May not be used in "COMM" mode (CTRL H).
- <ESC>V Allows the user to view an entire line without terminating a line. Useful in "CREATE" mode. May not be used in "COMM" mode.
- / Abort. Cancels line and return to @ prompt. May be changed through CONFIG. Must be first character of input to be recognized. May not be used in "COMM" mode. All information on line is deleted.
- <BACKSPACE> Moves cursor backwards and deletes character. May not be used in "COMM" mode.
- <BREAK KEY> On occasion, the user may find that the SYSTEM has the wrong baud rate (parameter 13 in CONFIG) for the terminal being used. If that happens, set the terminal to 300 baud and tap the break key. The SYSTEM will shift to 300 baud so the CONFIG command can be used to properly set parameter 10. THE BREAK KEY SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
- <RETURN> Terminates line.
- <ESC>Q Used to interrupt CREATE mode, will start Question and Answer Session and then return to place where interrupt occurred.
- <ESC>ICAN Allows the input of CAN cycles while in input mode.
- <SPACE BAR> Will stop scrolling on terminal; second depression will restart the scrolling.
- NOTE: <ESC> is the command prefix; it may be changed through CONFIG parameter 02.

COMM MODE SUB-COMMANDS

- <ESC>B Break
- <ESC>E Abort, ends COMM command
- <ESC>O Turn off record function
- <ESC>P Turn on playback function
- <ESC>R Turn on record function

APPENDIX IV (continued)

CONFIG MODE SUB-COMMANDS

- <RETURN> Value displayed will be left unchanged and the next parameter displayed.
- <NEW VALUE><RETURN> Will cause old parameter to be replaced with new value.
- /<RETURN> Terminates CONFIG.
- ^<RETURN> Allows user to go backwards through parameter list.

AUTO FORMAT INPUT

- +S Adds a space before each formatted parameter. May only be entered once at the beginning of the line format.
- +T Adds a tab before each formatted parameter. May only be entered once at the beginning of the line format.
- <PARAMETER NAME> Up to 4 characters--alphabetic, numeric, or controls.
- + Adds a plus sign to positive numbers.
- % Reserves numeric position; leading zeros may be deleted.
- # Reserves numeric position; numbers may not be masked out.
- . Decimal point position.
- ! Defines decimal point position but not printed on display.

LEADER INPUT

- S Space (Precede with integer up to 99)
- N Null (Precede with integer up to 99)
- D Delete (Precede with integer up to 99)

MANREADABLE MODE

- <ESC><RETURN> First character on line following prompt ENTER
MANREADABLE: will cause system to exit mode.

APPENDIX V

NC-2400EHX READER/PUNCH

115/230VAC selection is on the underside of the unit. The unit accepts automatically 50 or 60Hz without selection.

HAZELTINE ESPRIT II VISUAL DISPLAY UNIT

115/230VAC selection is on the underside of the unit. 50/60Hz selection is dip-switch settable on the rear of the unit (position 4 on the dip switch to the right--see on following page).

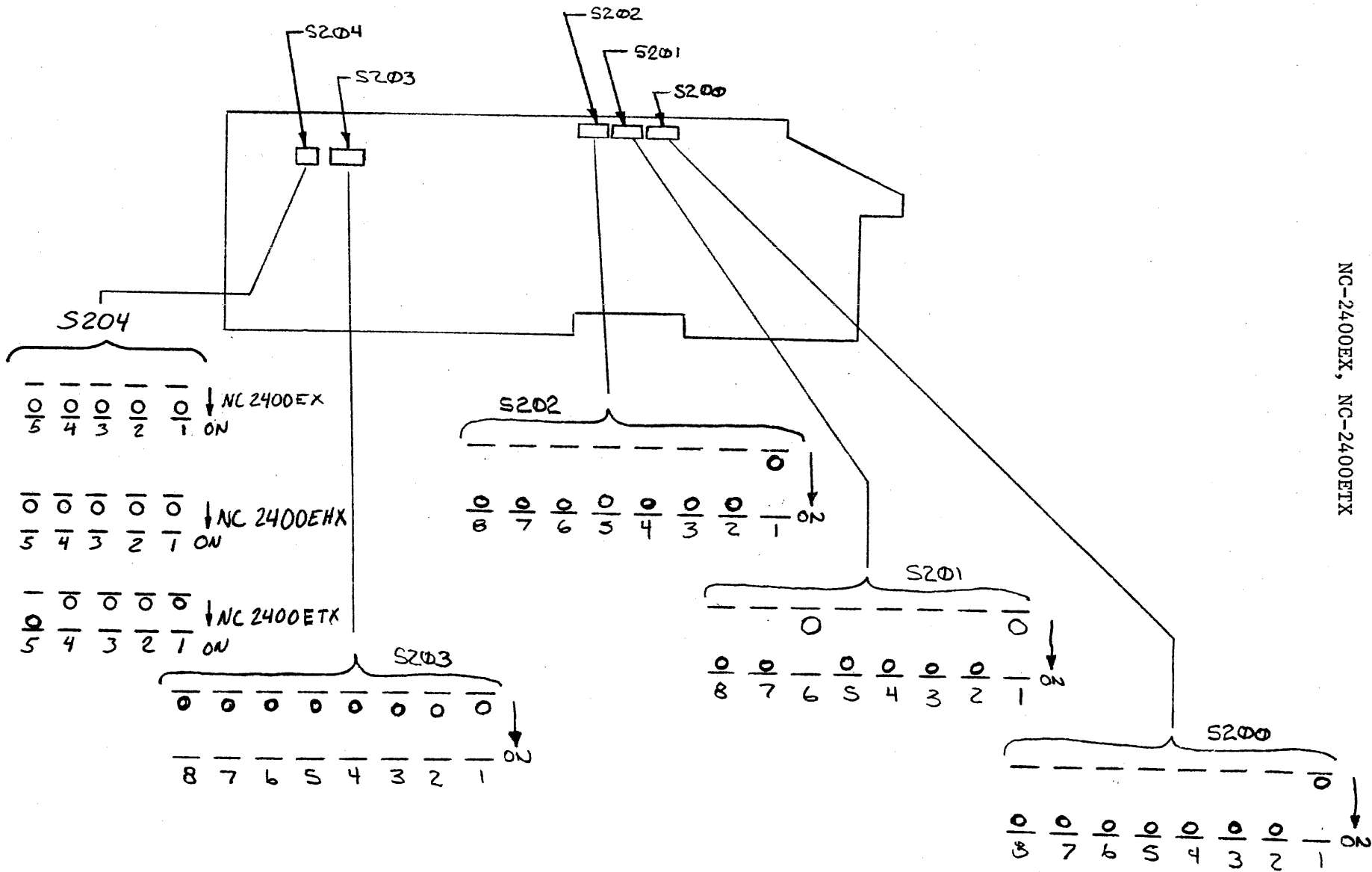
OKIDATA MODEL 82-A OR 82-AV

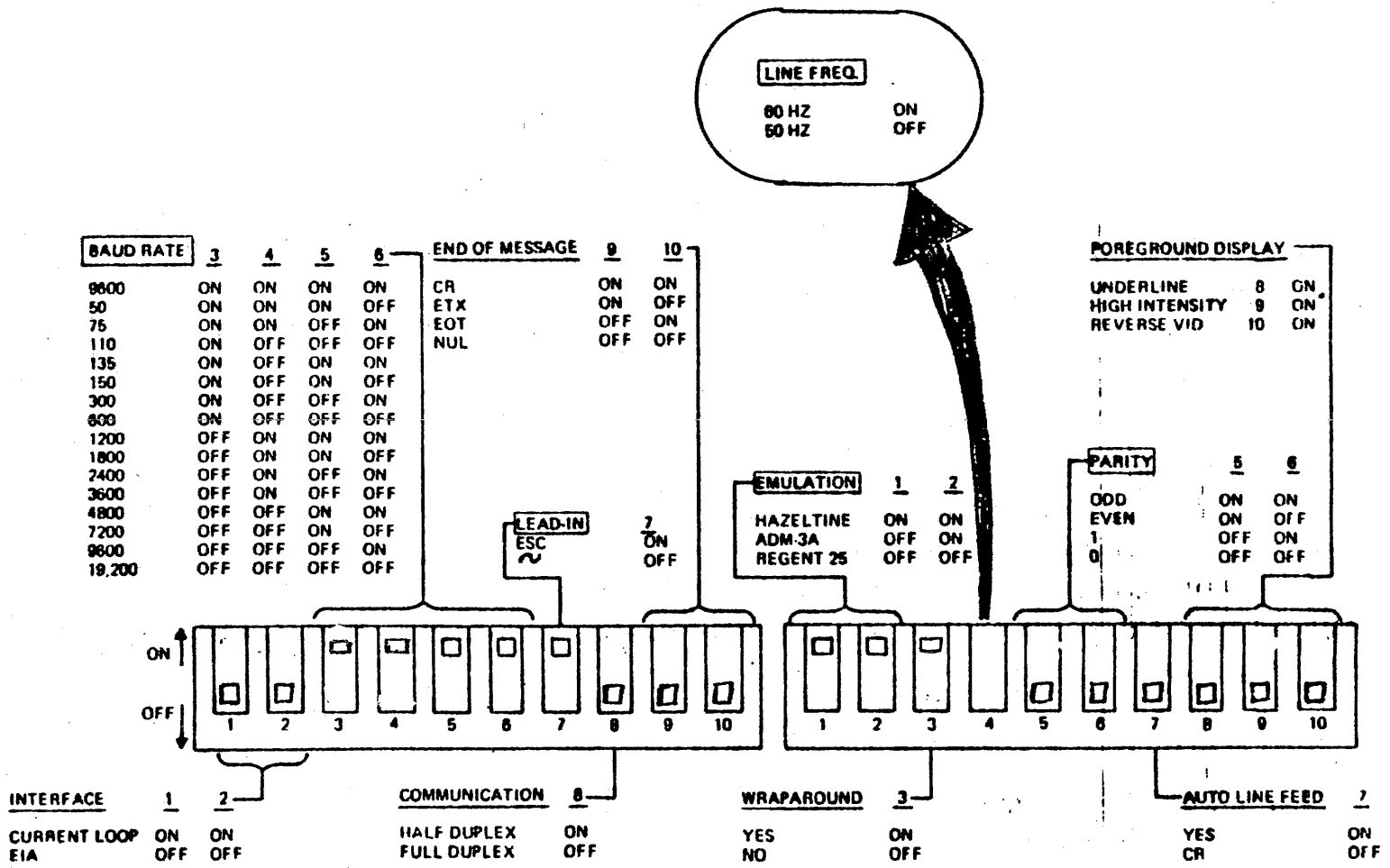
There are two versions of this printer: one for the 115VAC/60Hz (82-A); the other for 230VAC/50Hz (82-AV). Be sure you have the correct version.

APPENDIX V

DIP SWITCH SETTINGS FOR NC-2400EHX

NC-2400EX, NC-2400ETX

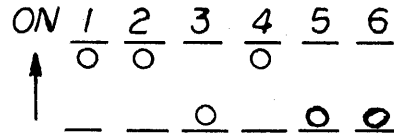
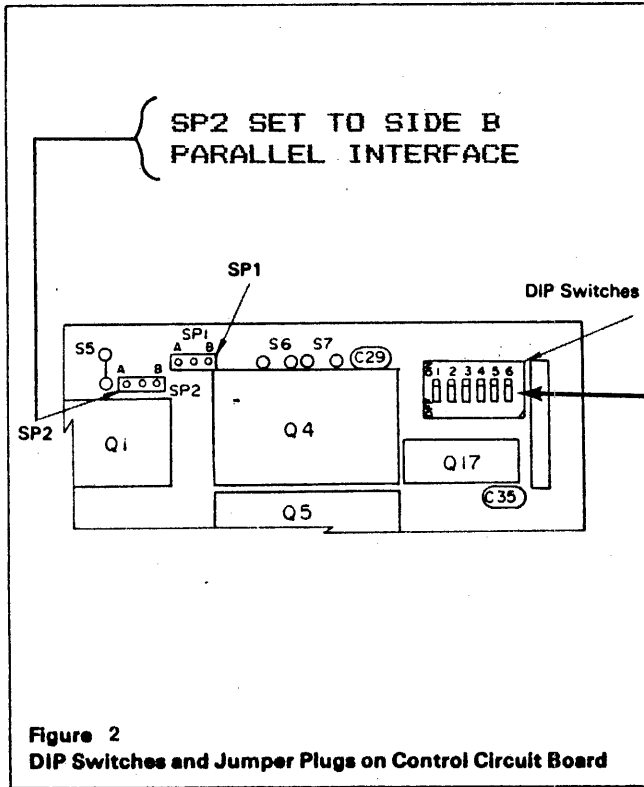




DEPRESS SHIFT/BREAK IF ANY OUTLINED SELECTION IS CHANGED WITH POWER ON

APPENDIX V

OKIDATA PRINTER DIP SWITCH SETTINGS



SWITCH SETTING FOR SERIAL INTERFACE ON NC-2400E

Figure 2
DIP Switches and Jumper Plugs on Control Circuit Board

DIP Switches (for L.S. Serial Interface) on Control Circuit Board (LEPV-1)

Switch	ON	OFF
SW1	SSD polarity (Space when ready, mark when busy)	SSD polarity (Mark when ready, space when busy)
SW2	Transmitting speed setting See Table B.	
SW3		
SW4		
SW5	Unused	Unused
SW6	With parity	Without parity

2. Jumper Plugs Refer to figure 2

Direction Plug	Side A	Side B	Use
SP1	DTR signal is for space (ON) under select (ready for receiving) condition	DTR signal is for space (ON) after power ON.	L.S. serial interface.
SP2	Bit 8 supplied by external controller	Supplies grounding to DATA Bit-8	Parallel interface

Note: Selection of A or B side can be performed as follows:

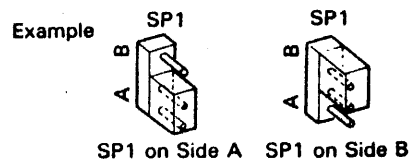


Table B Transmitting Speed Switching

DIP switch			Transmitting Speed (BPS)
SW2	SW3	SW4	
			110
ON			150
	ON		200
ON	ON		300
		ON	600
ON		ON	1,200

Note: "ON" means that SW is at ON position.

Remove the upper cover for operation of these switches and buttons.

1. DIP Switches

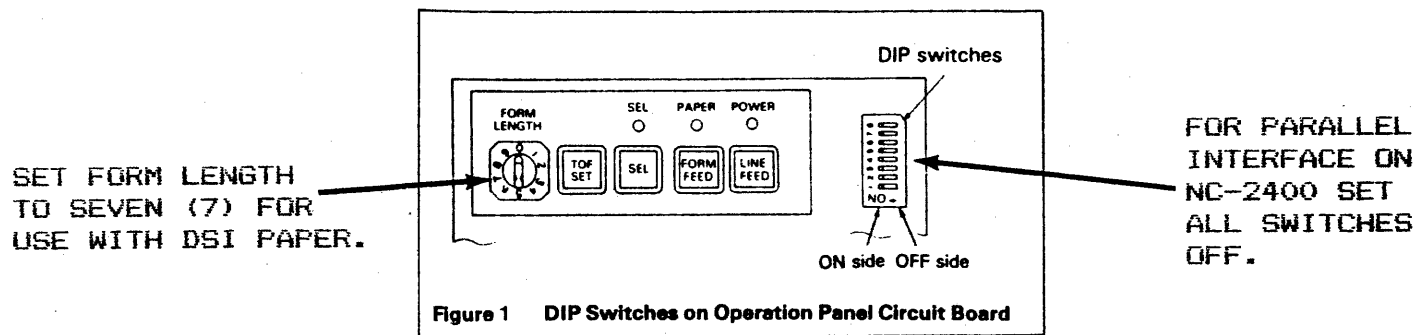


Figure 1 DIP Switches on Operation Panel Circuit Board

Table A: Table of Character Sets

No.	DIP switch				Kind
	SW1	SW2	SW3	SW4	
1	OFF	OFF	OFF	OFF	US ASCII
2	ON				Unused
3		ON			BRITISH
4	ON	ON			GERMAN
5			ON		FRENCH
6	ON		ON		SWEDISH
7		ON	ON		DANISH
8	ON	ON	ON		NORWEGIAN
9				ON	NETHERLANDISH
10	ON			ON	ITALIAN
11		ON		ON	TRS-80
12	ON	ON		ON	Unused
13			ON	ON	Unused
14	ON		ON	ON	Unused
15		ON	ON	ON	Unused
16	ON	ON	ON	ON	Option

Note: "ON" means that SW is at ON position.

DIP Switches on Operation Panel Circuit Board

DIP Switch	ON	OFF
SW1	Character sets	
SW2	Refer to Table A	
SW3		
SW4		
SW5	7 bits	8 bits
SW6	As CR is received, printer prints, automatically returns carriage, and moves paper up one line.	As CR is received, printer prints, and automatically returns carriage.
SW7	As DEL code is received, printer prints.	Printer ignores DEL code.
SW8	Low-speed serial interface effective.	Parallel interface effective.

APPENDIX VI

System II CONNECTOR AND CABLE INFORMATION

Appendix VI is divided into 6 sections:

- Section A: Modem Port
- Section B: Terminal Port
- Section C: Printer Port Parallel
- Section D: Printer Port Serial
- Section E: Parallel 4070 Port
- Section F: Current Loop Port Modem

Section A: MODEM PORT

Modem Interface Standard DB25P Connector (J3)

The MODEM PORT for the SYSTEM II is a RS-232C port, using a DB25P connector. The pinouts for this connector are as follows:

- Pin 2 Transmitted Data. This is the serial data output of the unit. When the SYSTEM II is in the LOCAL mode, this lead is held in the "OFF" state.
- Pin 3 Received Data. This lead is the serial data input to the SYSTEM II from the modem. When the SYSTEM II is in the LOCAL mode, this input is ignored.
- Pin 4 Request To Send. This lead is an output of the SYSTEM II. It is the "OFF" state.
- Pin 5 Clear to Send. This input lead can be used to control the SYSTEM II. When this lead is driven to the "OFF" state, the SYSTEM II will be inhibited from sending. When this lead is left unwired or driven to the "ON" state, the SYSTEM II will be enabled.
- Pin 6 Data Set Ready. This lead is an input to the SYSTEM II, but is inoperative at this time.
- Pin 7 DC Ground. This lead serves as the voltage reference between the interfaced devices.
- Pin 8 Carrier Detect. This lead is an input to the SYSTEM II, but is inoperative at this time.
- Pin 20 Data Terminal Ready. This output indicates whether the SYSTEM II is in the Line or Local mode.
- Pins 1, 9-19, 21-25 Unterminated.

APPENDIX VI, cont.

Section B Terminal Port

The TERMINAL PORT for the SYSTEM II is a RS-232C port using a DB25S connector. The pinouts for this connector are as follows:

Terminal Interface Standard, DB25S Connector (P4).

- Pin 2 Data From Terminal. This input lead is the Serial data input to the unit from the terminal.
- Pin 3 Data To Terminal. This output lead is the Serial data output to the terminal.
- Pin 4 Request to Send. This input lead is not operable.
- Pin 5 Clear to Send. This output is always in the "ON" condition.
- Pin 6 Data Set Ready. This output lead is always in the "ON" state.
- Pin 7 DC Ground. This lead serves as the voltage reference between the interfaced devices.
- Pin 8 Carrier Detect. This output is always in the ON condition.
- Pin 20 Data Terminal Ready. This input lead is used by SYSTEM II to determine if the Terminal is on.
- Pins 1, 9-19, 21-25 Unterminated.

DSI Cable NC-2400 to VDT P/N 4282. This cable interfaces between SYSTEM II and Hazeltine VDT. The cable has (2) two DB25P connectors and is wire as follows:

Pin 1 to Pin 1	all other pins are not used,
2	2 and should be left unterminated
3	3
4	4
5	5
6	6
7	7
8	8
9	9
13	13
20	20
24	24
25	25

APPENDIX VI, cont.

SECTION C PRINTER PORT PARALLEL

The PRINTER PORT PARALLEL for the SYSTEM II is an 8 bit parallel CENTRONICS type port using a DB25P as the connector. The pinouts for this port are as follows:

Parallel Printer Option E, DB25P Connector (J18).

- Pin 1 /Data Strobe. This lead is a pulse output to the Printer indicating that there is a character to print.
- Pin 2-8 Data Bits 1-7. These leads contain the parallel data that should be printed.
- Pin 9 Data Bit 8. This lead is an output to the Printer and is always in the logic "0" state.
- Pin 10 /Acknowledge. This lead is an input pulse to the unit from the Printer indicating that the Printer has received the character and is ready to accept another character.
- Pin 11 Busy. This lead is an input to the unit from the Printer indicating that the Printer is ready to receive data. A logic "0" state indicates that the Printer is ready to receive data, a logic "1" state means it is not able to receive data.
- Pin 13 Select. This lead is an input to the unit which when at a logic "1" state indicates that the Printer is selected.
- Pin 16 DC Ground. This lead serves as the voltage reference between the interfaced devices.
- Pins 12, 14, 15, 17-25 Unterminated.

DSI Cable NC-2400 to Parallel printer P/N4280. This cable interfaces between the NC-2400 SYSTEM II and the parallel printer. The cable has a DB25P connector on one end and a Amphenol 36 pin (57-30360) connector on the other. The pinouts are as follows:

APPENDIX VI, cont.

DB25P		Amphenol 36 Pin
Pin 1	to	Pin 1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
9		9
10		10
11		11
12		12
13		13
14		14
15		24
16		16
17		17
18		18
19		19
20		20
21		21
22		22
23		23
24		31
25		32

SECTION D PRINTER PORT SERIAL

The PRINTER PORT SERIAL is a RS-232C port using a DB25S connector. The pinouts for the SERIAL PORT connector are as follows:

RS232 Printer Option E, DB25S Connector (P19)

- Pin 2. Data In. This lead is input to the NC-2400 but is inoperative.
- Pin 3. Data To Printer. This lead is the serial data output to a Serial Printer.
- Pins 5,6. Clear To Send, Data Set Ready. These leads to the Printer are always held in the "On" state.
- Pin 7. DC Ground. This lead serves as the voltage reference between the interfacing devices.
- Pin 8. Carrier Detect. This output to the Printer is always held in the "ON" state.
- Pin 11. Supervisory Send Data. This lead is an input to the unit that indicates the Printer is ready to operate and can accept data.
- Pin 1, 4, 9, 10, 11-25. Unterminated.

APPENDIX VI, cont.

SECTION E PARALLEL 4070 PORT

The PARALLEL PORT for the SYSTEM II is FACIT compatible input into the system for punching a tape. The input uses a DB25S connector with the pinouts as follows:

Parallel Input Option H, DB25S Connector (P17)

- Pins 1-8 Data Input 1-8. Channel 1-8. A logic "1" state on these inputs will cause a hole to be punched in the tape when a Punch Command at Pin 11 (described below) is initiated.
- Pin 11 Punch Command. A pulse input, switching from logic "0" state to logic "1" state which will initiate data capture and serial conversion if the conditions for Punch Ready (Pin 12) are met. The required duration of the pulse input is 100 microseconds.
- Pin 12 Punch Ready. A Logic "1" state output indicates the unit is ready to accept data, a Logic "0" state indicates the unit is processing the data, and is not ready for additional data.
- Pins 20, 21 Error 1 and 2. These outputs are connected DC Ground.
- Pin 22 Unregulated +9V.
- Pin 24 +5V. This lead is a +5V output and should be limited to .1 Amp maximum.
- Pin 25 DC Ground. This lead serves as the voltage reference between interfacing devices.
- Pins 9, 10, 13-19, 23. Unterminated.

SECTION F CURRENT LOOP PORT MODEM

The SYSTEM II has the capability to receive or send data from and to an external source using current loop. The pinouts for the terminal block are as follows:

Modem Current Loop Option T or Option H 6 Position Terminal Block.

- Pos 1. +Receive. This lead is the Current Loop serial data positive terminal for data input from the modem.

APPENDIX VI, cont.

SECTION F CURRENT LOOP PORT MODEM, cont.

- Pos 2. -Receive. This lead is the negative terminal connection for completion of the receive current loop.
- Pos 3. +Transmit. This lead is the current loop serial data positive terminal for data output to the modem. When the LOCAL modem is selected, there will be current flow (mark) to the modem.
- Pos 4. -Transmit. This lead is the negative terminal connection of the transmit current loop.
- Pos 5. +Reader Enable. This lead is the current loop positive reader control. When current is flowing, the reader is enabled.
- Pos 6. -Reader Enable. This lead is the negative terminal connection of the reader enable current loop.

NOTE: (Pos 5 and Pos 6) Reader Enable is not supplied on standard current loop Option T or H. The reader is always enabled. This feature allows the reader to be controlled (started/stopped) by the modem, if this feature is required, please consult the factory.