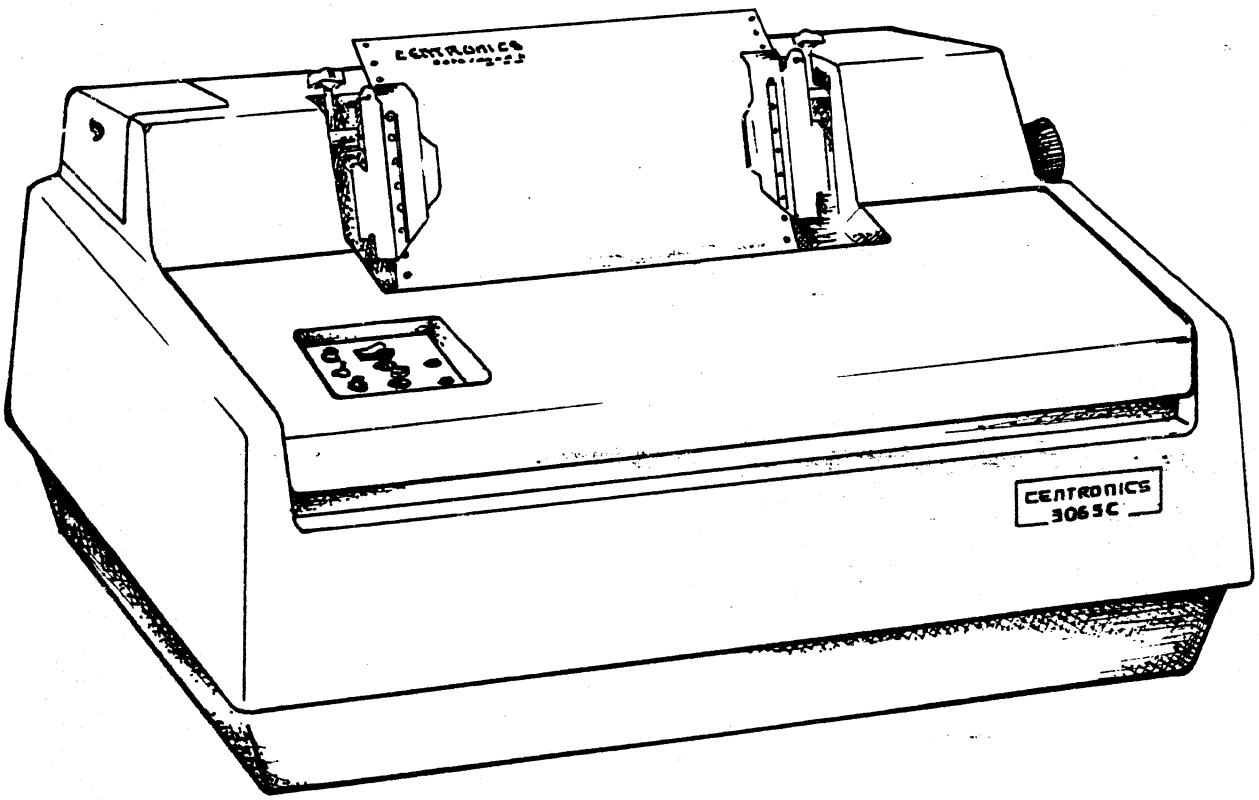
PROGRAMMERS MANUAL

MODEL 306SC PRINTER



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INTRODUCTION

SCOPE

This manual provides the necessary information needed to develop software for instructing the Model 306SC Printer. The information includes:

A. General description of the Model 306SC capabilities.
B. Information concerning data input and timing, description of all control codes recognized by the printer, and a brief discussion on how the printer stores and processes data.
C. Examples and reproductions of actual printouts to illustrate method of printer instruction.
D. Illustrations of standard character and geometric segment sets.

GENERAL DESCRIPTION

The Centronics Model 306SC Printer is a versatile serial dot matrix impact printer, which can print any size character from 0.1 -inch high standard size alphanumeric characters to large size characters 0.2-inch high and above. The large size characters are formed by assembling one-tenth inch character segments via software control.

The Model 306SC can also print standard or large size characters in a normal or condensed character density. When printing standard characters, up to 80 or 132 characters per eight-inch line can be printed in normal or condensed character density, respectively. Added to this versatility, the characters can also be printed double-width (elongated). Therefore, the printout can be normal, normal/elongated, condensed or condensed/elongated. In the standard printer, the characters can be elongated by line when the printer receives an octal 016 code. There is an option available where characters within a line can be elongated.

There are other standard and optional features that can be configured into the Model 306SC printer to enhance local control and remote software control. The standard features include:

A. Local and remote line feed control.
B. Form feed control (via paper tape loop).
C. Local form feed override to allow the last form to be printed.
D. Automatic line feed on carriage return.
E. Separate prime (reset) line and fault line to the output connector.
F. Parallel ASCII 8 bit data input. Maximum input rate of 75,000 characters per second.
G. Print rate of −100 cps at 80 char/line or 165 cps at 132 char/line
−55 + 5 full lines per minute (80 or 132 character line).
H. Gated strobe pulse (data input).
I. Ability to initiate printer electronics and clear the buffer via a delete control code (octal 177).
J. Printout of elongated characters (double width characters line by line).
K. Local selection of either 6/8/10 or 6/8/12 line per inch paper motion as ordered.
L. Paper slew rate of 8 inches per second.
M. Automatic motor control to eliminate printer noise and minimize wear while the printer is not receiving data.
N. Paper runaway inhibit (6 second time out). Paper motion is terminated.
O. Self test capability.
P. Prints original plus four copies.
Q. Software control of character density.
R. Standard 64 character set, with .5 x 7 dot matrix.
S. Five 64 geometric segment character sets with 6 x 7 dot matrix.

T. Operation on 115V/60 Hz or 230V/50 Hz ac power, as ordered.

The optional features include:

A. Local control of character density (10 or 16.5 characters per inch).
B. Single character elongation.
C. Bell alarm that is sounded by a BELL code or paper empty condition.
D. Programmable paper feed that provides ability to have vertical tabs of various lengths.
E. Delete control inhibit. Disables delete control feature.
F. Elapsed time indicator to provide visual indication of accumulated print time.
G. Automatic line feed disabled.
H. Operation on 100, 110, 120, 200, 220 or 240 Vac, 50 or 60 Hz, as ordered.
I. Return to primary character set after each line.
J. No prime (reset printer circuitry) on select.
K. 96 character set (printout upper and lower case characters).
L. 128 character set (two 64 character sets selected by data line 7).
M. 9 x 7 character matrix (not available with 128 character set).

DATA RECOGNITION AND PROCESSING

The following text provides information concerning data input and timing, description of all Control Codes recognized by the printer and an introduction on how the stored data is processed and printed.

PRIMING AND SELECTING

The Model 306SC must be primed and selected before receiving data. The prime operation initializes the printer logic to a ready state. The select operation resets the busy line to the interface connector and prepares the printer to receive data.

The printer can be primed by:

1. Power turn-on.
2. Printer selection, if printer is configured without the inhibit prime on select option.
3. End of a printed line.
4. Reception of a delete code (octal 177), when the printer does not have the delete inhibit option.
5. Appearance of a low input prime ($\overline{IP}$) signal level at the interface connector.

The printer is selected by operating the control panel SELECT switch, or by receiving an octal 021 code on the data input line.

DATA INPUT

Inputs to the printer consist of seven standard parallel data lines, (DATA1-DATA7), an optional DATA8 line, an active low $\overline{DATA\ STROBE}$ input, and an active low input prime ($\overline{IP}$) line. The first seven data lines receive the 7 bit USASCII code.

The optional eighth bit is used as a control bit to print an elongated character or select an additional character set. The data strobe synchronizes the input data with the printer electronics. The input prime line ($\overline{IP}$) primes the printer electronics.

In response to received data strobe,the printer generates an acknowledge pulse ($\overline{ACKNLG}$) to confirm reception of a character. If the received character caused the printer to perform some function such as a paper movement, character printing, etc., the printer responds with a busy signal (BUSY) until the function is completed.

DATA INPUT TIMING

The data transfer sequence consists of the input device placing the appropriate code on the data lines then generating a data strobe puse. The printer, after a slight delay, responds with an acknowledge pulse. Or, if the received data caused a busy condition, the printer first activates the busy line for the duration of the busy condition then responds with an acknowledge pulse.

As illustrated in Figure 1, each data line must be stable at least 1.0 microsecond before and after DATA STROBE, and the DATA STROBE pulse must be at least 1.0-microsecond wide.

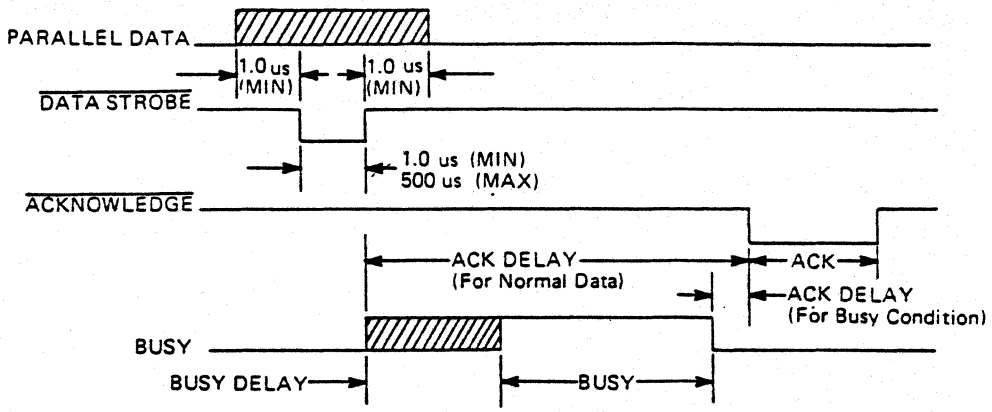


Figure 1. INPUT DATA TIMING 00337

If the data received does not cause a busy conditon, the printer will generate a 2.5 to 5.0-microsecond ACKNOWLEDGE pulse 2.5 to 10 microseconds following the trailing edge of DATA STROBE. The ACKNOWLEDGE pulse indicates that the printer is ready to receive additional data. As a standard feature, the Model 306SC will not recognize a data strobe during the acknowledge delay. As an option,however, a non-gated data strobe is available.

If the data received initiates a function listed in Table 1 that causes a busy condition, the printer responds with a BUSY signal 0 to 1.5 microseconds following the trailing edge of DATA STROBE (See Figure 1). As shown in Table 1, the duration of BUSY depends on the specific function being performed. Zero to 10-microseconds after BUSY is terminated, the printer generates a 2.5 to 5-microsecond ACKNOWLEDGE pulse.

TABLE 1
FUNCTION AND ASSOCIATED BUSY TIMING

FUNCTION	BUSY TIMING
Any printable character (except 132th character on a line when printing 16.5 characters/inch).	No Busy
Line Feed (6,8,10 or 12 lines/inch)	35-50 msec
Programmable Line Feed Example: 1. one step, 1/120 inch 2. ten steps, 10/120 inch 3. 120 steps, 1 inch	1 msec + (no. of steps X1.04 msec) 2.04 msec 11.40 msec 125.80 msec
Vertical Tab (1 inch)	155-170 msec
Form Feed (11 inches)	1.40-1.42 sec
Delete	100-400 usec
Bell	No Busy
Select Deselect	100-400 usec Until printer is selected
Print (CR or last character)	8.4 msec per character plus 35-50 msec line feed. Printer is not busy during return time (270 msec max.).

TABLE 2.
PARALLEL INTERFACE SIGNALS

The Model 306SC is supplied with an Amphenol No. 57-40360, 36-pin interface connector (Centronics No. 31310019). The pin assignments, name, source and description for each interface signal are listed below.

Parallel Interface Connector	Signal Name	Source	Description
Pin 1, 19 (See Note 1)	DATA STROBE (See Note 2)	Input Device	A 1.0 usec pulse (min.) used to clock data from the processor to the printer logic.
2, 20	DATA 1	Input Device	Input data levels. A high represents a binary ONE, a low represents a ZERO. All printable characters (i.e., codes having a ONE in DATA 6 or DATA7) are stored in the printer buffer. Control characters (i.e,. codes having a ZERO in both DATA 6 and DATA 7), are used to specify special control functions. These codes are not stored in the buffer except when they specify a print command and are preceded by at least one printable character in that line.
3, 21	DATA 2	Input Device	
4, 22	DATA 3	Input Device	
5, 23	DATA 4	Input Device	
6, 24	DATA 5	Input Device	
7, 25	DATA 6	Input Device	
8, 26	DATA 7	Input Device	
9, 27	DATA 8	Input Device	
10, 28	$\overline{\text{ACKNLG}}$	Printer	Acknowledge pulse that indicates input of a character into memory or the end of a functional operation.
11, 29	BUSY	Printer	Level that indicates the printer cannot receive data.
12	PE	Printer	A level that indicates the printer is out of paper.
13	SLCT	Printer	A level that indicates the printer is selected.
14	±OV	Printer	
15	OSCXT	Printer	100-200 KHz signal.
16	±OV		
17	Chassis Gnd		
18	+5V		
31, 30	$\overline{\text{INPUT PRIME}}$	Input Device	A level which causes the printer to be primed.
32	$\overline{\text{FAULT}}$	Printer	A level that indicates a paper empty, light detect, or a deselect condition.
34	NOT USED		
35	NOT USED		
36	NOT USED		

NOTE:

1 Second pin number indicates twisted pair return (±OV).

2 Active low signals are specified by a line over the signal name. Active high signals have no line.

CONTROL CODES

The USASCII control codes recognized by the Model 306SC are used to activate and de-activate the printer electronics, select character density, elongate characters, move paper, reset the printer circuitry and initiate an optional operator alert signal. Other functions are initiated by using escape numeric code sequences.

The escape numeric code sequence consists of an octal 033 or 034 as an escape code followed by a numeric octal code. The escape numeric code sequence can perform three basic functions:

A. Select standard or geometric segment character set.
B. Control bit 8.
C. Initiate a programmable paper feed function.

When octal 033 is followed by a numeric octal code 060 to 016, 062, 065, 066 or 067, a character set is selected. The same character set will remain selected until another set is addressed. If for some reason the printer does not recognize the numeric code, the desired character set will not be selected, yet the printer will generate an acknowledge ($\overline{\text{ACKNLG}}$) pulse. To correct this situation the escape (033) numeric code sequence has to be repeated.

Table 3 provides a functional description of all codes recognized by Model 306SC. Prior to code reception, except for the select and delete code functional description, it is assumed that the printer is selected.

TABLE 3. CONTROL CODES

NOTE: 1. Unless otherwise noted, the functions described reflect a standard unit configuration.
2. The escape code sequences address physical locations of character generators (PROM). Therefore, if a special configuration relocates a PROM, the addressing will also change.

OCTAL CODE	CODE NAME	FUNCTION
007 (BEL)	Bell (Option)	Activates a speaker circuit. The speaker generates a 2-second audible tone.
012 (LF)	Line Feed	Advances paper one line. *
013 (VT)	Vertical Tab	Advances paper until the next hole is reached in channel 5 of VFU tape.*
014 (FF)	Form Feed	Advances paper until the next hole is reached in channel 7 of VFU tape.* ***Note** **If the code is received in the middle of a line of data, paper will be advanced immediately then, without loss of data, the full line of data will be printed.**
015 (CR)	Carriage Return	Causes line of stored data to be printed. As a standard feature, an automatic line feed occurs after printing a line of data. There is no action if Carriage Return code is received before the first printable character in a line. **Note** **Any line of data with less than 132 characters must be terminated with a carriage return.**

CODE	CODE NAME	FUNCTION
016 (SO)	Elongated Characters	Prints entire line of characters in elongated format (double width)
021 (DC1)	Select	Conditions printer to accept data.
022 (DC2)	Character Density	In the standard Model 306SC, this code causes condensed printout (16.5 characters per inch)of a full line of data. At the end of the printed line, character density returns to normal (10 characters per inch). Note **If the printer has the N/C switch option,the full line of data will be printed in the character density opposite to the N/C switch setting.**
023 (DC3)	Deselect	Disables printer from receiving any data except a Select (021) or Delete (177) code.
177 (DEL)	Delete	Resets printer storage to zero, terminates paper motion, sets character density to normal and returns printer to standard character set (ROM Configuration). If the printer has the N/C switch option, character density will return to that set by the N/C switch. Note **If the printer has the Delect Inhibit option, Delete code (177) will be acknowledge, but not acted on.**
033 (ESC)	Escape	Escape code that allows recognition of numeric octal codes 060 to 067.
033 060 (ESC 0)	Escape Numeric 0	Selects standard 64 character set.
033 061 (ESC 1)	Escape Numeric 1	Selects geometric segment set for 0.2-inch alphanumeric characters.
033 062 (ESC 2)	Escape Numeric 2	Selects geometic segment set for 0.3-inch alphabetic characters.
033 063 (ESC 3)	Escape Numeric 3 (Option)	Sets bit 8 high. If printer is configured to print individual elongated characters, this code sequence will cause all following characters to be printed double-width (elongated). If printer is configured for 128 character set, the second 64 character set is selected. The bit 8 high function is reset by an 033 064 code sequence, delete code (octal 177) when there is no Delete Inhibit option, reception of input prime (IP) signal or, if so configured, the end of a printed line.
033 064 (ESC 4)	Escape Numeric 4 (Option)	Sets bit 8 low. If printer is configured for 128 character set, the first (standard set position) 64 character set is selected.
033 065 (ESC 5)	Escape Numeric 5	Selects geometric segment set for 0.3-inch numeric characters.

NAME	CODE NAME	FUNCTION
033 066 (ESC 6)	Escape Numeric 6	Selects geometric segment set for 0.4-inch characters and larger.
033 067 (ESC 7)	Escape Numeric 7	Selects set for vertical bar codes.
034 XXX (FS X)	Programmable (Option)	Provides ability to have vertical tabs of various lengths. Octal code (xxx) is a numeric code. The paper will move in increments of 1/120-inch steps with the number of increments specified by the numeric code (000 to 177) plus one. Up to 1-1/15-inch paper can be moved per command. If the printer is configured to recognize bit 8 with this option, numeric codes 000 to 376 can be recognized to move up to 2-1/8-inches of paper per command.

In addition to functions listed in the table above, the printer also monitors input data for the first printable character (i.e., a high on bit 6 or 7). Detection of the first printable character enables the printer, upon recognition of a carriage return code, or if the DSC option is used, recognition of a Line Feed, Vertical Tab or Form Feed code, to print the line of data.

STORING AND PRINTING DATA

The Model 306SC stores and prints characters utilizing:

A. Storage buffers to commit up to a line of data into temporary memory.
B. Read Only Memory (ROM) and Programmable Read Only Memory (PROM) as character generators to generate signals used to drive the print head solenoids elements.
C. Control logic to coordinate character generator addressing and fetching of character formation data at a rate established by the dual-timing fence.

As the print head carriage moves across the page, the timing fence (and light source) generates timing pulses used by the logic to register the five full columns of dots in the printed character.

Depending on whether a 5 x 7 or optional 9 x 7 character matrix is used for character generation in the standard ROM position (code sequence 033/060), the logic uses either one or two ROM (Read-Only Memory) elements for each character set. One ROM defines the dot pattern for the five full-step columns, the other defines the dot pattern for the four half-step columns in a 9 x 7 matrix.

When addressing the PROM positions (code sequence 033/061, 062, 065, 066, or 067) for printing 0.2 inch characters and larger, the Model 306SC LPI (lines per inch) switch, located on the control panel, must be set to provide a line density of 10 or 12 lines per inch. This line density results in no vertical spacing between segments. Horizontal spacing between character segments is also eliminated by using a 6 x 7 dot matrix pattern. The combination of these vertical and horizontal features allows character segments, which form the basic building blocks for the large characters, to abut one another with no spacing between segments. As an example, to form a character 0.4 inches high and three print positions wide, four passes of the print head are made and up to three character segments are printed on each pass.

The Model 306SC can also print in Arabic (optional). To form this cursive (script) writing, the 6 x 7 dot matrix is used so that the characters abut one another horizontally, but the line density is set to either 6 or 8-lines per inch to provide space between lines.

Example:

BASIC MODEL 306SC PROGRAM INSTRUCTIONS

The following text provides the twelve examples to illustrate how to instruct the printer to print standard ASCII and/or segmented characters and bar codes. Each example includes a string of ASCII printable and non-printable data sent to the printer followed by the resultant sample printout.

To make the data format more legible, the data strings have extra spaces to separate the control codes (e.g., ESC 0 ! instead of ESC01). All legal spaces are designated by [S]. More than one space, such as five spaces, will be designated as [SSSSS].

The following example illustrates the printable and non-printable characters in a line of data, and how the control codes will be separated and legal spaces designated.

```
DATA:          ESC O ![S]([S]O[S]8[S]@[S]H[S]P[S]X[S]←[S]CR LF
PRINTABLE:          ↑   ↑   ↑   ↑   ↑   ↑   ↑   ↑   ↑
NON-
PRINTABLE:     *  *   *   *   *   *   *   *   *   *   *  *  *
PRINTER
RESPONSE:      !  (  O  8  @  H   P   X   ←
```

Because the instructions are given in USASCII characters, the following table is provided for easy conversion to octal code and cross-referencing to the associated dot matrix pattern in the Character Set section. The function of all control codes is located in the Control Code section, Table 3.

TABLE 5. USASCII CHARACTER/OCTAL CODE

OCTAL	0	1	2	3	4	5	6	7 (lsb)
(msb) 04	SP	!	"	#	$	%	&	'
05	(	)	*	+	,	-	.	/
06	0	1	2	3	4	5	6	7
07	8	9	:	;	<	=	>	?
10	@	A	B	C	D	E	F	G
11	H	I	J	K	L	M	N	O
12	P	Q	R	S	T	U	V	W
13	X	Y	Z	[	\	]	^	←

Example: # = 043

PRINTER CONDITIONS

The printout examples were printed under the following conditions:

A. POWER switch - ON position.
B. SELECT INDICATOR - lit.
C. SELF TEST switch - OFF position.
D. LPI switch - 10 position.
E. If printer has N/C switch - N position.
F. Internal jumper option - automatic line feed disabled.

PRINTOUT USING THE STANDARD CHARACTER SET

The following four examples illustrate how to instruct the printer to print standard 0.1-inch characters in condensed (16.5 CPI), normal (10 CPI), elongated or condensed/elongated character density.

NOTE

The selected character density is effectively reduced by half when printing elongated characters.

EXAMPLE 1 (NORMAL)

DATA: ESC 0 ABCDEFGHIJKLMNOPQRSTUVWXYZ CR LF

PRINTER RESPONSE: ABCDEFGHIJKLMNOPQRSTUVWXYZ

EXAMPLE 2 (CONDENSED)

DATA: ESC 0 DC2 ABCDEFGHIJKLMNOPQRSTUVWXYZ CR LF

PRINTER RESPONSE: ABCDEFGHIJKLMNOPQRSTUVWXYZ

NOTE

Control code DC2 (022) can appear anywhere before CR or the 132nd printable character of any given line.

EXAMPLE 3 (ELONGATED)

DATA: ESC 0 SO ABCDEFGHIJKLMNOPQRSTUVWXYZ CR LF

PRINTER RESPONSE:

ABCDEFGHIJKLMNOPQRSTUVWXYZ

NOTE

Control code SO (016) can appear anywhere before CR and the 132nd printable character of any given line.

EXAMPLE 4 (CONDENSED/ELONGATED)

DATA: ESC 0 DS2 SO ABCDEFGHIJKLMNOPQRSTUVWXYZ LF CR

PRINTER RESPONSE: ABCDEFGHIJKLMNOPQRSTUVWXYZ

PRINTOUT OF CHARACTER SEGMENTS TO FORM LARGE CHARACTERS

Segmented character formation requires more than one pass of the print head. On each pass, 0.1-inch geometric character segments are printed according to the line of data. The number of passes depends on the height of the character (e.g., 0.2-inch high character needs two passes to form the character, 0.7-inch character needs seven passes).

If the printer is used extensively to print segments, the printer should be configured so that the printer does not return to the standard character set after each line. This enables the character set to be selected on an escape basis instead of a line by line basis. On a line by line basis, the escape numeric code sequence has to be sent at the beginning of each line of data. On the escape basis, the character set selected remains until an escape numeric code sequence is sent for another character set.

The following examples show:

A. Individual segments and resultant printout for each line of data.
B. All lines of data and complete character formation.
C. How to form characters 0.2-inch to 0.4-inch high.

Note

Examples 1, 2 and 3 illustrate use of the escape code on a line by line basis while example four illustrates use of the escape code on an escape basis.

EXAMPLE 1 (0.2-INCH ALPHANUMERIC CHARACTERS)

		Individual Segments	Resultant Printout
DATA (LINE 1) :	ESC 1 N Y CR LF		
DATA (LINE 2) :	ESC 1 [Z CR LF		

Data and printer response of complete 0.2-inch character.

```
ESC 1 N Y CR LF
ESC 1 [ Z CR LF
```

EXAMPLE 2 (0.3-INCH ALPHA CHARACTERS)

DATA (LINE 1) :	ESC 2 \A + CR LF	 
DATA (LINE 2):	ESC 2 ← G ! CR LF	 
DATA (LINE 3):	ESC 2 ^[S] ? CR LF	

Completed 0.3-inch character.

```
ESC 2 \ A + CR LF
ESC 2 ← G ! CR LF
ESC 2 ^ [S] ? CR LF LF
```

EXAMPLE 3 (0.3-INCH NUMERIC CHARACTERS)

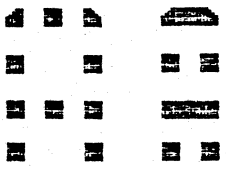
DATA (LINE 1):	ESC 3 [S] T Z CR LF	
DATA (LINE 2):	ESC 3 U V [CR LF	
DATA (LINE 3):	ESC 3 [S] [S] > CR LF	

Completed 0.3-inch character.

```
ESC 3 [S] T Z CR LF
ESC 3 U V [ CR LF
ESC 3 [S][S] > CR LF LF
```

EXAMPLE 4 (0.4-INCH NUMERIC CHARACTERS)

DATA (LINE 1): ESC 6 9 ! 8 CR LF
DATA (LINE 2): ! [S] ! CR LF
DATA (LINE 3): ! ! ! CR LF
DATA (LINE 4): ! [S] ! CR LF



Completed 0.4-inch character.

```
ESC 6 9 ! 8 CR LF
        ! [S] ! CR LF
        ! ! ! CR LF
        ! [S] ! CR LF LF
```

Characters 0.5, 0.6 and 0.7 inch high are formed in the same manner as the 0.4 inch character, except that more passes are required using the same escape numeric code sequence.

PRINTOUT MIXING STANDARD AND SEGMENTED CHARACTERS

The following three examples illustrate how to instruct the printer to mix standard and segmented characters and bar codes in a printout.

Any octal code, whether it represents an ASCII character or segment, can be given in the same line of data.

EXAMPLE 1 (CHARACTERS IN DESCENDING SIZE)

In this example seven lines of data (seven passes of the print head) and several escape sequences are needed to obtain the printer response shown.

DATA LINE No.

1. ESC 6 ?9!8>[S] CR LF
2. ESC 6 9#[S]%8[S]"!!!$[S] CR LF
3. ESC 6 ![SSS]![S]<[SS]![S]?98>[S] CR LF
4. ESC 6 ![SSS]![S]![SSS]![S]9#%8[S]9!8[S] CR LF
5. ESC 6 !!!!![S]!!!!![S]!. . ![S]![S]![S] ESC 2 \A+ CR LF
6. ESC 6 ![SSS]![S]![SSS]![S]!//![S]!!![S]
   ESC 2 ←G! ESC 1 NY CR LF
7. ESC 6 ![SSS]![S]![SSS]![S]![SS]![S]![S]![S] ESC 2 ^[SSS]
   ? ESC 1 [Z ESC O A CR LF

Printer Response :

EXAMPLE 2 (MIXED CHARACTER FORMATIONS)

DATA LINE No.

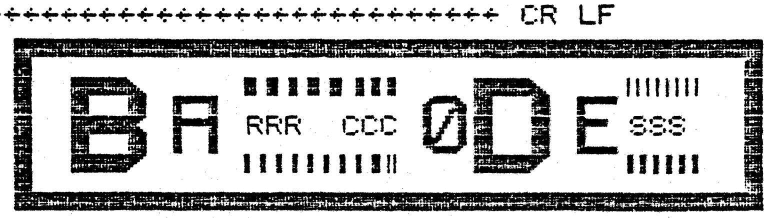
```
1. ESC 6 !!8[S] ESC 2 \AE ESC 1 NG ESC 0 [S]BBBB[SSSSSSSS]
   ESC 6 ?9!8>[S] CR LF
2. ESC 6 !.;[S] ESC 2 ←GQ ESC 1 \H ESC 0 [SSSSSSS]
   ESC 6 "!!!$[S]9#[S]%8[S] CR LF
3. ESC 6 !/8[S] ESC 2 )DL ESC 0 [SSSS] ESC 6 ?98>[S]
   !<[SS]![S]![SSS]![S] CR LF
4. ESC 6 !!;[S] ESC 0 [SSS] ESC 6 9!8[S]9#%8[S]![SSS]![S]![SSS]
   ![S] CR LF
5. ESC 0 [SSSS] ESC 2 \A+ ESC 6 ![S]![S]!..![S]!!!!![S]
   !!!!![S] CR LF
6. ESC 0 [SS] ESC 1 NY ESC 2 ←G! ESC 6 !!![S]!//![S]![SSS]
   ![S]![SSS]![S] CR LF
7. ESC 0 A[S] ESC 1 [Z ESC 2 ^[S]? ESC 6 ![S]![S]![SS]![S]![SSS]
   ![S]![SSS]![S] CR LF
```

Printer Response: 

EXAMPLE 3 (CHARACTER FORMATIONS AND BAR CODES)

DATA LINE No.

```
1. ESC 7 ←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←← CR LF
2. ESC 7 ← [SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS] ← CR LF
3. ESC 7 ←[SS] ESC 6 !!!$[S] ESC 7 [SSSS]/><\XASY[SSSS]
   ESC 6 !!!$[S] ESC 7 [SSS]))))[SS]← CR LF
4. ESC 7 ←[SS] ESC 6![SS]![S] ESC 2 \A+ ESC 0 [SSSSSSSSSS]
   ESC 5 C,- ESC 6 ![SS]![S] ESC 2 \AH ESC 7[SSSSSS]← CR LF
5. ESC 7 ←[SS] ESC 6 !!!J[S] ESC 2 ←G! ESC 0 [S]RRR[SS]
   CCC[S] ESC 5 ^%? ESC 6 ![SS]![S] ESC 2 ←G[S]
   ESC 0 SSS[SSS] ESC 7← CR LF
6. ESC 7 ←[SS] ESC 6 ![SS]![S] ESC 2^[S]? ESC 0 [SSSSSSSSSS]
   ESC 5 )*L ESC 6 ![SS]![S] ESC 2 )DO ESC 7 [SSSSSS]← CR LF
7. ESC 7 ←[SS] ESC 6 !!!#[S] ESC 7 [SSSS]CQ8,&CQI[SSSS]
   ESC 6 !!!#[S] ESC 7 [SSS]S,S,[SS]← CR LF
8. ESC 7 ← [SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS] ← CR LF
9. ESC 7 ←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←←← CR LF
```

Printer Response: 

CHARACTER SETS

The following information includes:

A. Table of USACII code.
B. Dot matrix patterns (5 x 7 and 9 x 7) and associated octal codes of the standard character sets.
C. Dot matrix patterns (6 x 7) and associated octal codes of the geometric segment character sets.
D. Illustrations of large scale segmented character sets that can be formed using geometric segments. Each character illustrated is shown with the octal codes needed for the character formation.

USASCII CODE

TABLE 4. USASCII CODE

Bits $b_7 b_6 b_5$ →					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4 ↓	b_3 ↓	b_2 ↓	b_1 ↓	Column / Row	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	\`	p
0	0	0	1	1	SOH	◤DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	◤DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	◤DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	◤BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	◤LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	◤VT	◤ESC	+	;	K	[	k	{
1	1	0	0	12	◤FF	◤FS	,	<	L	\	l	|
1	1	0	1	13	◤CR	GS	-	=	M	]	m	}
1	1	1	0	14	◤SO	RS	.	>	N	∧	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	◤DEL
					CONTROL CODES		STANDARD				OPTIONAL	

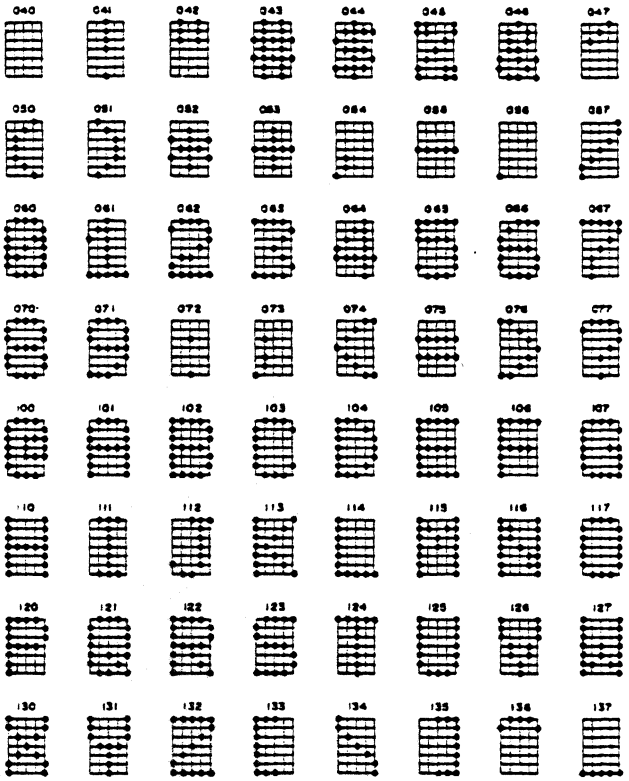
Notes: 1. ◤ Indicates control codes recognized by Model 306SC printer.

2. Underscore (octal 137) is replaced by a back-arrow in the standard 9 x 7 matrix.

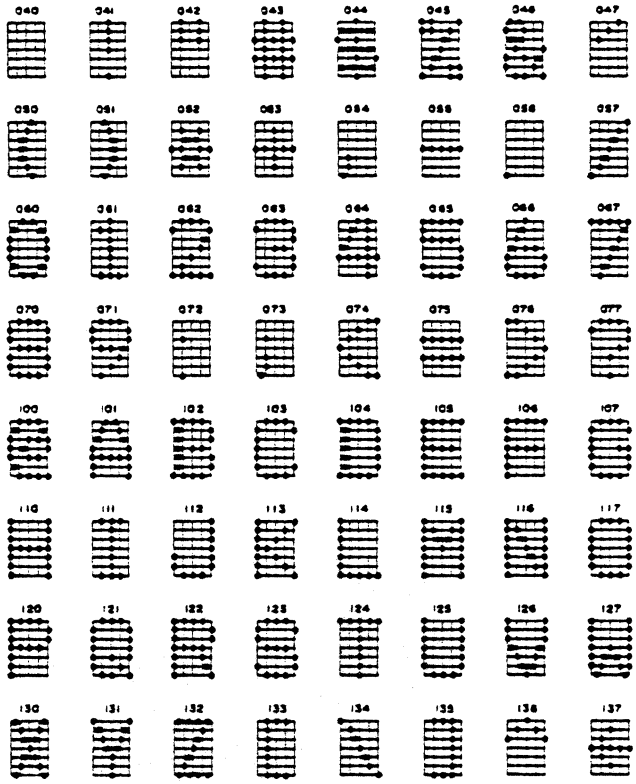
STANDARD CHARACTER SETS

In the standard printer configuration, the standard 5 x 7 character set is called up by the escape numeric code sequence 033 060 to generate characters. The standard 9 x 7 character set is optional, but if configured into the printer, it would replace the 5 x 7 character set and be called up by the same code sequence. For a complete list of all standard character sets, refer to the Centronics brochure. Printer Character Sets (C332-20).

STANDARD 5 x 7
CHARACTER MATRIX



STANDARD 9 x 7
CHARACTER MATRIX



GEOMETRIC SEGMENT CHARACTER SETS

The geometric segment sets are used to form characters 0.2-inch high to any larger size desired. Three of the segment sets (35552041-1002, 1003 and 1007) are used to print 0.2 and 0.3-inch characters. Segment set 35552041-1004 can be used to print any characters or symbols 0.4-inch high or larger. Sets 35552041-1009 and 1006 are optional.

Each segment set is illustrated and has a heading that includes:

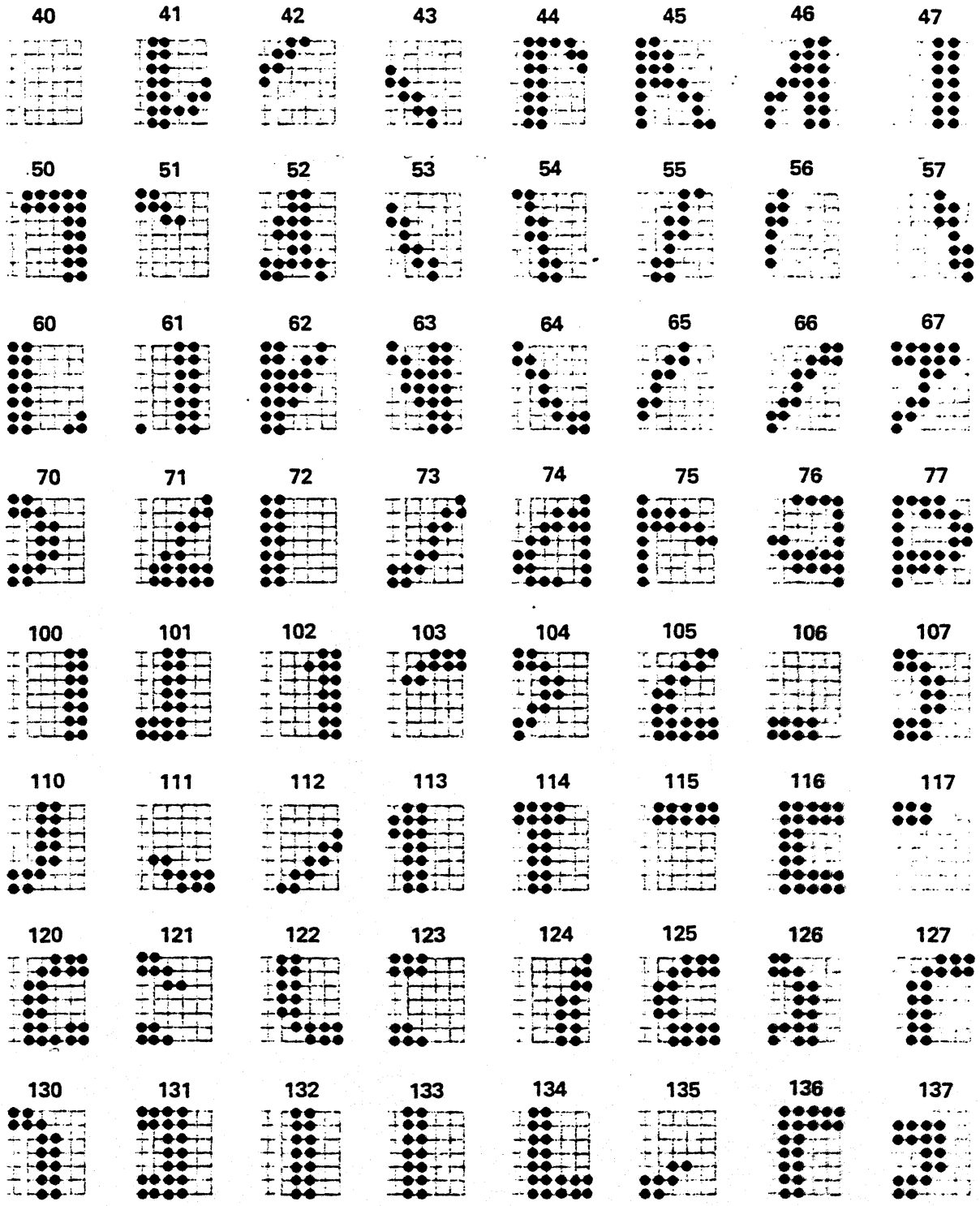
A. Escape Numeric Code Sequence.
B. Title
C. Part Numer

The sets considered standard have associated escape numeric code sequence given. This space, in the heading of other segment sets, is left blank for the user to register the assigned code sequence when the segment set is configured into the printer. Each segment in a set is illustrated with the associated octal code.

NOTE

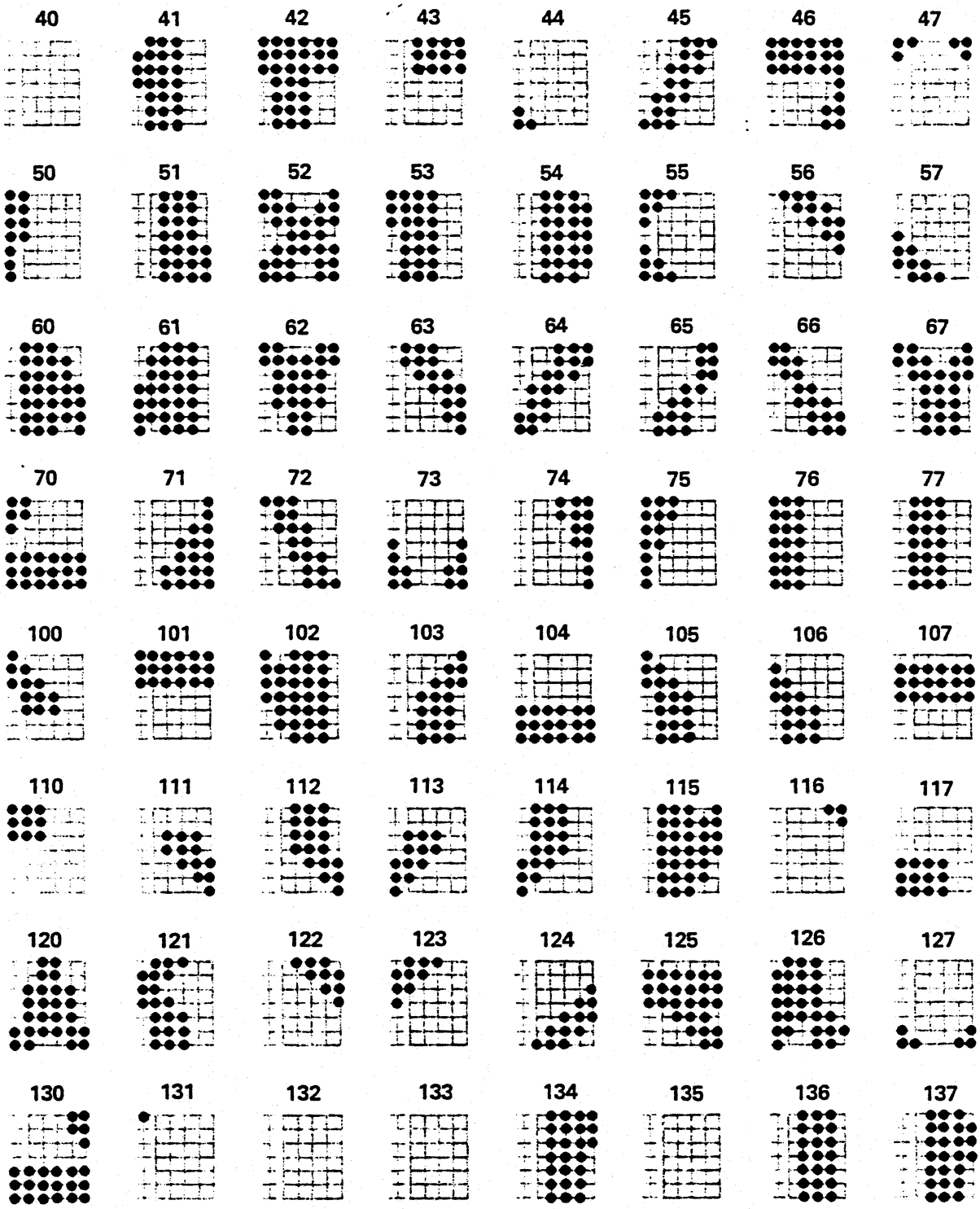
The escape code sequences address physical locations of character generators (PROM). Therefore, if a special configuration relocates a PROM, the addressing will also change.

ESCAPE NUMERIC SEQUENCE: 033 061
TITLE: Geometric Segment Set (0.2-Inch Alphanumeric)
NUMBER: 35552041-1002



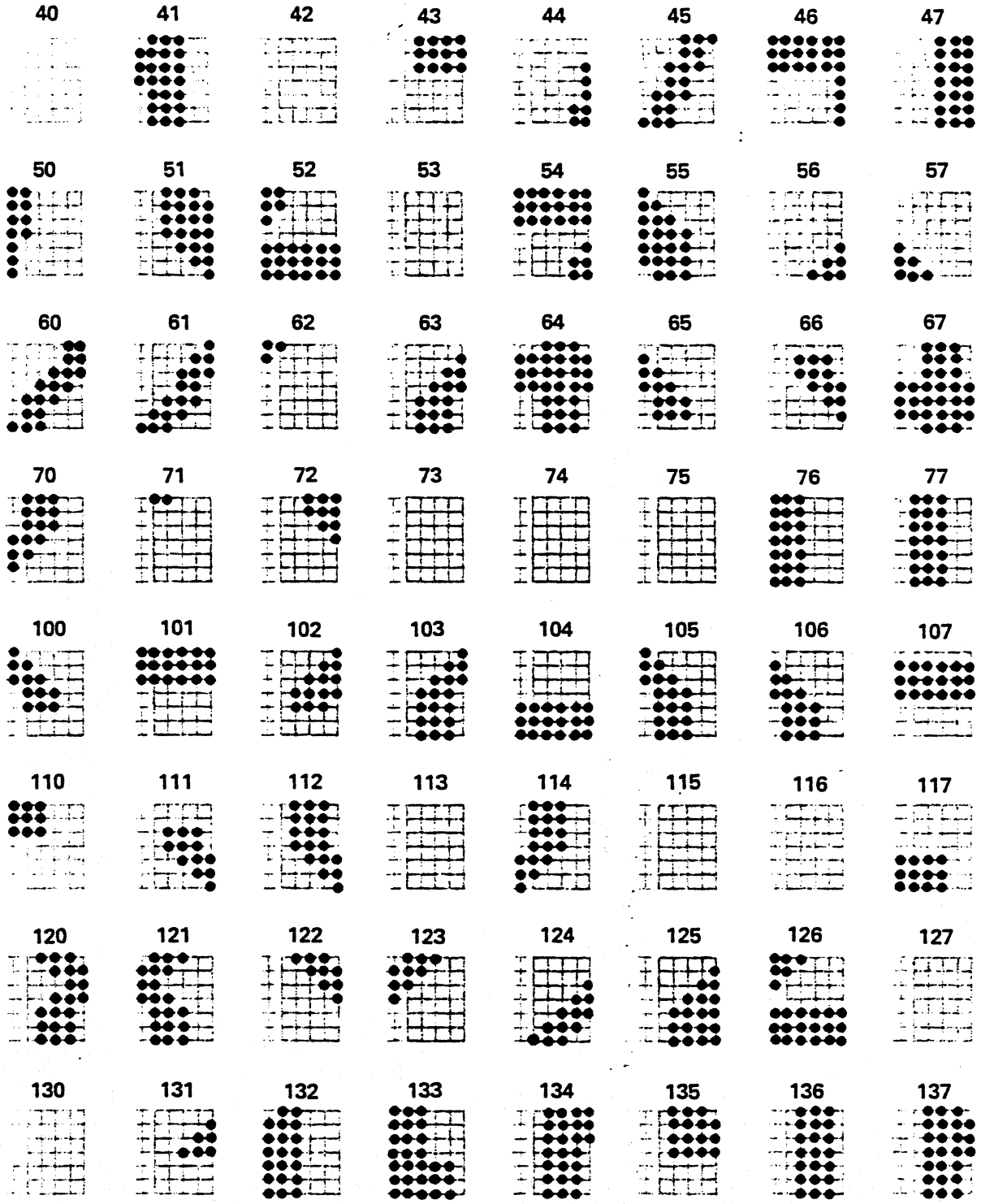
00147

ESCAPE NUMERIC SEQUENCE: 033 062
TITLE: Geometric Segment Set (0.3-Inch Alphabetic)
NUMBER: 35552041-1003



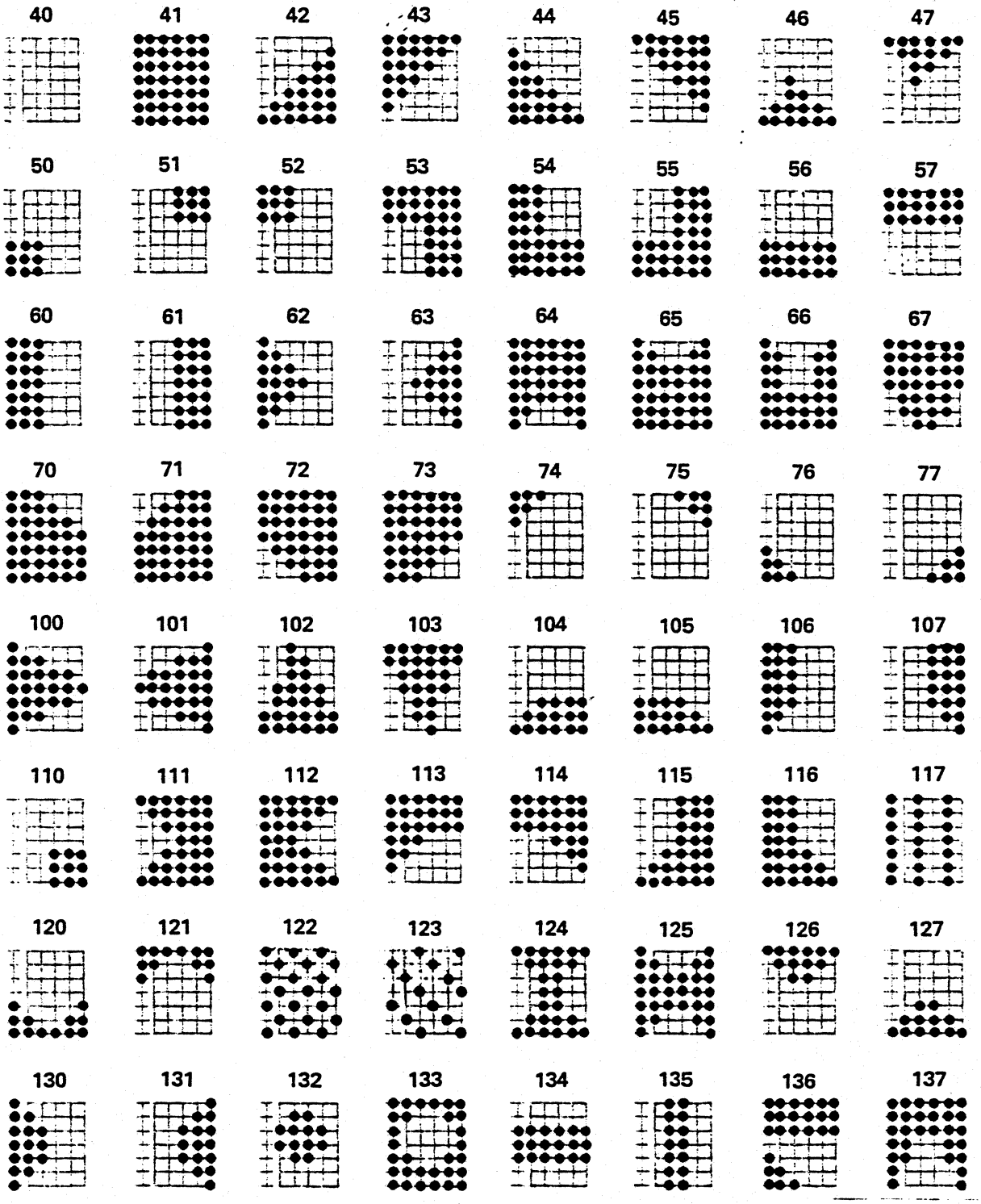
00148

ESCAPE NUMERIC SEQUENCE: 033 065
TITLE: Geometric Segment Set (0.3-Inch Numeric)
NUMBER: 35552041-1007



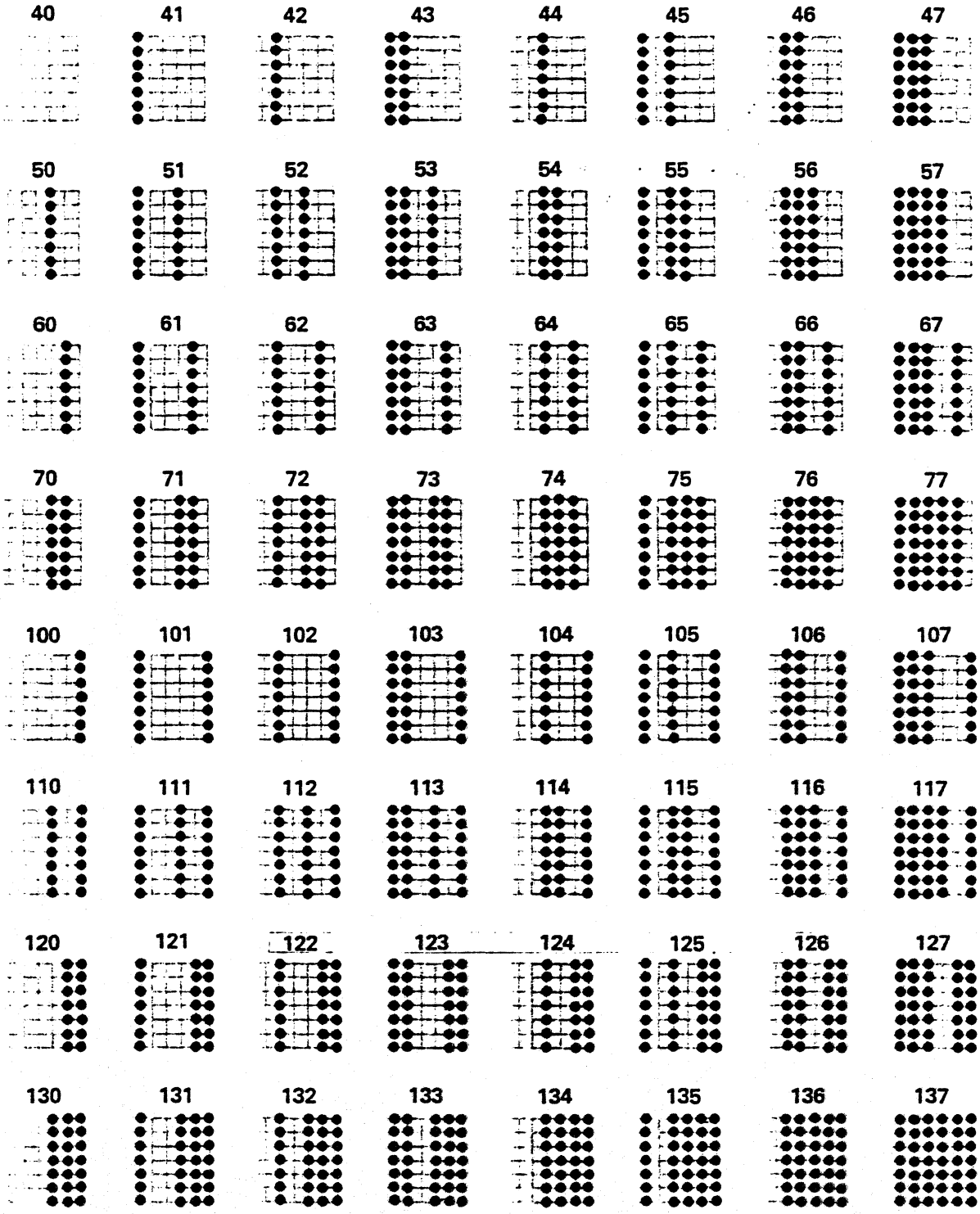
00149

ESCAPE NUMERIC SEQUENCE: 033 066
TITLE: Geometric Segment Set (0.4-Inch and Above)
NUMBER: 35552041-1004



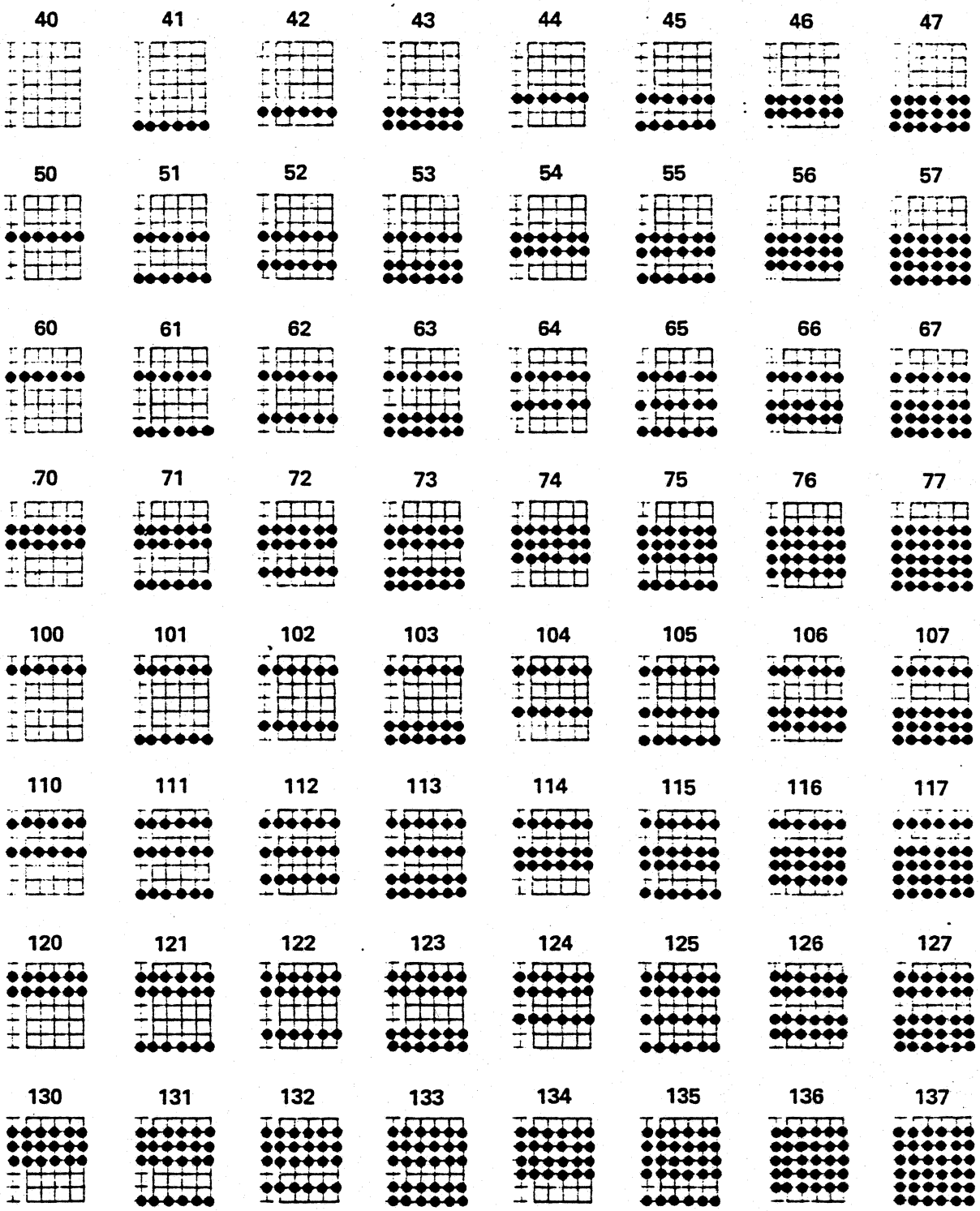
00150

ESCAPE NUMERIC SEQUENCE : 033 067
TITLE: Geometric Segment Set (Vertical Bar Codes)
NUMBER: 35552041-1008



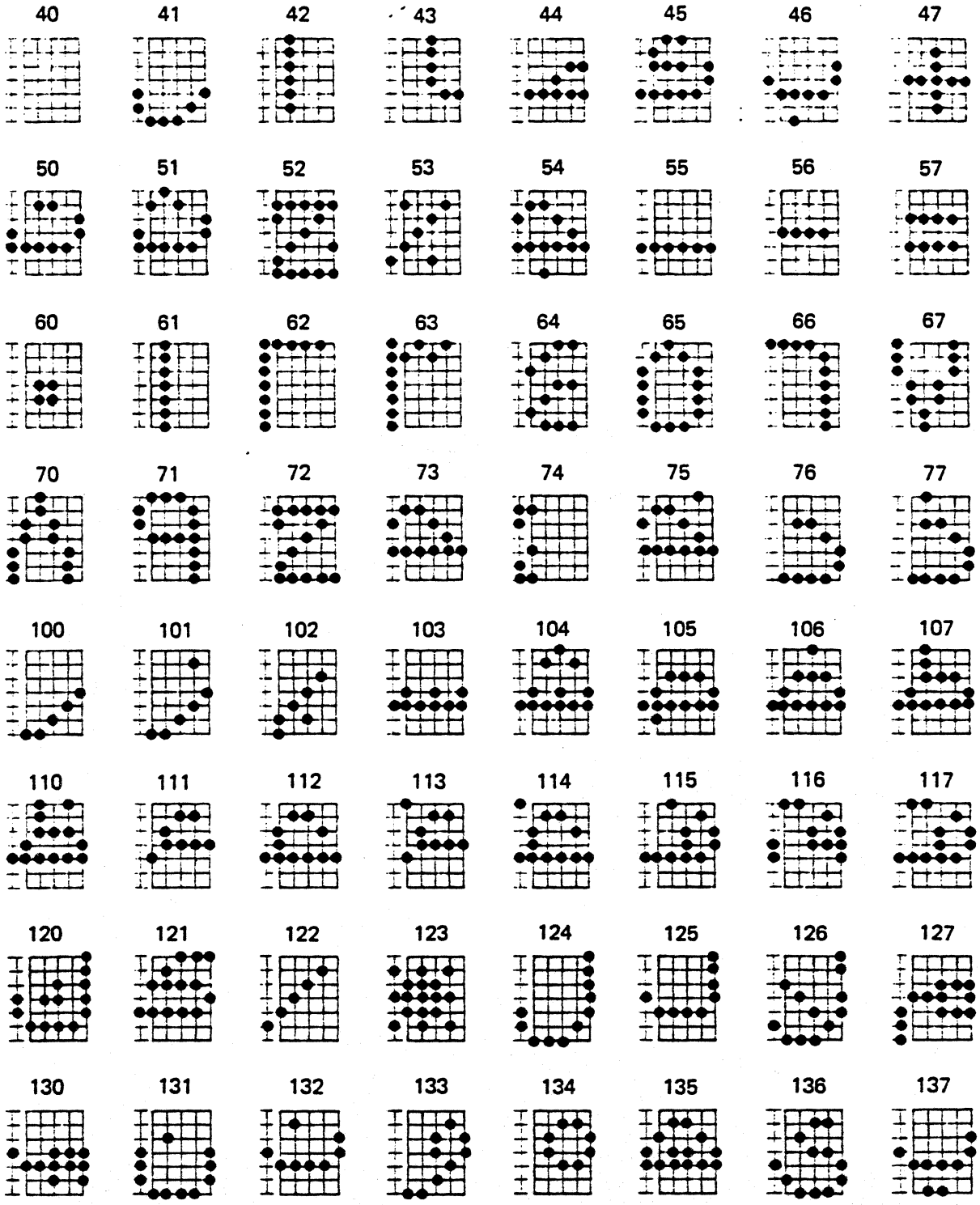
00151

ESCAPE NUMERIC SEQUENCE:
TITLE: Geometric Segment Set (Horizontal Bar Codes)
NUMBER: 35552041-1009



00152

ESCAPE NUMERIC SEQUENCE:
TITLE: Geometric Segment Set (Arabic)
NUMBER: 35552041-1006

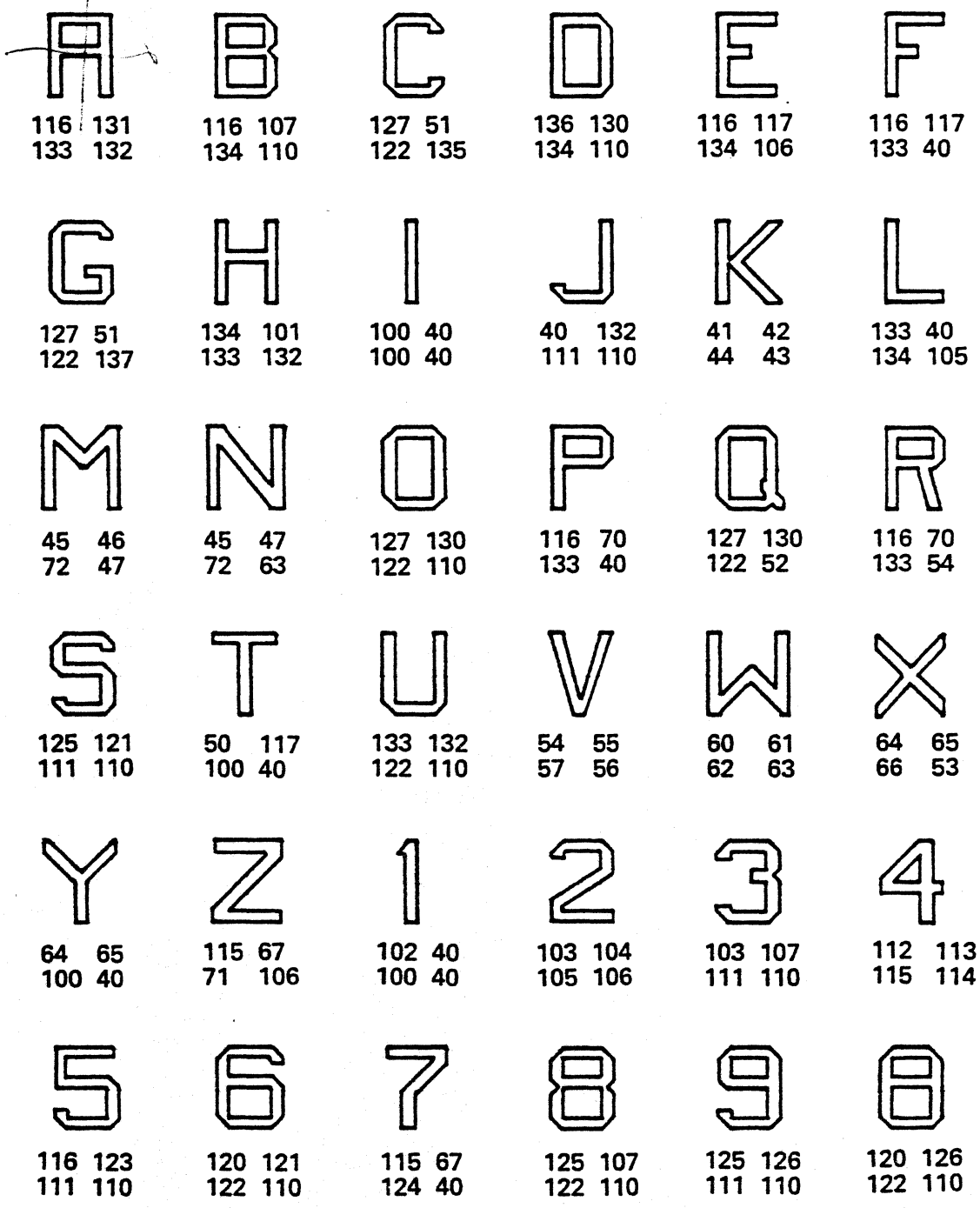


00153

LARGE SCALE SEGMENTED CHARACTER FORMATIONS AND ASSOCIATED CODES

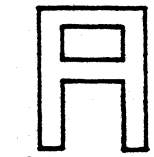
The following information illustrates the formation of characters 0.2-inch to 0.7-inch high. Each segmented character is shown with all segment associated octal codes.

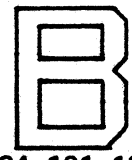
0.2-INCH CHARACTERS WITH GEOMETRIC SEGMENTS
(35552041-1002) AND ASSOCIATED OCTAL CODES
ESCAPE NUMERIC SEQUENCE: 033 061

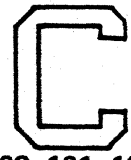


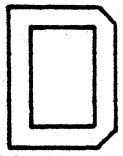
00154

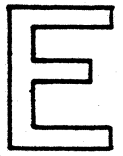
0.3-INCH CHARACTERS WITH GEOMETRIC SEGMENTS (35552041-1003 AND 35552041-1007) AND ASSOCIATED OCTAL CODES.
ESCAPE NUMERIC SEQUENCE: 033 062 (For Alphabetic)
033 065 (For Numeric)

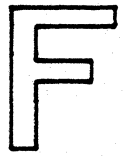

134 101 53
137 107 41
136 40 77


134 101 105
137 107 121
51 104 114

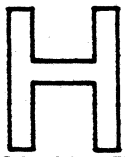

103 101 100
136 40 40
112 104 113

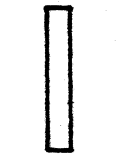

134 101 105
136 40 77
51 104 114

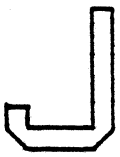

134 101 110
137 107 40
51 104 117


134 101 110
137 107 40
136 40 40

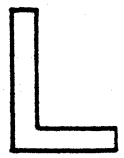

103 101 100
136 40 117
112 104 114

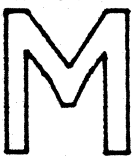

136 40 77
137 107 41
136 40 77


40 76 40
40 76 40
40 76 40

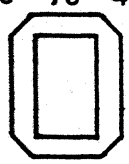

40 40 77
40 40 77
111 104 114


136 124 123
54 55 40
136 56 57

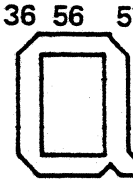

136 40 40
136 40 40
51 104 117


60 127 61
77 62 136
77 40 136

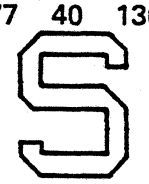

60 44 136
77 72 136
77 116 102

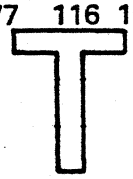

103 101 105
136 40 77
112 104 114

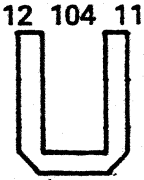

134 101 106
137 107 123
136 40 40

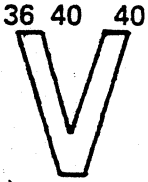

103 101 105
136 40 77
112 130 126


134 101 105
137 125 123
136 116 66

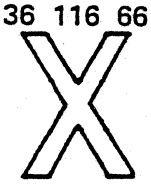

103 101 100
122 107 106
111 104 114

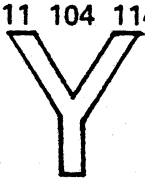

43 42 110
40 77 40
40 77 40

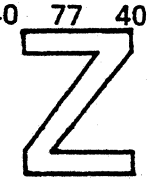

136 40 77
136 40 77
112 104 114

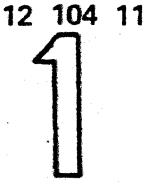

72 40 45
74 73 75
40 62 40

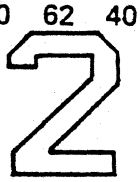

77 40 136
77 120 136
115 47 102


63 44 64
40 52 131
65 47 66

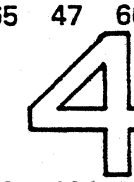

63 44 64
40 67 131
40 136 40


43 46 50
40 45 40
71 70 117


131 76 40
40 76 40
40 76 40

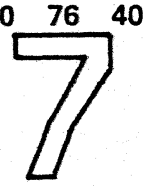

102 101 105
40 124 123
125 126 117


102 101 105
40 107 121
111 104 114


40 124 132
125 126 133
40 40 76


134 101 110
135 107 106
111 104 114


103 101 105
137 107 106
112 104 114


43 46 50
40 45 40
44 50 40

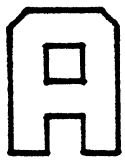

103 101 105
120 107 121
112 104 114


103 101 105
122 107 41
111 104 114

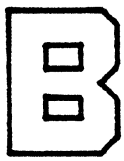

103 54 55
136 45 77
51 52 114

00155

0.4-INCH CHARACTERS WITH GEOMETRIC SEGMENTS
(35552041-1004) AND ASSOCIATED OCTAL CODES.
ESCAPE NUMERIC SEQUENCE: 033 066

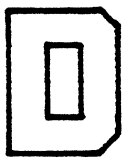


71 41 70
41 40 41
41 41 41
41 40 41

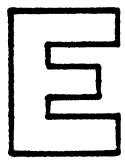


41 41 70
41 56 73
41 57 70
41 41 73

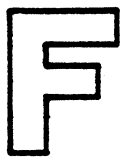
71 41 70
41 40 57
41 40 56
72 41 73



41 41 70
41 40 41
41 40 41
41 41 73

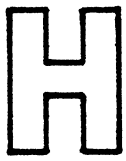


41 41 41
41 56 50
41 57 52
41 41 41



41 41 41
41 56 50
41 57 52
41 40 40

71 41 70
41 40 57
41 107 41
72 41 73



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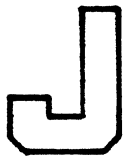

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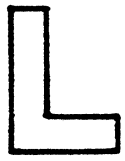

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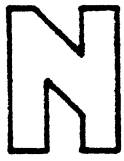

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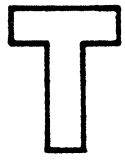

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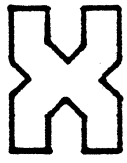

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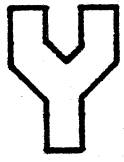

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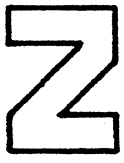

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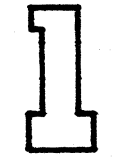

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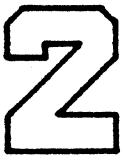

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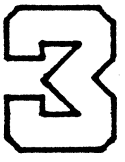

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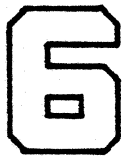

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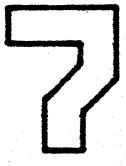

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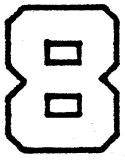

71 41 70
72 56 73
71 57 70
72 41 73

71 41 70
41 56 41
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41 41 73

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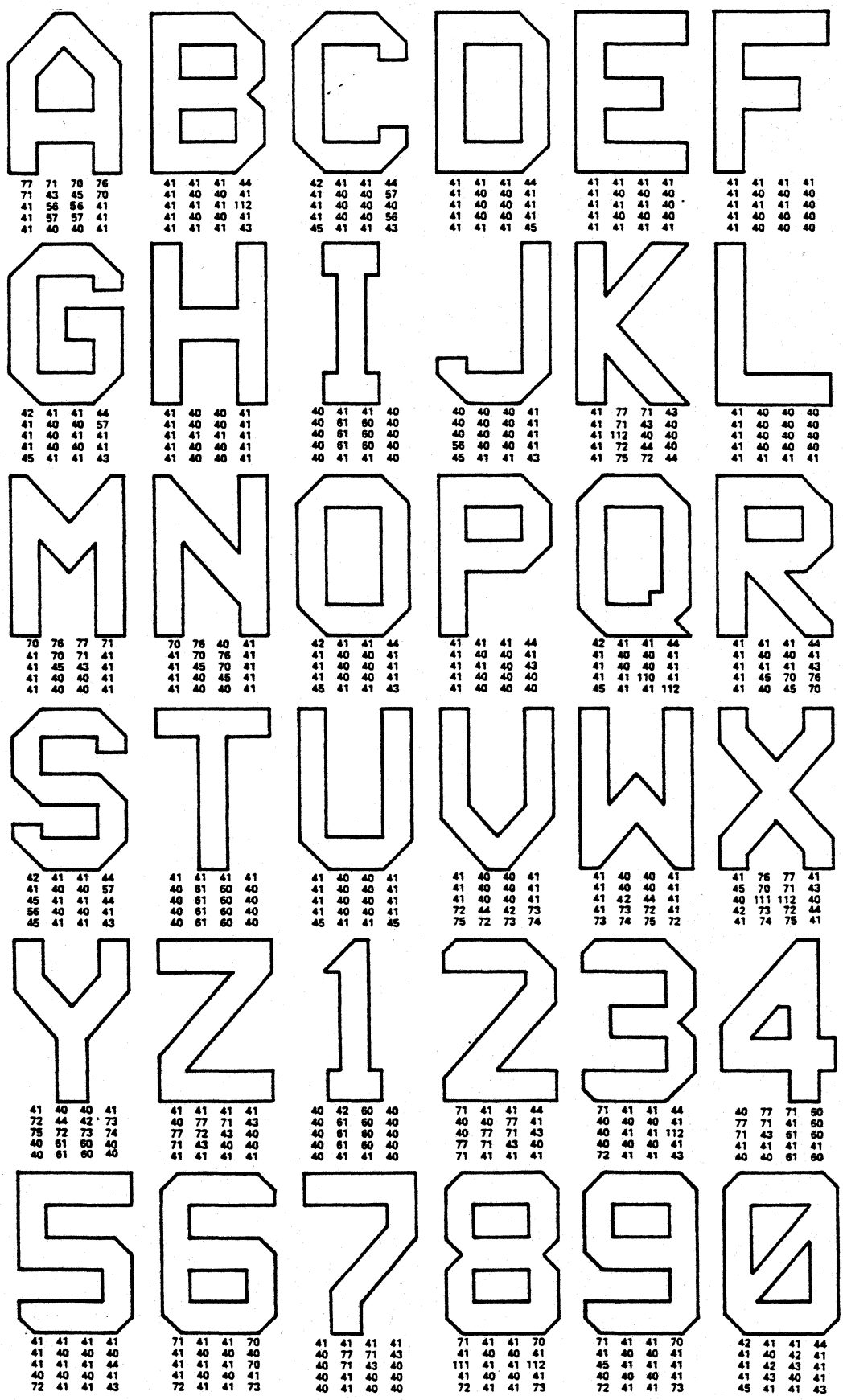
00160

0.5-INCH CHARACTERS WITH GEOMETRIC SEGMENTS (35552041 - 1004) AND ASSOCIATED OCTAL CODES.
ESCAPE NUMERIC SEQUENCE: 033 066



00156

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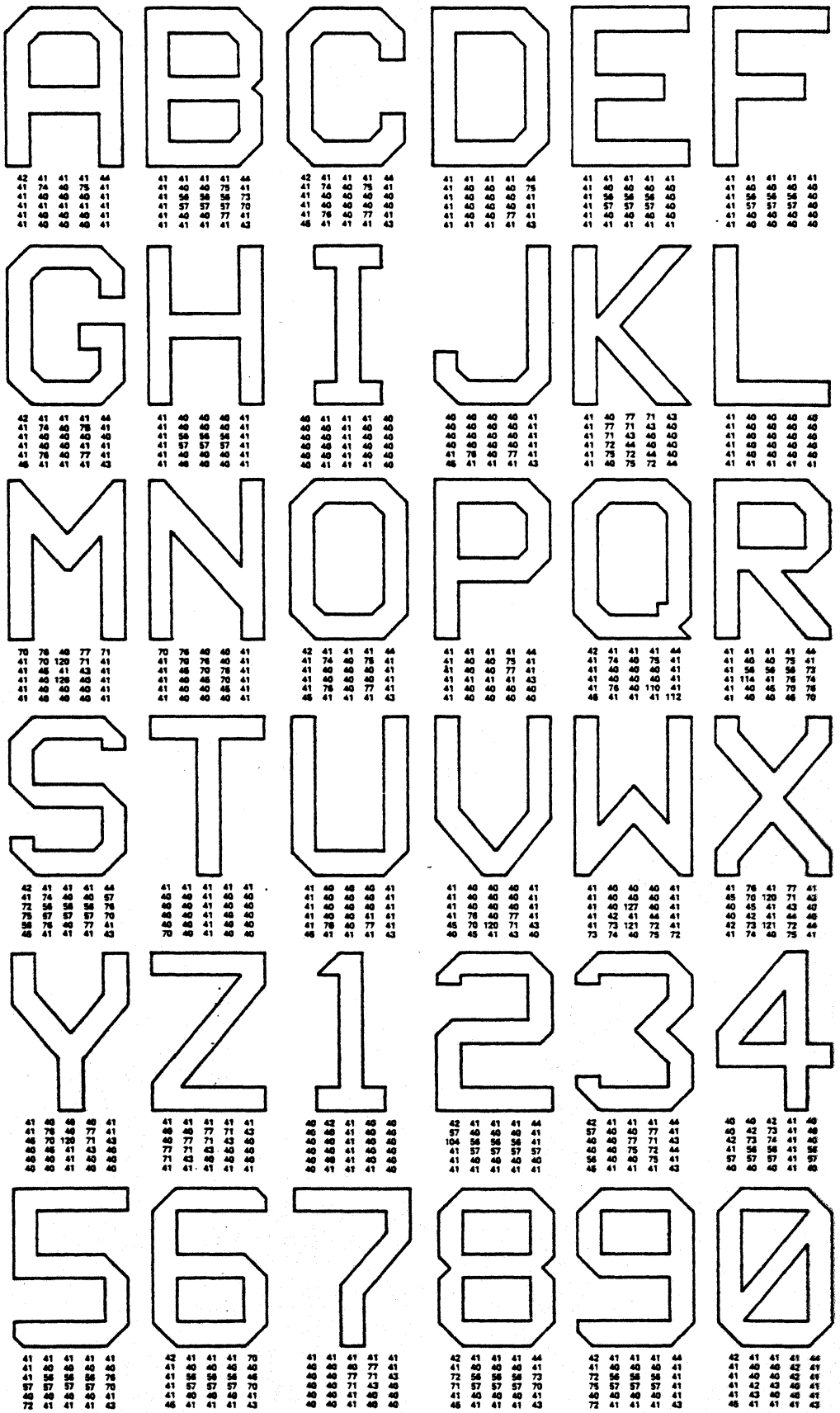

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0.7-INCH CHARACTERS WITH GEOMETRIC SEGMENTS
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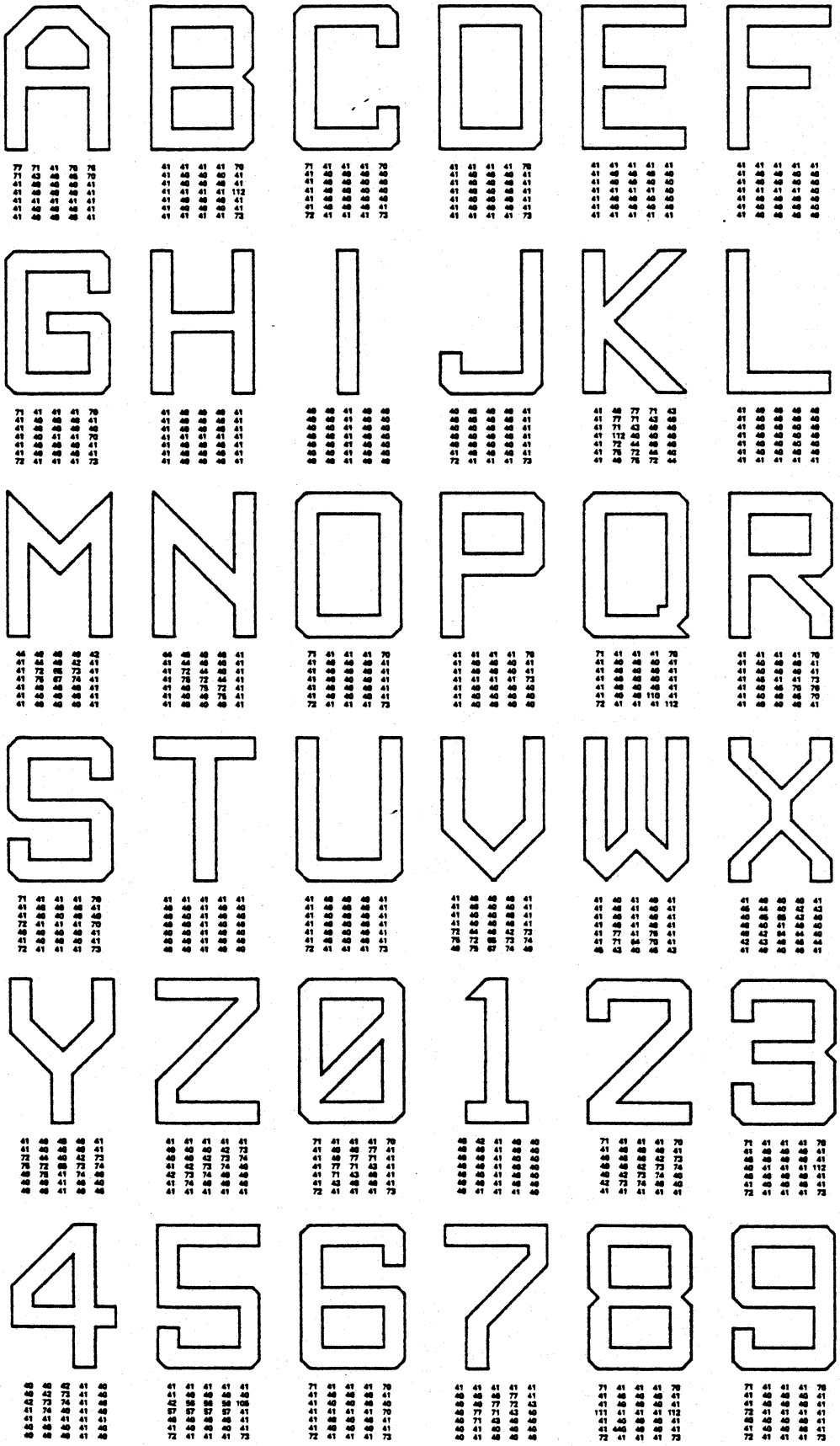

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