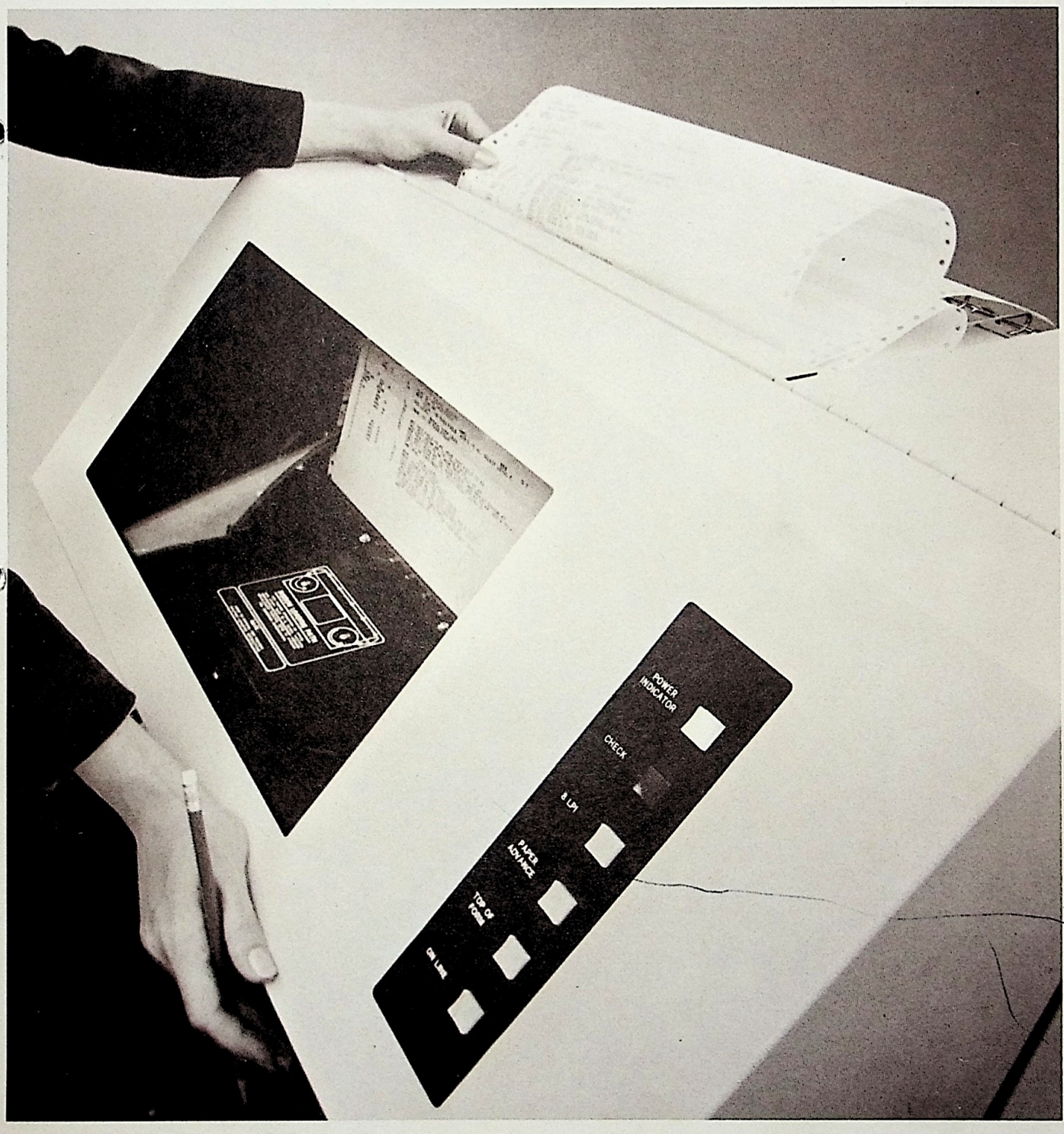
CMC Distributed KeyProcessing® Systems

XL40 Line Printer Manual
Model 4521–1/Model 4523–1



XL40 Distributed KeyProcessing® System

Line Printer Manual

Model 4521-1/Model 4523-1

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INTRODUCTION

This manual describes the Model 4521-1 and Model 4523-1 Line Printers, Figure 1, that are available with the XL40 Distributed KeyProcessing System. Both printers operate identically and differ only in rated speed as shown in the following table:

Model	Rated Speed
4521-1	170 lines/minute
4523-1	300 lines/minute

A line printer supports system operations in four important areas:

- Supervisory Reports - Printing of production logs and status reports generated by the XL40 System.
- Tape Listing - Tape-to-printer listing of files created on the XL40 or on other data processing equipment.
- Batch Listing - Preparing of detail listings of batches stored on the system's magnetic disk unit.
- Report Writing - Printing reports which have been generated from keyed data incorporating report requirements such as headings, subheadings, totals and page numbering.

PRINTER CHARACTERISTICS

The printer has 96 printable characters including the 64 character ASCII set and the lower case alphabet. In Table 1, those characters that are in addition to the ASCII set are listed in the right two columns.

Because of an electronic VFU (Vertical Forms Unit) control, no carriage tape is required. Table 2 summarizes the operating characteristics and installation requirements.

The Models 4521-1/4523-1 permit printing at the full rated speed in most cases. When lowercase characters include descenders (gjpqy), or if a character is underscored, the rated speed for that particular line is 130 or 240 lines per minute. The actual print rate for a particular application depends on the total number of lines to be printed, number of lines skipped, number of lines with lowercase descenders and amount of other concurrent system activity.

Figure 1. Model 4521-1/Model 4523-1 Line Printer

Table 1. Printable Characters

	Bits 4 - 1	Bits 7 - 5						
		000	010	011	100	101	110	111
		0	1	2	3	4	5	6
0	0000		space	0	@	P	'	p
1	0001		!	1	A	Q	a	q
2	0010		"	2	B	R	b	r
3	0011		#	3	C	S	c	s
4	0100		$	4	D	T	d	t
5	0101	plot	%	5	E	U	e	u
6	0110	8 LPI	&	6	F	V	f	v
7	0111		'	7	G	W	g	w
8	1000	elong char	(	8	H	X	h	x
9	1001		)	9	I	Y	i	y
0A	1010	line feed	*	:	J	Z	j	z
0B	1011	vert tab	+	;	K	[	k	{
0C	1100	form feed	,	<	L	\	l	'
0D	1101	carr rtn	-	=	M	]	m	}
0E	1110	shift out	.	>	N	^	n	~
0F	1111	shift in	/	?	O	_	o	del

Table 2. Printer Characteristics

Operating Characteristics	
Print Rate	Up to 300 LPM
Print Matrix	9 x 7 dot matrix
Character Set	96 standard ASCII
Character Format	132 characters per line 10 characters per inch 6 or 8 lines per inch
Paper Type	Pin feed, continuous fan fold
Paper Width	4 inch (10.16 cm) to 16 inch (40.64 cm)
Paper	Single part 15 lb (6.8 kg) to 100 lb (45.36 kg)
Paper Advance Speed	Single line, 33 ms 6 LPI, 25 ms 8 LPI
Vertical Format	Electronic top-of-form Electronic 12-channel VFU
Ribbon	4 mil nylon, 1 in. (2.54 cm) x 60 yd (54.86 cm)
Size	16.5 in (41.91 cm) high 30.0 in (76.2 cm) wide 24.0 in (60.96 cm) deep
Weight	215 lb (81.65 kg) with pedestal
Installation Requirements	
Voltage	100, 110, 120, 200, 220, 240, 50 or 60 Hz single phase
Voltage Limits	+10%, - 15%
Power Consumption	550 watts max.
Operating Temperature	40F to 100F
Storage Temperature	-40F to 150F
Operating Humidity	20% to 90% (excluding condensation)
Operating Storage	5% to 95% (excluding condensation)
Heat Dissipation	500 Btu/hr.

PRINTER OPERATION

The power switch is located on the left side at the base of the printer. All other controls and indicators are located on the right side of the console cover. Table 3 lists the controls and indicators and describes their functions.

PAPER LOADING

The following procedures for loading paper refer to Figure 2.

1. The printer should be powered on with the ON LINE indicator off.
2. Lift the console cover.
3. Set Form Thickness Adjustment lever to load position by moving it upward. The platen moves away from the ribbon and print hammer.
4. Open the tractor gates on both the left and right tractors.
5. Insert the paper through the slot on the bottom of the printer and pass it over the platen.

Table 3. Controls and Indicators

Control/Indicator	Function
POWER ON/OFF switch	Turns on power to the printer.
POWER indicator	Lighted when power switch is on.
CHECK button/ indicator	Lighted when printer is not ready because of paper fault or an error condition. Printer cannot go on line if CHECK is lighted. Depressed to clear error condition.
8 LPI button/ indicator	Selects spacing of either 8 lines per inch (lighted) or six lines per inch (unlighted). Operational only when printer is off line.
PAPER ADVANCE button	Advances paper 6 or 8 lines per inch. Operational only when printer is off line.
TOP OF FORM button/ indicator	Advances paper to the top of the next form. Operational only when printer is off line. Lights only when electronic VFU is loaded.
ON LINE button/ indicator	Enables printing to begin. Lighted when the printer is on line.

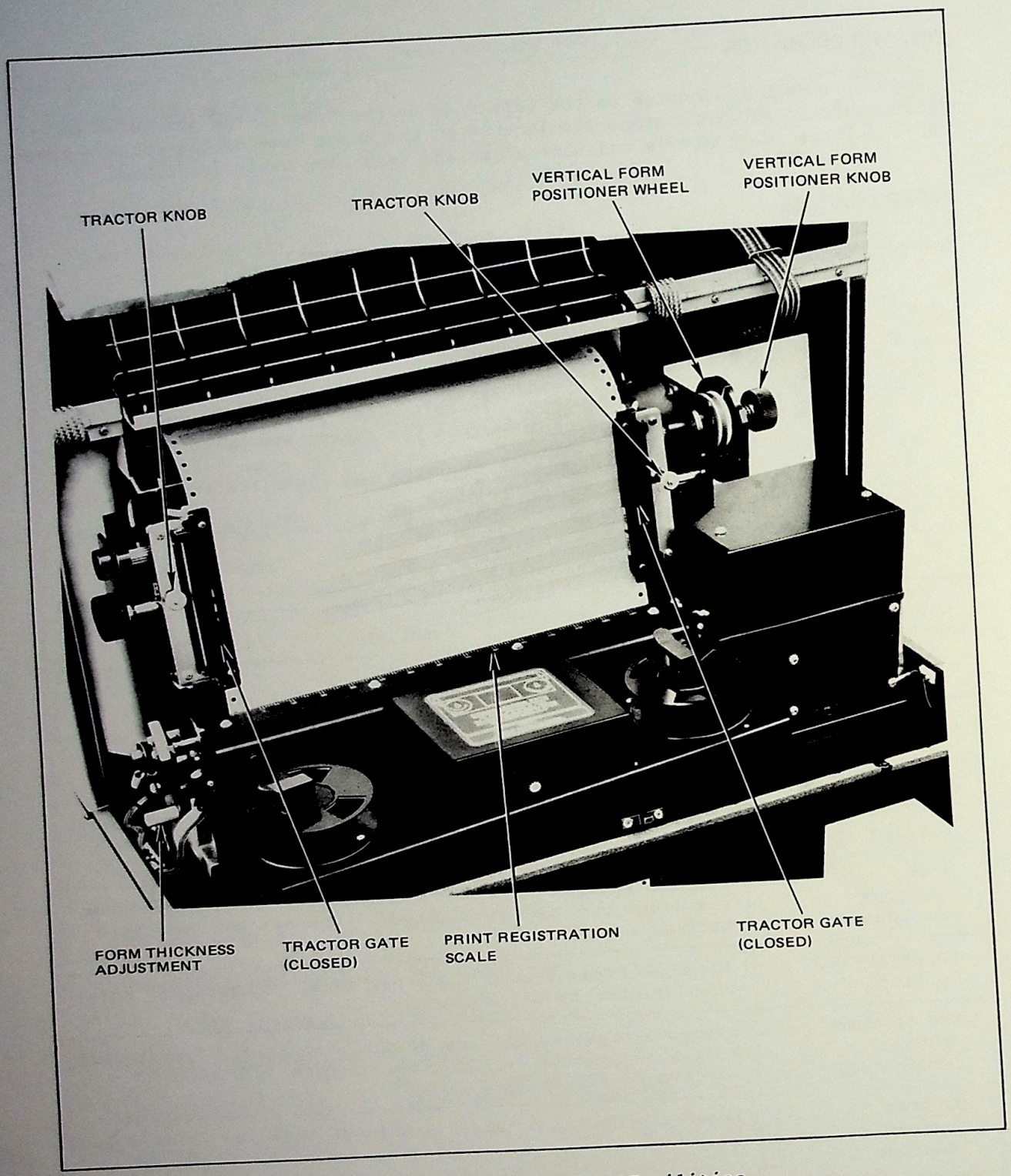

Figure 2. Paper Loading Facilities

6. Raise the paper to the tractors and fit the sprocket holes on the left and right margins of the paper to the feed pins on the tractors. If the feed pins and sprocket holes do not match, loosen the knob on the right tractor and move it to the right or left until a match is made.

7. Slide the right tractor until there is very slight tension across the paper. Too little tension causes wavy print lines. Too much tension causes the paper to jam in the printer and can make decollation and bursting difficult.

8. Tighten the knob on the right tractor. Be certain that the left side of the paper is close to the 1 on the print registration scale. This ensures that the paper passes over the paper-out detector. The CHECK indicator lights if this condition is not met.

9. Depress the TOP OF FORM button.

10. Using the Vertical Form Positioner knob, set the top of the paper at the point printing is to start by aligning that point between TOP FORM on the left and right tractors.

11. Turn the Vertical Form Positioner wheel until the white pointer on the wheel aligns with the tip of the wheel casing.

12. Turn the Vertical Form Position knob counterclockwise one revolution. The white pointer on the wheel is again aligned with the tip of the wheel casing.

13. Pull downwards on the paper where it enters the paper slot to make it taut in the printer.

14. Move the Form Thickness Adjustment lever downwards to the appropriate thickness.

Note

If the Form Thickness Adjustment lever is not closed or is positioned incorrectly for the thickness of the form, printing may not occur, and the ribbon may be destroyed.

14. Close the console cover and depress TOP OF FORM. If the CHECK indicator lights, depress the CHECK button. If it remains lighted, verify that paper is loaded properly according to steps 1 through 12 above and that the console cover is closed.

15. Depress the ON LINE button to put the printer on line.

CHANGING RIBBON

The ink ribbon prints approximately 150,000 lines before replacement is needed. It should be replaced with Printronix Part No. 102493-001.

The following procedure for changing the ribbon refers to Figure 3.

1. Turn printer power off.

2. Lift the console cover.

3. Set Form Thickness Adjustment lever to the load position by moving it upward.

4. Rotate either ribbon reel to put slack in the ribbon.

5. Lift the latches on top of the reels.

6. Remove and discard the reels.

7. Place the reels of the new ribbon on the hubs and thread as shown in the drawing between the ribbon reels in the interior of the console.

Note

The end of reel sensor wires (diagonal stitching on the ribbon at the end of the reel) must be taken up on the reel.

8. Rotate either reel to take up slack and ensure that the ribbon runs smoothly over the guides. A twisted ribbon causes missing characters, shortens ribbon life, and creates paper jams.

9. Turn printer power on.

10. Set the Form Thickness Adjustment lever to the position suitable for the paper or form in the printer.

Note

If the Form Thickness Adjustment lever is not closed or is positioned incorrectly for the thickness of the form, printing may not occur, and the ribbon may be destroyed.

11. Close the console cover and turn the power switch to the ON position. The printer is now ready.

PRINTER USE

The line printer can be used to produce outputs in conjunction with various supervisor procedures and commands. This is done by designating the line printer as the 01 OUTPUT device or the LOG DEVICE through the SET command. When used as one of these devices, the printer advances one line after each line is printed. For further information see the XL40 Reference Manual.

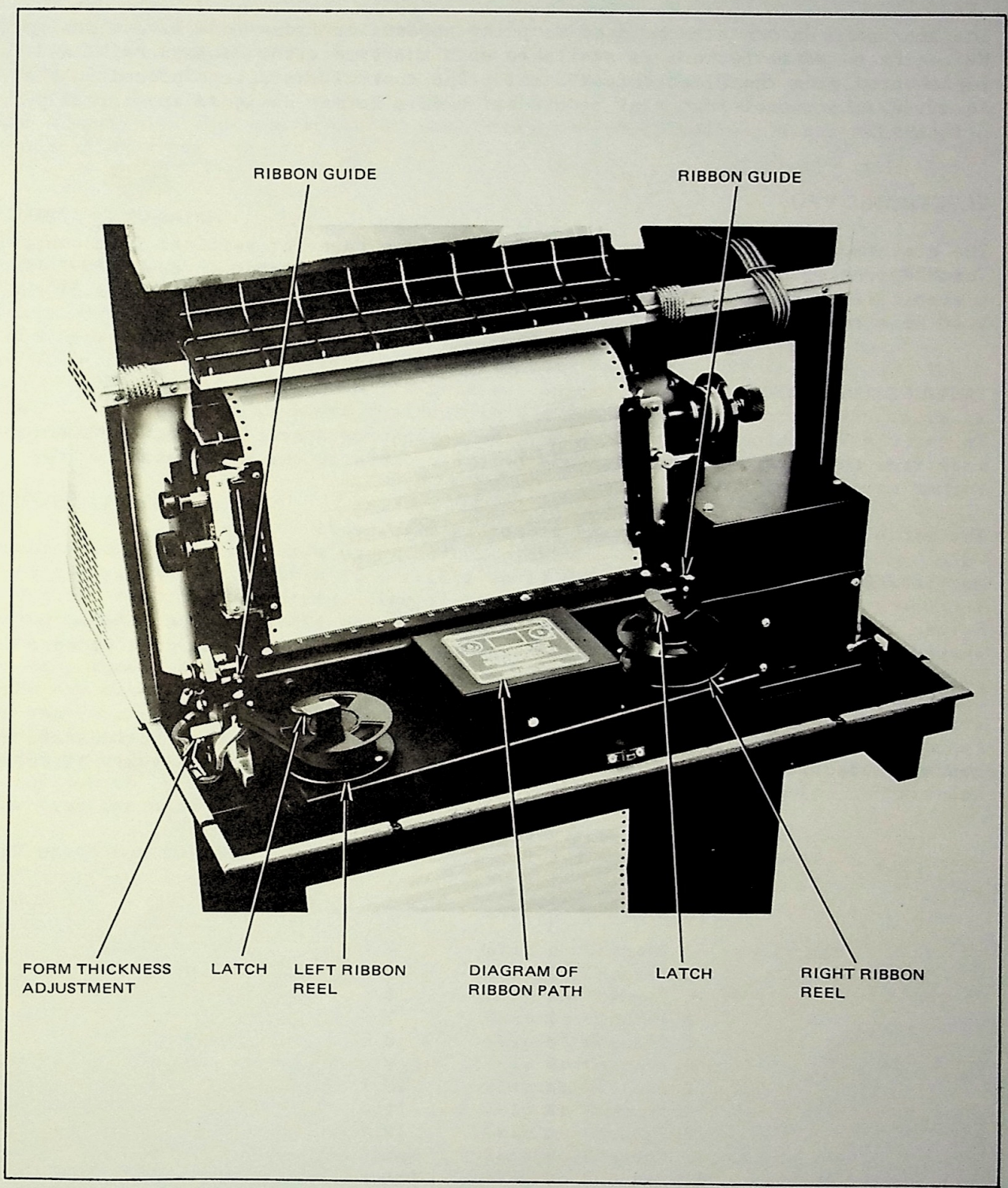

Figure 3. Ribbon-Changing Facilities

The line printer can also be used to print reports or forms in a layout designed by the user. This feature is available with the supervisor command PRINT and is implemented with the electronic VFU and print control characters placed in the Format which controls entry of a data batch or a Format designed specifically for printing.

ELECTRONIC VFU

The electronic VFU is used in place of a carriage tape for vertical form control. The VFU control batch is a data batch entered into the system through VFU-FORM, a specialized Format contained in the User Program Library. (Appendix A of the XL40 Reference Manual describes the User Program Library.)

ENTERING A VFU BATCH

To enter a VFU batch into the system, the keystation operator selects the enter mode from the work menu and responds to the prompts in the usual manner. For Format name, VFU-FORM is entered.

The batch opens and the following prompt is displayed:

ENTER NUMBER OF LINES ON FORM (1 to 128)

Key in the total number of lines on the form. Up to 128 lines are allowed. The system automatically generates a start code (S) and displays the next prompt:

ENTER VFU CONTROL OR "*" FOR EACH LINE

For each line of the form, key in a channel number or an asterisk to indicate no channel selection. Up to 12 channels may be designated. The codes are listed below.

Character	Channel
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
*	None
S	Start
E	End

After each line of the form is accounted for with either a channel number or an asterisk, an E is keyed to indicate the end of the batch. For example, if a VFU control for 80 lines is entered, the 81st position in the field displayed should contain an E. The batch closes automatically and batch and operator statistics are displayed. The system checks for errors, however, and the batch will not close if an error exists.

LOADING A VFU BATCH

After the batch is closed it is loaded into the printer through the supervisor command, PRINT. When loading a VFU batch it is the only batch which can be loaded during that running of the PRINT command. To indicate to the system that this is a VFU batch and not an ordinary data batch, when the system prompts PRINT OPTIONS, TRANS is selected and a translation code of 22 is entered. The TOP OF FORM indicator light on the printer console lights when the VFU batch is loaded. That VFU batch stays resident in the printer until another VFU batch is loaded or the printer is powered off.

REPORT LAYOUT

Reports can be printed in a user-designed layout. In the Format which controls data entry, the first field of a record to be printed contains either one or two VFU print control characters. The first character designates either the channel of the electronic VFU to be selected or the number of lines to skip. Skipping a line is called slewing. The second character indicates the sequence in which paper movement and printing are to occur. The system treats these characters like any other data, and they must be assigned no output positions (checkbox 15 on the Source Input Form). If the print control characters are not entered as a field in the Format, they may be generated by MOVE or COMPUTE statements in the COBOL Procedure section of the Format. If the print control characters vary from print job to print job, they can be manually keyed by the keystation operator at the time the data batch is entered.

VFU print control characters which may be placed in the Format are:

	Character	Function
Input Record Position 1	1	Skip to Channel 1 (top of form)
	2	Skip to Channel 2
	3	Skip to Channel 3
	4	Skip to Channel 4
	5	Skip to Channel 5
	6	Skip to Channel 6
	7	Skip to Channel 7
	8	Skip to Channel 8
	9	Skip to Channel 9
	A	Skip to Channel 10
	B	Skip to Channel 11
	C	Skip to Channel 12

	Character	Function
Input Record Position 1 - continued	blank	Slew 1 Line
	0	Slew 2 Lines
	-	Slew 3 Lines
	M	Slew 4 Lines
	N	Slew 5 Lines
	O	Slew 6 Lines
	P	Slew 7 Lines
	Q	Slew 8 Lines
	R	Slew 9 Lines
	S	Slew 10 Lines
	T	Slew 11 Lines
	U	Slew 12 Lines
	V	Slew 13 Lines
	W	Slew 14 Lines
	X	Slew 15 Lines
Input Record Position 2	blank	Paper movement occurs before printing
	Any Other Character	Printing occurs before paper movement

HEXADECIMAL PRINT CONTROL CODES

Print control codes other than VFU controls as described above can be embedded within the data record. The codes available are as follows:

Code	Function
0A	Line Feed
0C	Top of Form

The codes must be assigned output positions in checkbox 15 of the Source Input Form. The codes must be converted to packed hexadecimal by entering H in checkbox 18 on the form.

Note

If data records contain binary or hexadecimal conversion as part of the data entry Format, the records should not be printed. The system cannot distinguish between the 0A and 0C as print control characters and the 0A and 0C as data within a record. Unwanted paper movement can occur.

If more than 132 characters are sent prior to a print control code, no automatic printing occurs. The buffer overflows and data is lost. A sample application is contained in Appendix A.

EDIT SUBPROGRAM

Data is stored on disk with no punctuation such as dollar signs or decimal points. In order to insert punctuation into a data field for a printed report, the EDIT Subprogram is used. EDIT is available in the User Program Library.

The EDIT Subprogram permits the creation of an edit mask. An edit mask is a frame to hold punctuation in specified positions. Data is moved into the frame around the punctuation. The frame and data are then printed on paper.

DESIGNING AN EDIT MASK

Use of the EDIT Subprogram requires careful analysis of the data to be edited, the edit mask, and the desired printed output. The edit mask must be large enough to contain both the data and the punctuation. The following arguments are necessary in the COBOL Procedure section to use EDIT:

1. The data to be edited. This must be an A register. Therefore, not more than 13 digits can be edited.

2. The edit mask. This can be a literal, a field, or a C register.

3. The area where the edited data is to be stored. This can be a C register or a nonkeyed field. The register or the field must be as large as or larger than the original edit mask.

If several data fields use the same edit mask, the mask should be stored in a C register. If a mask is to be used only once, it can be a literal in a procedure statement.

The EDIT Subprogram adds one position to the edit mask stored in a C register. Therefore, if none of the fields or literals in the Format is at least one position larger than the edit mask a SUBSCRIPT OVERFLOW error can occur. To preclude this, a DECLARE REGISTER SIZE statement to the size of the C register plus one should be written in the COBOL Procedure section.

The edit characters are as follows:

Character	Function
_	An underscore indicates a position to be replaced by data or a fill character.
0	A zero indicates zero suppression. It should be placed in the rightmost position where zero suppression is to begin.
*	An asterisk indicates asterisk fill which is frequently used for check protection. It is placed in the rightmost position where asterisk fill is to begin.
$	If a dollar sign occurs in the leftmost position, it remains fixed. Fill will depend upon the presence or absence of a

Character	Function
	zero or asterisk within the mask. If a dollar sign occurs in any other position of the mask, it becomes a floating dollar sign and zero suppression character. It is placed in the rightmost position where zero suppression is to occur. The dollar sign will be placed immediately to the left of the first significant digit.
,.b/-	Commas, decimal points, blanks, slashes and dashes are placed in the positions in which they are to appear. If zero suppression, asterisk fill or a floating dollar sign is specified, these characters will be replaced by the appropriate fill character if they occur to the left of the most significant digit.
CR -	The characters CR or a minus sign occurring in the last position(s) of the mask will remain if the data is negative and will be replaced with a blank(s) if the data is positive. A zero amount is always positive.

The zero, asterisk and floating dollar sign are mutually exclusive. If two or more are located in the same mask, the one furthest to the right takes precedence.

Table 4 illustrates the various uses of edit functions. Appendix A shows a sample application.

Table 4. Edit Functions

Mask	± Data	+ Result	- Result
_ _ _,_ _ _._ _	00001250	000,012.50	000,012.50
$_ _ _,_ _0._ _	00001250	$bbbbb12.50	$bbbbb12.50
_ _ _,_ _*._ _	00001250	*****12.50	*****12.50
_ _ _,_ _$._ _	00001250	$12.50	$12.50
$_ _ _,_ _0._ _CR	00001250	$bbbbb12.50bb	$bbbbb12.50CR
_ _ _,_ _$._ _b-	00001250	$12.50bb	$12.50b
$_ _ _,_ _0._ _CR	00000000	$bbbbbbb.00bb	$bbbbbb.00bb
$_ _ _,_ _*._ _b-	00000000	$*******.00bb	$*******.00bb
_ _ _,_ _$._ _	00000000	$.00	$.00
_ _/_ _/_ _	060375	06/03/75	06/03/75
_ _-_ _-_ _	060375	06-03-75	06-03-75

SUPERVISOR IMPLEMENTATION

Data records which contain print control characters for producing reports must be output using the PRINT command. After the appropriate VFU batch has been loaded into the printer, another PRINT command is initiated to specify the data batches which are to be printed.

The PRINT command is on page 2 of the supervisor menu. System prompts are shown below.

```
OPTION=       PRINT OPTIONS
              DEFAULT = NONE

              PRT CTL
              TRANS
              SKIP PROC

PRT CTL=      PRINT CONTROL
              DEFAULT = NO

              NO
              ONE CHAR
              TWO CHAR

TRANS=        PRT TRANSLATION
              DEFAULT = NO
```

The PRT CTL option specifies whether control is necessary and, if so, how many characters are used. PRT CTL must be specified when the data records to be printed have VFU control characters at the beginning of the record in order for these characters to be recognized as print control commands. Data records which have embedded control characters can be printed with PRT CTL = NO.

With no print control, the data will be printed line by line. Output will begin in position 1 (or the first programmed position). Any print control characters that may be in the records will also be printed as part of the data.

ONE CHAR means that the first character of each record is a print control character. This character controls the vertical paper movement.

TWO CHAR means that the first two characters of each record are print control characters. The first character controls vertical paper movement and the second character controls the sequence of print and paper movement.

The TRANS option specifies the type of translation to be performed. The default, NO, indicates ASCII translation. The other translations available are the same as those for the WRITE command. Special printer translation tables can be entered in the same manner as user translation tables. The table is entered under a Format, written to tape and loaded into the system during system generation.

SKIP PROC means that COBOL procedures will not be executed during the print function. This increases printing speed.

Before the PRINT command is used, the 01 OUTPUT device must be specified using the SET command. Usually, the line printer (LP) is specified. However, output to magnetic tape or the keystation display screen is also possible. If either of these two devices is used, the PRINT command acts the same as the WRITE command in that print control characters are written as part of the data.

The supervisor commands WRITE and INPUT allow manipulation of data batches for printing purposes. For example, a data batch may be entered under a simple Format. The batch is written to tape with the WRITE command using that same Format. The tape is loaded on disk with an INPUT command using a different Format, one which generates headings and print control required for a user-designed report.

DATA ENTRY PROCEDURES

Data entry is affected only if the print control within the data batch is variable and the operator is required to enter print control codes manually. If the codes are generated automatically by a MOVE or COMPUTE statement, the operator will not be aware of this additional field.

ERROR MESSAGES

Two error messages may be produced by the line printer. These messages, which are displayed on the terminal that initiated the printer function, are:

```
PRINTER OFF-LINE     KEY n, ANS LP OUT

     or

PRINTER ERROR        KEY n, ANS  LP OUT
```

The first message occurs whenever the printer goes off line. This condition can be caused by a paper jam, running out of paper or depressing the ON LINE button. If the printer is manually put off line, the remainder of the record will be output before the printer stops.

The second error message occurs with all other errors.

Since a line printer error is a background function, an error is corrected by depressing the CTRL and DISPLAY keys simultaneously. The number in the message, a comma, and R for RETRY or C for CANCEL are then keyed. If the printer is out of paper, after paper is loaded and a retry command is given, printing will continue with the next line. No data will be lost.

SYSTEM THOUGHPUT

The throughput considerations for printing depend upon constraints similar to tape write. The appropriate rule of thumb is that the printer rate is slightly less than the tape write speed (one line = one record). During heavy system loading, the 300 lpm printer will run at near maximum speed. Because the PRINT

command is similar to the WRITE command, the double-buffering feature can be available during a PRINT operation. This allows the printer to approach its maximum throughput. However, lowercase decenders on letters (gjpqy) will affect printing speed.

The following restrictions must be considered when setting up printing applications:

1. If VFU print control is to be specified, the first one or two positions of every record to be output must be reserved for the control characters. Any records that are not to be output do not need print control characters.

2. Records containing binary or hexadecimal conversion should not be printed since certain characters can cause unwanted paper movement.

3. Care must be exercised when using headers for every page on data batches where the record count can vary (i.e., records are inserted or deleted during a search/modify operation). Since all records, including headers, are written on disk, any deviation in level selection can cause a runtime error. Once a level sequence has been established, it cannot be altered.

4. Headings can be located anywhere within the page: beginning, middle, or end. The number of headers allowed is the same as the maximum number of levels (32).

5. Headings must become part of the data batch on disk. Since they are usually automatically generated, it is impossible to record backspace to any records prior to a heading. Therefore, any corrections must be made during verify when the record is encountered or in search/modify by searching for the specific record.

The following considerations apply when using the EDIT subprogram:

1. The major concern is the compatibility of the data, mask, and area for the result. If the data is larger than the mask, either a SUBSCRIPT OVERFLOW will occur or the edited data will be incorrect.

2. Data to be edited cannot be over 13 digits.

3. The register size must be at least one position larger than the largest mask or a SUBSCRIPT OVERFLOW will occur. The DECLARE REGISTER SIZE statement can be used to avoid this problem.

4. Since the EDIT subprogram contains several separate routines, a time lag may be noticed when editing a large field. If several fields in each record are being edited, it is recommended that the procedures be skipped when the data is output.

APPENDIX A

SAMPLE APPLICATIONS

This appendix contains examples of the following printer applications:

- Report Printing
- Edit Functions

REPORT PRINTING

In this example, level 0 is used to initialize the page register. Since no output is generated, print control is not necessary.

Levels A, B, C, and D produce the various types of headings used. These levels are automatically selected by line count or new job or department. Level A always goes to the top of the page (designated by a 1 in field 1). Levels C (Job Heading) and D (Detail Heading) double space (0 in field 1).

The detailed information is entered under Level E which double spaces (0 in field 1). Level F is for generating job totals and triple spaces (- in field 1). The generated report follows the sample Format.

```
JOB NAME:  PRNTDEMO      BATCH: 50000                DATE: 11111   TIME: 1128

REC      PROGRAM  LVL LVL  REC  AVRG  TRAN REC  BLK  BLK  LABEL
NUM      NAME     ID  SEL  SIZ  KSTR       FIL  PAD  FAC  NAME      DATE     COMMENT

  1      PRNTDEMO 0       131                                        04-01-75 SAMPLE PRINT PROGRAM


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

  2   1           0                                                 MOVE 1 TO A2. MOVE '___0._' TO C2. DECLARE REGISTER SIZE 25.
  3                                                                 SELECT LEVEL A.
  4                                                                 END LEVEL.
REC      NEW      LVL LVL                                           DATE     COMMENT
NUM      LEVEL    ID  SEL
                                                                                 FIRST HEADER LINE
  5              A


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

  6   1           1 A U    N                          0                    MOVE '1' TO THIS FIELD.
  7   2          47 A AB   N                         41                    MOVE 'X Y Z   C O M P A N Y   J O B   A N A L Y S I S'
  8                                                                          TO THIS FIELD.
  9   3           5 A U    N                        102                    MOVE 'PAGE: ' TO THIS FIELD.
 10   4           3 N      N                        108    B               MOVE A2 TO THIS FIELD. ADD 1 TO A2. MOVE 1 TO A1.
 11                                                                        SELECT LEVEL B.
 12                                                                        END LEVEL.
REC      NEW      LVL LVL                                                 DATE     COMMENT
NUM      LEVEL    ID  SEL
                                                                                 DEPARTMENT HEADER INFORMATION
 13              B


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 14   1           1 A U    N                          0                    MOVE '-' TO THIS FIELD.
 15   2          11 A U    N                         26                    MOVE 'DEPARTMENT: ' TO THIS FIELD.
 16                                                                        IF C1 = 'C' OR C1 = 'S' THEN TAB TO DATAMOVE.
 17   3           3 N      F                          0                    MOVE THIS FIELD TO A3.
 18   4          15 A U    S      Y                   0                    MOVE THIS FIELD TO C3.
 19   5 DATAMOVE  3 N      N                         38                    MOVE A3 TO THIS FIELD.
 20   6          15 A U    N                         43                    MOVE C3 TO THIS FIELD.
 21   7           7 A U    N                         59                    IF C1 = 'C' OR C1 = 'S' THEN MOVE '(CONT.)' TO THIS FIELD.
 22   8          21 A U    N                         81                    MOVE 'WEEK ENDING:  6/27/75' TO THIS FIELD. ADD 3 TO A1.
 23                                                                        SELECT LEVEL C.
 24                                                                        END LEVEL.
REC      NEW      LVL LVL                                                 DATE     COMMENT
NUM      LEVEL    ID  SEL
                                                                                 JOB HEADING
 25              C
```

```
REC FLD  FIELD     SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME        SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 26   1              1 A U    N                                0          MOVE '0' TO THIS FIELD.
 27   2             11 A U    N                                26         MOVE '*****  JOB: ' TO THIS FIELD.
 28                                                                       IF C1 = 'C' THEN TAB TO DATAMOVE.
 29   3              3 N      F                                0          MOVE THIS FIELD TO A4.
 30   4             15 A U    S      Y                         0          MOVE THIS FIELD TO C4.
 31   5  DATAMOVE    3 N      N                                38         MOVE A4 TO THIS FIELD.
 32   6             15 A U    N                                43         MOVE C4 TO THIS FIELD.
 33   7              7 A U    N                                59         IF C1 = 'C' THEN MOVE '(CONT.)' TO THIS FIELD
 34                                                                         ELSE MOVE 0 TO A5, A6, A8.
 35   8              5 A U    N                                96         MOVE '*****' TO THIS FIELD. ADD 2 TO A1. MOVE ' ' TO C1.
 36                                                                       SELECT LEVEL D.
 37                                                                       END LEVEL.
REC       NEW       LVL LVL                                             DATE      COMMENT
NUM       LEVEL     ID  SEL

 38                 D                                                             DETAIL HEADING


REC FLD  FIELD     SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME        SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 39   1              1 A U    N                                0          MOVE '0' TO THIS FIELD.
 40   2             70 A U    N                                31         MOVE 'EMP NO              NAME                    REG       O T
 41                                                                          TOTAL' TO THIS FIELD. ADD 2 TO A1. SELECT LEVEL E.
 42                                                                       END LEVEL.
REC       NEW       LVL LVL                                             DATE      COMMENT
NUM       LEVEL     ID  SEL

 43                 E                                                             DETAIL ITEM LEVEL


REC FLD  FIELD     SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME        SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 44   1              1 A U    N                                0          MOVE '0' TO THIS FIELD.
 45   2  EMP-NO      5 N                                       32
 46   3  NAME       25 A AB                                     42
 47   4  REG         5 N                                       0          ADD THIS FIELD TO A5. MOVE THIS FIELD TO A9.
 48   5              6 A U    N                                71         CALL EDIT USING A9, C2, THIS FIELD.
 49   6  OT          5 N                                       0          ADD THIS FIELD TO A6. MOVE THIS FIELD TO A9.
 50   7              6 A U    N                                81         CALL EDIT USING A9, C2, THIS FIELD. ADD REG OT GIVING A7.
 51   8              6 A U    N                                91         CALL EDIT USING A7, C2, THIS FIELD. ADD A7 TO A8. ADD 2 TO A1.
 52                                                                       IF A1 > 58 THEN MOVE 'C' TO C1 SELECT LEVEL A.
 53                                                                       END LEVEL.
REC       NEW       LVL LVL                                             DATE      COMMENT
NUM       LEVEL     ID  SEL

 54                 F                                                             TOTAL LEVEL


REC FLD  FIELD     SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME        SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 55   1              1 A U    N                                0          MOVE '-' TO THIS FIELD.
 56   2              6 A U    N                                55         MOVE 'TOTALS' TO THIS FIELD.
 57   3              6 A U    N                                71         CALL EDIT USING A5, C2, THIS FIELD.
 58   4              6 A U    N                                81         CALL EDIT USING A6, C2, THIS FIELD.
 59   5              6 A U    N                                91         CALL EDIT USING A8, C2, THIS FIELD. ADD 3 TO A1.
 60   6              1 A A           Y                         0          ALLOW 'Y', 'N'. IF A1 > 58 THEN MOVE 'S' TO C1.
 61                                                                       IF THIS FIELD = 'Y' THEN MOVE ' ' TO C1.
 62                                                                       IF THIS FIELD = 'Y' OR A1 > 58 THEN SELECT LEVEL A
 63                                                                         ELSE SELECT LEVEL C.
 64                                                                       END.
```

X Y Z C O M P A N Y J O B A N A L Y S I S PAGE: 1

WEEK ENDING: 6/27/75

DEPARTMENT: 101 PLANNING

***** JOB: 536 ECONOMY *****

EMP NO	NAME	REG	O T	TOTAL
10105	JEFF JONES	25.5	5.5	31.0
10110	HANK MILLER	10.2	.0	10.2
10116	BILL JOHNSON	38.0	10.2	48.2
10135	JACK GREENE	15.0	5.0	20.0
10143	GEORGE MARTIN	27.8	.0	27.8
10162	DON LANE	25.0	.0	25.0
10178	JESS MARLOWE	3.5	.5	4.0
10223	JIM ADAMS	5.0	.0	5.0
	TOTALS	150.0	21.2	171.2

***** JOB: 752 BETTER-WAY *****

EMP NO	NAME	REG	O T	TOTAL
10105	JEFF JONES	5.0	.7	5.7
10135	JACK GREENE	10.0	2.0	12.0
10143	GEORGE MARTIN	9.1	1.1	10.2
10156	MATT EVANS	35.0	2.7	37.7
10162	DON LANE	13.0	3.0	16.0
10178	JESS MARLOWE	8.0	.0	8.0
10190	SCOTT ANDERSON	14.3	.0	14.3
	TOTALS	94.4	9.5	103.9

***** JOB: 825 E-Z METHOD *****

EMP NO	NAME	REG	O T	TOTAL
10105	JEFF JONES	10.7	.0	10.7
10110	HANK MILLER	35.0	5.2	40.2
10116	BILL JOHNSON	12.2	.0	12.2
10135	JACK GREENE	22.0	.0	22.0

X Y Z C O M P A N Y J O B A N A L Y S I S PAGE 2

WEEK ENDING: 6/27/75

DEPARTMENT: 101 PLANNING (CONT.)

***** JOB: 825 E-Z METHOD (CONT.) *****

EMP NO	NAME	REG	O T	TOTAL
10143	GEORGE MARTIN	4.0	.8	4.8
10156	MATT EVANS	7.7	.0	7.7
10162	DON ALLEN	5.0	.0	5.0
10178	JESS MARLOWE	20.0	4.0	24.0
10190	SCOTT ANDERSON	28.0	2.3	30.3
10255	JOHN SAWYER	7.0	.0	7.0
	TOTALS	131.6	12.3	183.9

X Y Z C O M P A N Y J O B A N A L Y S I S PAGE: 3

DEPARTMENT: 205 ENGINEERING WEEK ENDING: 6/27/75

***** JOB: 536 ECONOMY *****

EMP NO	NAME	REG	O T	TOTAL
20210	MIKE THOMAS	40.0	.0	40.0
20223	JIM ADAMS	15.4	2.4	17.8
20229	MILT EVERS	18.0	2.0	20.0
20264	HERMAN MELROSE	20.0	2.0	22.0
20275	DAN JEFFERS	15.8	2.8	18.6
	TOTALS	109.2	9.2	118.4

***** JOB: 752 BETTER-WAY *****

EMP NO	NAME	REG	O T	TOTAL
20229	MILT EVERS	12.0	2.0	14.0
20238	DAVE WAGNER	27.6	.0	27.6
20245	RUSS BAKER	48.0	8.0	56.0
20255	JOHN SAWYER	22.8	2.8	25.6
20258	JERRY HANSON	35.0	.0	35.0
20264	HERMAN MELROSE	12.0	.0	12.0
20275	DAN JEFFERS	5.0	.0	5.0
20283	STEVE DANIELS	29.5	3.5	33.0
20290	CHARLES GRAY	8.0	.0	8.0
	TOTALS	199.9	16.3	216.2

***** JOB: 825 E-Z METHOD *****

EMP NO	NAME	REG	O T	TOTAL
20178	JESS MARLOWE	16.0	.0	16.0
20223	JIM ADAMS	20.0	0	20.0
20229	MILT EVERS	14.0	.0	14.0
20238	DAVE WAGNER	15.0	2.6	17.6
20255	JOHN SAWYER	11.0	.0	11.0

DEPARTMENT: 205 ENGINEERING (CONT.) WEEK ENDING: 6/27/75

***** JOB: 825 E-Z METHOD (CONT.) *****

EMP NO	NAME	REG	O T	TOTAL
20258	JERRY HANSON	15.0	.0	15.0
20264	HERMAN MELROSE	20.0	.0	20.0
20275	DAN JEFFERS	24.2	2.2	26.4
20283	STEVE DANIELS	11.0	.0	11.0
20290	CHARLES GRAY	40.0	8.0	48.0
	TOTALS	186.2	12.8	199.0

X Y Z C O M P A N Y J O B A N A L Y S I S PAGE: 5

DEPARTMENT: 510 MANUFACTURING WEEK ENDING: 6/27/75

***** JOB: 536 ECONOMY *****

EMP NO	NAME	REG	O T	TOTAL
50507	ROY BURNS	35.8	5.8	41.6
50523	DICK CRAMER	20.2	.0	20.2
50529	DENNIS FALLON	32.3	.0	32.3
50547	TOM GROSS	28.5	8.5	37.0
50552	GENE KAPLAN	5.1	.0	5.1
50560	BILL LLOYD	50.0	10.0	60.0
50573	PAUL MONTGOMERY	8.0	.0	8.0
50578	EUGENE OCONNELL	29.9	2.9	32.8
50584	RAY PIPER	14.8	.0	14.8
	TOTALS	224.6	27.2	251.8

***** JOB: 752 BETTER-WAY *****

EMP NO	NAME	REG	O T	TOTAL
50517	KIRK RAMSEY	32.9	4.9	37.8
50523	DICK CRAMER	18.0	6.2	24.2
50531	JULES AARON	24.0	.0	24.0
50534	KEITH BOSWELL	13.7	.0	13.7
50547	TOM GROSS	9.2	1.2	10.4
50549	LANCE CALVERT	48.5	8.5	57.0
50550	LARRY DEANE	33.3	3.3	36.6
50552	GENE KAPLAN	27.8	2.9	30.7
50554	MARK FISHER	13.7	.0	13.7
50558	BOB HERMAN	19.2	.0	19.2
50561	JOHN KEMPER	50.0	10.0	60.0
50573	PAUL MONTGOMERY	10.1	2.1	12.2
50577	RANDY MAYS	38.6	4.6	43.2

X Y Z C O M P A N Y J O B A N A L Y S I S PAGE: 6

DEPARTMENT: 510 MANUFACTURING (CONT.) WEEK ENDING: 6/27/75

***** JOB: 752 BETTER-WAY (CONT.) *****

EMP NO	NAME	REG	O T	TOTAL
50584	RAY PIPER	20.0	2.8	22.8
50587	VERN NELSON	31.7	5.7	37.4
50590	FRED SCHAFER	28.2	.0	28.2
	TOTALS	418.9	52.2	471.1

***** JOB: 825 E-Z METHOD *****

EMP NO	NAME	REG	O T	TOTAL
50507	ROY BURNS	10.0	.0	10.0
50517	KIRK RAMSEY	10.0	.0	10.0
50523	DICK CRAMER	6.0	.0	6.0
50529	DENNIS FALLON	10.0	2.3	12.3
50531	JULES AARON	26.5	10.5	37.0
50534	KEITH BOSWELL	27.0	.7	27.7
50547	TOM GROSS	28.0	.0	28.0
50550	LARRY DEANE	12.3	2.3	14.6
50552	GENE KAPLAN	20.1	10.1	30.2
50554	MARK FISHER	27.0	.0	27.0
50558	BOB HERMAN	25.0	4.2	29.2
50573	PAUL MONTGOMERY	24.0	.0	24.0
50577	RANDY MAYS	6.0	.0	6.0
50578	EUGENE OCONNELL	15.4	2.4	17.8
50584	RAY PIPER	8.0	.0	8.0
50587	VERN NELSON	14.0	.0	14.0
50590	FRED SCHAFER	16.0	4.2	20.2
	TOTALS	285.3	36.7	322.0

EDIT FUNCTIONS

In the following application, level 0 moves masks that are used more than once into C registers. The register size is also set to 19 since the largest mask is 18 characters, which is also the largest field.

Level 1 produces the detail output. Since the masks for the date and hours are each used only once, they are set up as literals in the procedure. The dollar fields are both edited the same and use the mask previously stored in C1.

Level Z totals the details and outputs the results. Again, two masks are set up as literals and two are in C2.

Illustrated on the sample output are:

1. Data edited with slashes.
2. Fixed dollar sign with zero suppression.
3. Credit amount.
4. Floating dollar sign.
5. Fixed dollar sign with asterisk fill.

```
JOB NAME:  SAMPLE        BATCH: 50000                DATE: 77150   TIME: 1132

COMPILED FILE CONFLICT
COMPILATION ABORTED
ERRORS:      1   SIZE:         WORDS

JOB NAME:  SAMPLE        BATCH: 50000                DATE: 77150   TIME: 1133

REC      PROGRAM  LVL LVL  REC  AVRG  TRAN REC  BLK  BLK  LABEL
NUM      NAME     ID  SEL  SIZ  KSTR       FIL  PAD  FAC  NAME      DATE     COMMENT

  1      SAMPLE    0       130                                        SAMPLE PROGRAM USING 'EDIT' SUBPROGRAM


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

  2   1             0                                                  DECLARE REGISTER SIZE 19.
  3                                                                    MOVE '$___,__0.__ CR' TO C1.  MOVE 0 TO A2, A4, A5.
  4                                                                    MOVE '__,___,__$.__ CR' TO C2.
  5                                                                    SELECT LEVEL 1.
  6                                                                    END LEVEL.
REC      NEW      LVL LVL                                              DATE     COMMENT
NUM      LEVEL    ID  SEL

  7                1


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

  8   1             6 N      F                              0              MOVE THIS FIELD TO A1.  MOVE 0 TO A3.
  9   2             8 A U    N                              21             CALL EDIT USING A1, '__/__/__', THIS FIELD.
 10   3  DEPT      16 A U    S     Y                        31
 11   4  HOURS      4 N      S     Y                        0              MOVE THIS FIELD TO A1.  ADD THIS FIELD TO A2.
 12   5             5 A U    N                              55             CALL EDIT USING A1, '__0.__', THIS FIELD.
 13   6  DOL-HRS    8 N      S     Y                        0              MOVE THIS FIELD TO A1.  ADD THIS FIELD TO A3.
 14                                                                       ADD THIS FIELD TO A4.
 15   7            14 A U    N                              65             CALL EDIT USING A1, C1, THIS FIELD.
 16   8  DOL-MATL   8 N S    S                              0              MOVE THIS FIELD TO A1.  ADD THIS FIELD TO A3.
 17                                                                       ADD THIS FIELD TO A5.
 18   9            14 A U    N                              85             CALL EDIT USING A1, C1, THIS FIELD.
 19  10            14 A U    N                              105            CALL EDIT USING A3, C1, THIS FIELD.
 20                                                                       END LEVEL.
REC      NEW      LVL LVL                                              DATE     COMMENT
NUM      LEVEL    ID  SEL

 21                2


REC FLD  FIELD    SIZ   DATA   UPD   DSP   BAL   AUT   POS   FIL
    NUM  NAME       SHF    KEY   REL   VER   TAB   AUX   JUS   CNV          PROCEDURE

 22   1             7 A U    N                              41             MOVE 'TOTALS: ' TO THIS FIELD.
 23   2             7 A U    N                              53             CALL EDIT USING A2, '_,__0.__', THIS FIELD.
 24   3            16 A U    N                              63             CALL EDIT USING A4, C2, THIS FIELD.
 25   4            16 A U    N                              83             CALL EDIT USING A5, C2, THIS FIELD.  ADD A4 TO A5.
 26   5            18 A U    N                              101            CALL EDIT USING A5, '$___,___,__*.__ CR', THIS FIELD.
 27                                                                       END.
```

06/06/75	PLANNING	250.0	$ 2,000.00	$ 1,500.00	$ 3,500.00
06/10/75	RESEARCH	200.0	$ 2,000.00	$ 13,582.00	$ 15,582.00
06/13/75	ENGINEERING	360.0	$ 3,600.00	$ 250.00 CR	$ 3,350.00
06/20/75	DOCUMENTATION	168.3	$ 1,100.00	$ 2,500.00	$ 3,600.00
06/20/75	PURCHASING	120.0	$ 720.00	$ 8,563.00	$ 9,283.00
06/01/75	PERSONNEL	120.0	$ 500.00	$ 865.00 CR	$ 365.00 CR
07/01/75	MANUFACTURING	958.0	$ 4,790.00	$ 48,235.00	$ 53,025.00
07/01/75	QUALITY CONTROL	456.0	$ 3,192.00	$ 6,248.00 CR	$ 3,056.00 CR
07/15/75	TRAINING	135.0	$ 743.00	$ 2,000.00	$ 2,743.00
07/15/75	SALES	160.0	$ 2,400.00	$ 1,565.00	$ 3,965.00
07/25/75	CUSTOMER SERVICE	485.0	$ 2,225.00	$ 10,376.00	$ 12,601.00
	TOTALS:	3,412.3	$23,270.00	$80,958.00	$****104,228.00

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