*Appendix D*

# *TRS-80 Computers*

All that's required to connect Radix to your TRS-80 is a cable. It is available at your Radix dealer.

## *Setting the Switches*

When connecting Radix to a TRS-80 we recommend that you set the DIP switches in Radix as shown below. Since you will be using the parallel interface, the settings of switch B have no effect.

*Table D-1*
***Recommended DIP switch settings for TRS-80***

| Switch | Setting | Function |
|---|---|---|
| A-1 | ON | 11 inch page size |
| A-2 | ON | Normal print density |
| A-3 | ON | 10 CPI pitch |
| A-4 | ON | Normal characters |
| A-5 | ON | 1/6 inch line feed |
| A-6 | ON | U.S.A. Character set |
| A-7 | ON | |
| A-8 | ON | |
| C-1 | ON | Paper-out detector active |
| C-2 | OFF | Parallel interface |
| C-3 | OFF | 8-bit interface |
| C-4 | ON | Auto line feed |

## *TRS-80 BASIC*

You may have to initialize your Model II to direct LPRINT statements to the printer. Use the SYSTEM "FORMS" command to do it.

***Table D-2***
***TRS-80 Model I parallel cable***

| Radix | | | TRS-80 Model I | |
|---|---|---|---|---|
| **Pin No.** | **Function** | | **Pin No.** | **Function** |
| 1 | STROBE | ——— | 1 | STROBE |
| 2 | D1 | ——— | 3 | D1 |
| 3 | D2 | ——— | 5 | D2 |
| 4 | D3 | ——— | 7 | D3 |
| 5 | D4 | ——— | 9 | D4 |
| 6 | D5 | ——— | 11 | D5 |
| 7 | D6 | ——— | 13 | D6 |
| 8 | D7 | ——— | 15 | D7 |
| 9 | D8 | ——— | 17 | D8 |
| 11 | BUSY | ——— | 21 | READY |

***Table D-3***
***TRS-80 Model II parallel cable***

| Radix | | | TRS-80 Model II | |
|---|---|---|---|---|
| **Pin No.** | **Function** | | **Pin No.** | **Function** |
| 1 | STROBE | ——— | 1 | STROBE |
| 2 | D1 | ——— | 3 | D1 |
| 3 | D2 | ——— | 5 | D2 |
| 4 | D3 | ——— | 7 | D3 |
| 5 | D4 | ——— | 9 | D4 |
| 6 | D5 | ——— | 11 | D5 |
| 7 | D6 | ——— | 13 | D6 |
| 8 | D7 | ——— | 15 | D7 |
| 9 | D8 | ——— | 17 | D8 |
| 10 | ACK | ——— | 19 | ACK |
| 11 | BUSY | ——— | 21 | BUSY |

TRS-80 uses another version of Microsoft Basic. Most of the programs in this book will work just as they are, but the TRS-80 does have a few unique "problem codes." They are 0, 10, 11, and 12. None of these are passed properly to the printer.

You can bypass the TRS-80's BASIC and send these codes directly to the printer with the following short routine. The variable N must be set equal to the code that you wish to pass (in our example it's 0).

```
9Ø N = Ø
1ØØ IF PEEK(14312)<>63 THEN 1ØØ
11Ø POKE 14312,N
```

Or you can use this special printer driver that will solve all your problems. Just run this program first, and then any codes sent by a BASIC program will be sent directly to the printer. This program is for the TRS-80 Model III.

```
5 REM  DRIVER FOR TRS-8Ø III
1Ø AD=16571
2Ø FOR I=Ø TO 14
3Ø READ A:POKE AD+I,A
4Ø NEXT I
5Ø POKE 16422,187
6Ø POKE 16423,64
7Ø DATA 33,232,55,2Ø3,126,32,252,33,17,
   Ø,57,126,211,251,2Ø1
8Ø END
```

And here is a version for the TRS-80 Model I.

```
5 REM  DRIVER FOR THE TRS-8Ø I
1Ø AD=16571
2Ø FOR I=Ø TO 15
3Ø READ A:POKE AD+I,A
4Ø NEXT I
5Ø POKE 16422,187
6Ø POKE 16423,64
7Ø DATA 33,232,55,2Ø3,126,32,252,33,17,
   Ø,57,126,5Ø,232,55,2Ø1
8Ø END
```

***Listing programs***

To list a BASIC program that is in your TRS-80's memory on Radix, type LLIST. This directs the listing to the printer instead of the screen.

# Program Listings

### Download character editing utility

```
1Ø 'Program to allow editing down-load characters.
2Ø 'for the RADIX printer.
3Ø '
4Ø 'Initialization.
45 CLEAR 1ØØØ
5Ø DIM Z(8,12),MM(11)
6Ø AS=33 : ESC$ = CHR$(27)
65 PN$=ESC$+"X"+CHR$(1):PF$=ESC$+"X"+CHR$(Ø)
67 NN$=ESC$+"$"+CHR$(1):NF$=ESC$+"$"+CHR$(Ø)
8Ø CS$="C":SC$=CHR$(143):SS$="@"
9Ø GOSUB 191Ø
1ØØ '
11Ø 'Main loop.
12Ø A$=INKEY$:IF A$="" THEN 12Ø
15Ø IF A$ = "+" THEN GOSUB 1Ø5Ø : GOTO 34Ø 'Wider.
16Ø IF A$ = "-" THEN GOSUB 1Ø8Ø : GOTO 34Ø 'Narrower.
17Ø IF A$ = "T" OR A$="t" THEN GOSUB 111Ø : GOTO 34Ø
   'Descender.
18Ø IF A$="Q" OR A$="q" THEN CLS : END
19Ø IF A$="P" OR A$="p" THEN GOSUB 135Ø : GOTO 34Ø
21Ø IF A$="C" OR A$="c" THEN GOSUB 191Ø : GOTO 34Ø
22Ø IF A$="A" OR A$="a" THEN GOSUB 167Ø : GOTO 34Ø
24Ø IF A$="R" OR A$="r" THEN GOSUB 2Ø1Ø : GOTO 34Ø
27Ø IF A$=CHR$(8) THEN GOSUB 9ØØ:GOTO 34Ø 'Left.
28Ø IF A$=CHR$(9) THEN GOSUB 92Ø:GOTO 34Ø 'Right.
29Ø IF A$=CHR$(1Ø) THEN GOSUB 94Ø:GOTO 34Ø 'Down.
3ØØ IF A$=CHR$(91) THEN GOSUB 96Ø:GOTO 34Ø 'Up.
31Ø IF A$="I" OR A$="i" THEN GOSUB 98Ø:GOTO 34Ø 'Insert.
32Ø IF A$= "D" OR A$="d" THEN GOSUB 1Ø2Ø:GOTO 34Ø
   'Delete.
34Ø GOTO 12Ø
39Ø '
4ØØ 'Subroutine to paint screen.
41Ø CLS
42Ø GOSUB 177Ø
43Ø '
44Ø 'Draw grid.
```

```
450 PRINT @2*64+5,"M1  M2  M3  M4  M5  M6  M7  M8  M9
   M10 M11"
470 PRINT @3*64+4,"!---!---!---!---!---!---!---!---!---
   !---!---!"
480 FOR I=0 TO 6:PRINT @(I+4)*64+1,2[I;
485 PRINT @(I+4)*64+4,"!";TAB(48);"!";:NEXT I
490 PRINT @11*64+4,"!---!---!---!---!---!---!---!---!---
   !---!---!";
620 '
630 'Put in dots.
640 FOR H = 1 TO 11 : FOR J = 1 TO 7 : Z(J,H) = 0
680 NEXT J : NEXT H
690 FOR H = 1 TO 11 : GOSUB 1190 : NEXT H
700 X=1:Y=1:G=1:H=1
710 GOSUB 1290
720 '
730 'Paint menu.
732 PRINT @49,"CURSOR MOVEMENT";
734 PRINT @1*64+50,"LEFT ARROW";
736 PRINT @2*64+50,"RIGHT ARROW";
738 PRINT @3*64+50,"UP ARROW";
739 PRINT @4*64+50,"DOWN ARROW";
745 PRINT @5*64+50,"P)RINT CHAR.";
750 PRINT @6*64+50,"A)SCII SET";
760 PRINT @7*64+50,"C)LEAR DOTS";
770 PRINT @8*64+50,"Q)UIT";
780 PRINT @9*64+50,"R)OM COPY";
790 PRINT @10*64+50,"T)OGGLE DESC.";
820 PRINT @11*64+50,"I)NSERT DOT";
830 PRINT @12*64+50,"D)ELETE DOT";
840 PRINT @13*64+50,"+) WIDER CHAR.";
850 PRINT @14*64+50,"-) NARROWER";
870 RETURN
880 '
890 'Edit subroutines.
900 GOSUB 1230:Y=Y-1:H=H-1:IF Y<1 THEN Y=1:H=1
910 GOSUB 1290:RETURN
920 GOSUB 1230:Y=Y+1:H=H+1:IF Y>11 THEN Y=11:H=11
930 GOSUB 1290:RETURN
940 GOSUB 1230:X=X+1:G=G+1:IF X>7 THEN X=7:G=7
950 GOSUB 1290:RETURN
960 GOSUB 1230:X=X-1:G=G-1:IF X<1 THEN X=1:G=1
970 GOSUB 1290:RETURN
980 IF Z(G,H-1)=1 OR Z(G,H+1)=1 THEN RETURN
```

```
990 Z(G,H) = 1
1000 PRINT @(X+3)*64+Y*4+2,SS$;
1010 GOSUB 1140 : RETURN
1020 Z(G,H)=0
1030 PRINT @(X+3)*64+Y*4+2,CS$;
1040 GOSUB 1140 : RETURN
1050 IF PROWID = 11 THEN  RETURN
1060 PROWID = PROWID + 1
1070 GOSUB 1770 : RETURN
1080 IF PROWID = 4 THEN  RETURN
1090 PROWID = PROWID - 1
1100 GOSUB 1770 : RETURN
1110 IF DESC = 1 THEN DESC = 0 : GOTO 1130
1120 DESC = 1
1130 GOSUB 1770 : RETURN
1140 '
1150 'Subroutine to calculate a column value and print
   it.
1160 MM(H) = 0 : FOR J=1 TO 7
1170 MM(H)=MM(H)+Z(J,H)*2[(J-1)
1180 NEXT J
1190 '
1200 'Subroutine to print a column value.
1205 PRINT @12*64+H*4+1,"   ";
1210 PRINT @12*64+H*4+1,RIGHT$(STR$(MM(H)),3);
1220 RETURN
1230 '
1240 'Subroutine to remove the cursor.
1250 PRINT @(X+3)*64+Y*4+2,"";
1260 IF Z(G,H) = 0 THEN PRINT "  ";
1270 IF Z(G,H) = 1 THEN  PRINT SC$;
1280 RETURN
1290 '
1300 'Subroutine to place the cursor.
1310 PRINT @(X+3)*64+Y*4+2,"";
1320 IF Z(G,H)=1 THEN  PRINT SS$;
1330 IF Z(G,H)=0 THEN  PRINT CS$;
1340 RETURN
1350 '
1360 'Subroutine to print current character.
1370 GOSUB 2080
1380 LPRINT "ASCII code =" AS : LPRINT
1400 LPRINT REC$ ; 'Download the character.
1410 LPRINT CHR$(27) "@" ;
```

```
146Ø LPRINT CHR$(27) "B" CHR$(3) "Condensed"
147Ø LPRINT NN$ STRING$(21,AS)
148Ø LPRINT NF$
149Ø LPRINT CHR$(27) "B" CHR$(2) "Elite"
15ØØ LPRINT NN$ STRING$(15,AS)
151Ø LPRINT NF$
152Ø LPRINT CHR$(27) "B" CHR$(1) "Pica"
153Ø LPRINT NN$ STRING$(12,AS)
154Ø LPRINT NF$
155Ø LPRINT CHR$(27) "W" CHR$(1) "Expanded"
156Ø LPRINT NN$ STRING$(6,AS)
157Ø LPRING NF$ CHR$(27) "W" CHR$(Ø)
1573 LPRINT:LPRINT "CHARACTER SET (NORMAL SPACING) "
1574 LPRINT NN$
1575 FOR I=33 TO 126:LPRINT CHR$(I);:NEXT I:LPRINT
1576 FOR I=16Ø TO 254:LPRINT CHR$(I);:NEXT
   I:LPRINT:LPRINT
1577 LPRINT NF$
158Ø LPRINT "Proportional"
159Ø LPRINT PN$ STRING$(15,AS)
1592 LPRINT PF$
1595 LPRINT:LPRINT "CHARACTER SET (PROPORTIONAL
   SPACING)":LPRINT PN$;
1596 FOR I=33 TO 126:LPRINT CHR$(I);:NEXT I:LPRINT
1597 FOR I=16Ø TO 254:LPRINT CHR$(I);:NEXT I:LPRINT
16ØØ LPRINT PF$
161Ø LPRINT : LPRINT : LPRINT
162Ø LPRINT "Use this data statement to download this
   character."
163Ø GOSUB 2Ø8Ø : LPRINT "DATA 27" ;
164Ø FOR I = 2 TO LEN(REC$)
165Ø LPRINT "," STR$(ASC(MID$(REC$,I,1))) ;
166Ø NEXT I : LPRINT : LPRINT : LPRINT : LPRINT : RETURN
167Ø '
168Ø 'Subroutine to input desired character code.
169Ø PRINT @14*64,"";
17ØØ INPUT "Enter ASCII code (33-126 OR 16Ø-254) --> " ;
   AS
171Ø GOSUB 2Ø4Ø
172Ø IF AS > 32 AND  AS < 127 THEN  GOTO 176Ø
173Ø IF AS > 159 AND AS < 255 THEN GOTO 176Ø
174Ø GOTO 169Ø
176Ø GOSUB 177Ø : RETURN
177Ø '
```

```
178Ø 'Subroutine to display header.
179Ø PRINT @1,"ASCII CODE = ";AS;" ";
18ØØ PRINT "(" CHR$(AS AND &H7F) ;
181Ø IF AS > 127 THEN PRINT " + 128" ;
182Ø PRINT ")        " ;
183Ø PRINT @3Ø,"DESCENDER = ";DESC;
188Ø PRINT @1*64+9,STRING$(11," ");
189Ø PRINT @1*64+1,"WIDTH : ";STRING$(PROWID,"*");
19ØØ RETURN
191Ø '
192Ø 'Subroutine to clear current character.
193Ø PROWID = 11 : DESC = Ø
194Ø FOR H = 1 TO 11 : MM(H) = Ø : NEXT H
195Ø GOSUB 39Ø : RETURN
2Ø1Ø '
2Ø2Ø 'Subroutine to perform a ROM copy.
2Ø3Ø LPRINT ESC$ "*" CHR$(Ø): RETURN
2Ø4Ø '
2Ø5Ø 'Subroutine to erase query message.
2Ø6Ø PRINT @14*64,STRING$(5Ø," ");
2Ø7Ø RETURN
2Ø8Ø '
2Ø9Ø 'Subroutine to build command string.
21ØØ REC$ = ESC$ + "*" + CHR$(1)
211Ø REC$ = REC$ + CHR$(AS) + CHR$(DESC*16 + PROWID)
212Ø FOR I = 1 to 11 : REC$ = REC$ + CHR$(MM(I)) : NEXT
   I
213Ø RETURN
```

### *Piechart program*

```
1Ø 'Program to print a piechart on the RADIX.
15 CLEAR 4ØØØ
2Ø CLS
21 'DIRECT-TO-PRINTER DRIVER FOR TRS-8Ø MODEL III
22 AD=16571
23 FOR I=Ø TO 14
24 READ A : POKE AD + I, A
25 NEXT I
26 POKE 16422,187
27 POKE 16423,64
28 DATA 33,232,55,2Ø3,126,32,252,33,17,Ø,57,126,
   211,251,2Ø1
29 '
3Ø 'Initialize program constants.
```

```
40 ESC$ = CHR$(27)      : LF$=CHR$(10)
50 FF$ = CHR$(12)       : VTAB$ = CHR$(11)
60 REVFF$ = ESC$ + FF$
70 'Emphasized & expanded modes.
80 TITLE$ = ESC$ + "E" + ESC$ + "W" + CHR$(1)
90 NTITLE$ = ESC$ + "F" + ESC$ + "W" + CHR$(0)
110 DIM BIT%(190,36),PCT%(25)
120 DIM TEXT$(48),PIECETEXT$(25)
130 MASK%(1) = 128        : MASK%(4) = 16
140 MASK%(2) = 64       : MASK%(5) = 8
150 MASK%(3) = 32       : MASK%(6) = 4
160 LX = 20             : LY = 20
170 LXFAC = 190/LX      : LYFAC = 216/LY
180 FOR I= 0 TO 48
190 TEXT$(I) = STRING$(79," ")
200 NEXT I
210 GOSUB 1040
215 GOSUB 2000
217 PRINT @64*7,"";
220 '
230 'Plot curve
240 RAD=8
250 X1 = 19               : Y1 = 10
270 FOR ANG% = 0 TO 360 STEP 15
280 RNG = ANG%*6.28/360
290 X2 = RAD*COS(RNG)+10  : Y2 = RAD*SIN(RNG)+10
300 GOSUB 640
310 NEXT ANG%
315 PRINT @64*9,"";:
320 FOR PIECE% = 1 TO PCNT%
330 X1 = 10 : Y1 = 10
340 TPCT%=TPCT%+PCT%(PIECE%)
350 ANG%=360*TPCT%*.01
360 RNG = ANG%*6.28/360
370 X2 = RAD*COS(RNG)+10    : Y2 = RAD*SIN(RNG)+10
380 GOSUB 640
390 GOSUB 870
400 NEXT PIECE%
410 '
420 'Send chart title to printer.
440 LPRINT ESC$ "A" CHR$(6) REVFF$ VTAB$ ;
450 LPRINT TITLE$ STRING$(16-LEN(CTITLE$)/2," ") ;
460 LPRINT CTITLE$ NTITLE$
```

```
470 LPRINT VTAB$ VTAB$ ;
480 FOR I = 0 TO 48
490 LPRINT TEXT$(I) : NEXT I
500 '
510 'Send bit image map to printer.
515 LPRINT ESC$ "A" CHR$(6) ;
520 LPRINT REVFF$ VTAB$ VTAB$ VTAB$ ;
530 LPRINT LF$ LF$ LF$ LF$ LF$ LF$
540 FOR ROW% = 2 TO 33
550 LPRINT "                              " ;
560 LPRINT ESC$ "K" CHR$(171) CHR$(0) ;
570 FOR COL% = 1 TO 171
580 LPRINT CHR$(BIT%(COL%,ROW%)) ; : NEXT
590 LPRINT
610 NEXT ROW%
620 LPRINT ESC$ "2" FF$
630 END
640 '
650 'Subroutine to draw a line from X1,Y1 to X2,Y2.
660 '
670 XL = X2 - X1        : YL = Y2 - Y1
680 NX = ABS(XL*LXFAC) : NY = ABS(YL*LYFAC)
690 IF NX < NY THEN NX = NY
700 NS% = INT(NX+1)
710 DX = XL/NS%         : DY = YL/NS%
720 FOR I% = 1 TO NS%
730 X1 = X1 + DX        : Y1 = Y1 + DY
740 GOSUB 780
750 NEXT I%
760 PRINT "*";
770 RETURN
780 '
790 'Subroutine to plot a point at X1,Y1.
800 '
810 XX = X1 * LXFAC     : YY = Y1 * LYFAC
820 COL% = INT(XX) + 1
830 ROW% = INT(YY/6)
840 XIT% = INT(YY - ROW% * 6)+1
850 BIT%(COL%,ROW%) = BIT%(COL%,ROW%) OR MASK%(XIT%)
860 RETURN
870 '
880 'Subroutine to arrange field descriptions.
890 '
900 MIDANG%=(ANG%+PREVANG%)/2
```

```
910 RNG = MIDANG%*6.28/360
920 X3 = INT(24*SIN(RNG)+.5) : Y3 = INT(20*COS(RNG))
930 X4 = 24 + X3 : Y4 = 42 + Y3
940 IF (MIDANG% > 70 AND MIDANG% < 110) THEN 990
950 IF (MIDANG% > 250 AND MIDANG% < 290) THEN 990
960 IF MIDANG%>270 OR MIDANG%<90 THEN 1010
970 MID$(TEXT$(X4), Y4-LEN(PIECETEXT$(PIECE%))) =
   PIECETEXT$(PIECE%)
980 GOTO 1020
990 MID$(TEXT$(X4),Y4-INT(LEN(PIECETEXT$(PIECE%))/
   2))=PIECETEXT$(PIECE%)
1000 GOTO 1020
1010 MID$(TEXT$(X4),Y4) = PIECETEXT$(PIECE%)
1020 PREVANG%=ANG%
1030 RETURN
1040 '
1050 'Subroutine to query user for data.
1060 '
1070 CLS: PRINT : PRINT : PRINT :
1080 PRINT "ENTER TITLE FOR CHART";
1085 INPUT CTITLE$
1090 IF LEN(CTITLE$) <= 32 THEN 1110
1100 PRINT "TITLE TOO LONG - 32 CHAR. MAX" : GOTO 1080
1110 SOFAR%=0 : LFT%=100
1120 FOR I=1 TO 24
1130 CLS
1140 PRINT "          ENTER PARAMETERS FOR PIE-CHART"
1150 PRINT "               TOTAL SO FAR :   ";
1160 PRINT USING "###";SOFAR%
1170 PRINT "               TOTAL REMAINING: ";
1180 PRINT USING "###";LFT%
1190 PRINT :PRINT :PRINT :PRINT
1200 PRINT "ENTER PERCENTAGE FOR FIELD:   ";
1205 INPUT PCT%(I)
1210 IF PCT%(I)>LFT% OR PCT%(I)=0 THEN PCT%(I)=LFT%
1220 LFT%=LFT%-PCT%(I)
1230 SOFAR%=SOFAR%+PCT%(I)
1240 PRINT :PRINT
1250 PRINT "ENTER DESCRIPTION OF FIELD:  ";
1255 INPUT PIECETEXT$(I)
1260 IF LEN(PIECETEXT$(I))<16 THEN 1280
1270 PRINT "FIELD TOO LONG - 15 CHAR. MAX": GOTO 1250
1280 IF LFT%=0 GOTO 1300
1290 NEXT I
```

```
1300 PCNT%=I
1310 IF PCNT%=1 THEN 1110
1320 CLS
1330 RETURN
2000 REM
2010 CLS
2020 PRINT:PRINT:PRINT
2030 PRINT "THIS PROGRAM TAKES ABOUT TWO MINUTES TO RUN"
2040 PRINT "PLEASE TURN ON YOUR PRINTER AND STAND BY..."
2050 PRINT:PRINT
2060 PRINT ":::::::::::::::::::::::::"
2070 PRINT
2080 FOR I=1 TO PCNT%:PRINT ":"; : NEXT I
2090 RETURN
```

### *Printer setup utility*

```
10 'Program to setup RADIX printer as directed.
20 '
30 'Initialize.
35 CLEAR 1000
40 ESC$ = CHR$(27) : TB = 15 : DIM TBS(256)
60 '
70 'Display MAIN menu.
80 CLS
90 TITLE$ = "MAIN MENU"
100 GOSUB 2560
110 PRINT TAB(TB) "0. Exit."
120 PRINT TAB(TB) "1. Select CHARACTER SET."
130 PRINT TAB(TB) "2. Select PRINTING MODES."
140 PRINT TAB(TB) "3. Select PITCH."
150 PRINT TAB(TB) "4. Select LINE SPACING."
160 PRINT TAB(TB) "5. Set MARGINS, TABS & FORMS."
170 GOSUB 2650
180 IF S<0 OR S>5 THEN 170
190 IF S = 0 THEN END
200 ON S GOSUB 220,490,360,1410,650
210 GOTO 60
220 '
230 'Subroutine to display CHARACTER SET menu.
240 TITLE$ = "CHARACTER SET MENU"
250 GOSUB 2560
260 PRINT TAB(TB) "0. Return to main menu."
270 PRINT TAB(TB) "1. Select NLQ character set."
280 PRINT TAB(TB) "2. Cancel NLQ character set."
```

```
290 PRINT TAB(TB) "3. Select ITALIC character set."
300 PRINT TAB(TB) "4. Cancel ITALIC character set."
310 GOSUB 2650
320 IF S<0 OR S>4 THEN 310
330 IF S = 0 THEN RETURN
340 ON S GOSUB 1310,1360,1800,1840
350 GOTO 220
360 '
370 'Subroutine to display PITCHES menu.
380 TITLE$ = "PITCHES MENU"
390 GOSUB 2560
400 PRINT TAB(TB) "0. Return to main menu."
410 PRINT TAB(TB) "1. Select PICA pitch."
420 PRINT TAB(TB) "2. Select ELITE pitch."
430 PRINT TAB(TB) "3. Select CONDENSED pitch."
440 GOSUB 2650
450 IF S<0 OR S>3 THEN 440
460 IF S = 0 THEN RETURN
470 ON S GOSUB 830,880,930
480 GOTO 360
490 '
500 'Subroutine to display PRINTING MODES menu.
510 TITLE$ = "PRINTING MODES MENU"
520 GOSUB 2560
530 PRINT TAB(TB) "0. Return to main menu."
540 PRINT TAB(TB) "1. Select EXPANDED mode."
550 PRINT TAB(TB) "2. Cancel EXPANDED mode."
560 PRINT TAB(TB) "3. Select EMPHASIZED mode."
570 PRINT TAB(TB) "4. Cancel EMPAHASIZED mode."
580 PRINT TAB(TB) "5. Select DOUBLE-STRIKE mode."
590 PRINT TAB(TB) "6. Cancel DOUBLE-STRIKE mode."
600 GOSUB 2650
610 IF S<0 OR S>6 THEN 600
620 IF S = 0 THEN RETURN
630 ON S GOSUB 1700,1750,2400,2440,2480,2520
640 GOTO 490
650 '
660 'Subroutine to display MARGINS, TABS & FORMS menu.
670 TITLE$ = "MARGINS, TABS & FORMS MENU"
680 GOSUB 2560
690 PRINT TAB(TB) "0. Return to main menu."
700 PRINT TAB(TB) "1. Set HORIZONTAL TABS."
710 PRINT TAB(TB) "2. Set VERTICAL TABS."
720 PRINT TAB(TB) "3. Set LEFT MARGIN."
```

```
730 PRINT TAB(TB) "4. Set RIGHT MARGIN."
740 PRINT TAB(TB) "5. Set TOP MARGIN."
750 PRINT TAB(TB) "6. Set BOTTOM MARGIN."
760 PRINT TAB(TB) "7. Cancel TOP AND BOTTOM MARGINS."
770 PRINT TAB(TB) "8. Set PAGE LENGTH."
780 GOSUB 2650
790 IF S<0 OR S>8 THEN 780
800 IF S = 0 THEN RETURN
810 ON S GOSUB 2050,2360,980,1060,1130,1210,1280,1880
820 GOTO 650
830 '
840 'Subroutine to select PICA pitch.
850 S$ = ESC$ + "B" + CHR$(1)
860 GOSUB 2730
870 RETURN
880 '
890 'Subroutine to select ELITE pitch.
900 S$ = ESC$ + "B" + CHR$(2)
910 GOSUB 2730
920 RETURN
930 '
940 'Subroutine to select CONDENSED pitch.
950 S$ = ESC$ + "B" + CHR$(3)
960 GOSUB 2730
970 RETURN
980 '
990 'Subroutine to set LEFT MARGIN.
1000 GOSUB 2770
1010 INPUT "Enter new left margin (1-255)" ; X
1020 IF X < 1 OR X > 255 THEN  GOTO 1000
1030 S$ = ESC$ + "M" + CHR$(X)
1040 GOSUB 2730
1050 RETURN
1060 '
1070 'Subroutine to set RIGHT MARGIN.
1080 GOSUB 2770
1090 INPUT "Enter new right margin (1-255)" ; X
1100 IF X < 1 OR X > 255 THEN  GOTO 1080
1110 S$ = ESC$ + "Q" + CHR$(X)
1120 GOSUB 2730 : RETURN
1130 '
1140 'Subroutine to set TOP MARGIN.
1150 GOSUB 2770
1160 INPUT "Enter new top margin (1-16)" ; X
```

```
1170 IF X < 1 OR X > 16 THEN  GOTO 1150
1180 S$ = ESC$ + "R" + CHR$(X)
1190 GOSUB 2730
1200 RETURN
1210 '
1220 'Subroutine to set BOTTOM MARGIN.
1230 GOSUB 2770
1240 INPUT "Enter new bottom margin (1-127)" ; X
1250 IF X < 1 OR X > 127 THEN  GOTO 1230
1260 S$ = ESC$ + "N" + CHR$(X)
1270 GOSUB 2730 : RETURN
1280 '
1290 'Subroutine to cancel TOP & BOTTOM MARGINS.
1300 S$ = ESC$ + "O" : GOSUB 2730 : RETURN
1310 '
1320 'Subroutine to select NLQ character set.
1330 S$ = ESC$ + "B" + CHR$(4)
1340 GOSUB 2730 : RETURN
1360 '
1370 'Subroutine to cancel NLQ character set.
1380 S$ = ESC$ + "B" + CHR$(5)
1390 GOSUB 2730
1400 RETURN
1410 '
1420 'Subroutine to select LINE SPACING.
1430 TITLE$ = "LINE SPACING MENU"
1440 GOSUB 2560
1450 PRINT TAB(TB) "0. Return to main menu."
1460 PRINT TAB(TB) "1. Select 1/6 inch line spacing."
1470 PRINT TAB(TB) "2. Select 1/8 inch line spacing."
1480 PRINT TAB(TB) "3. Select 7 dot graphics spacing."
1490 PRINT TAB(TB) "4. Select n/144 inch spacing."
1500 GOSUB 2650
1510 IF S<0 OR S>4 THEN 1500
1520 IF S = 0 THEN RETURN
1530 ON S GOSUB 1550,1580,1610,1640
1540 GOTO 1410
1550 '
1560 'Subroutine to select 1/6 inch line spacing.
1570 S$ = ESC$ + "2" : GOSUB 2730 : RETURN
1580 '
1590 'Subroutine to select 1/8 inch line spacing.
1600 S$ = ESC$ + "0" : GOSUB 2730 : RETURN
```

```
1610 '
1620 'Subroutine to select 7 dot graphics spacing.
1630 S$ = ESC$ + "1" : GOSUB 2730 : RETURN
1640 '
1650 'Subroutine to select n/144 inch line spacing.
1660 GOSUB 2770
1670 INPUT "Enter line space in n/144 ths of an inch"; X
1680 IF X < 0 OR X > 255 THEN 1660
1690 S$ = ESC$ + "3" + CHR$(X) : GOSUB 2730 : RETURN
1700 '
1710 'Subroutine to select EXPANDED print.
1720 S$ = ESC$ + "W" + CHR$(1)
1730 GOSUB 2730
1740 RETURN
1750 '
1760 'Subroutine to cancel EXPANDED print.
1770 S$ = ESC$ + "W" + CHR$(0)
1780 GOSUB 2730
1790 RETURN
1800 '
1810 'Subroutine to select ITALIC character set.
1820 S$ = ESC$ + "4" : GOSUB 2730
1830 RETURN
1840 '
1850 'Subroutine to cancel ITALIC character set.
1860 S$ = ESC$ + "5" : GOSUB 2730
1870 RETURN
1880 '
1890 'Subroutine to set PAGE LENGTH.
1900 GOSUB 2770
1910 PRINT "Page length in Inches or Lines (I,L)?"
1920 PRINT TAB(TB) ;
1930 A$ = INKEY$ : IF A$ = "" THEN 1930
1940 IF A$ = "I" OR A$ ="i" THEN 1970
1950 IF A$ = "L" OR A$ ="l" THEN 2010
1960 GOTO 1930
1970 INPUT "Length of page in inches (1-32)" ; X
1980 IF X < 1 OR X > 32 THEN 1900
1990 S$ = ESC$ + "C" + CHR$(0) + CHR$(X)
2000 GOSUB 2730 : RETURN
2010 INPUT "Length of page in lines (1-127)" ; X
2020 IF X < 1 OR X > 127 THEN 1900
2030 S$ = ESC$ + "C" + CHR$(X)
2040 GOSUB 2730 : RETURN
```

```
2050 '
2060 'Subroutine to set HORIZONTAL TABS.
2070 S$ = ESC$ + "D" : MAX = 255 : GOSUB 2080 : RETURN
2080 '
2090 'Subroutine to set tabs, either horiz or vert.
2100 GOSUB 2770
2110 PRINT "Would you like to set the tabs in"
2120 PRINT TAB(TB) "Regular intervals, or specify"
2130 PRINT TAB(TB) "each one Individually (R,I)"
2140 A$ = INKEY$ : IF A$ = "" THEN 2140
2150 IF A$ = "R" OR A$ = "r" THEN 2300
2160 IF A$ = "I" OR A$ = "i" THEN 2180
2170 GOTO 2080
2180 PRINT : I = 2 : TBS(1) = -1
2190 PRINT TAB(TB) "Enter the list of tabs, in"
2200 PRINT TAB(TB) "ascending order. No more than" MAX
   "."
2210 PRINT TAB(TB) : INPUT "Enter a tab" ; TBS(I)
2220 IF TBS(I) < 0 OR TBS(I) > 255 THEN 2170
2230 IF TBS(I) = 0 THEN I = 1 : GOTO 2270
2240 IF TBS(I) <= TBS(I-1) THEN 2170
2250 I = I + 1 : IF I > MAX THEN 2170
2260 GOTO 2210
2270 I = I + 1
2280 S$ = S$ + CHR$(TBS(I)) : IF TBS(I) <> 0 THEN 2270
2285 S$=S$+CHR$(0):GOSUB 2730
2290 RETURN
2300 PRINT : PRINT TAB(TB) ; : INPUT "Enter interval" ;
   X
2310 IF X < 0 OR X > 255 THEN 2080
2320 FOR I = 1 TO 255 STEP X
2330 MAX = MAX -1 : IF MAX = 0 THEN 2350
2340 S$ = S$ + CHR$(I) : NEXT I
2350 S$ = S$ + CHR$(0) : GOSUB 2730 : RETURN
2360 '
2370 'Subroutine to set VERTICAL TABS.
2380 S$ = ESC$ + "P" : MAX = 20 : GOSUB 2080
2390 RETURN
2400 '
2410 'Subroutine to select EMPHASIZED printing.
2420 S$ = ESC$ + "E" : GOSUB 2730
2430 RETURN
2440 '
2450 'Subroutine to cancel EMPHASIZED printing.
```

```
246Ø S$ = ESC$ + "F" : GOSUB 273Ø
247Ø RETURN
248Ø '
249Ø 'Subroutine to select DOUBLE-STRIKE printing.
25ØØ S$ = ESC$ + "G" : GOSUB 273Ø
251Ø RETURN
252Ø '
253Ø 'Subroutine to cancel DOUBLE-STRIKE printing.
254Ø S$ = ESC$ + "H" : GOSUB 273Ø
255Ø RETURN
256Ø '
257Ø 'Subroutine to print a menu title.
258Ø CLS
26ØØ PRINT TAB(18) "--- RADIX PRINTER SETUP ---"
261Ø PRINT
262Ø PRINT TAB((64-LEN(TITLE$))/2) TITLE$
263Ø PRINT
264Ø RETURN
265Ø '
266Ø 'Subroutine to input menu selection.
267Ø PRINT @96Ø+TB,"Enter selection. or hit P for a
   print out";
268Ø C$ = INKEY$ : IF C$ = "" THEN 268Ø
2685 IF C$="P" OR C$="p" THEN GOSUB 3ØØØ:GOTO 266Ø
269Ø IF C$ < "Ø" OR C$ > "9" THEN  GOTO 268Ø
27ØØ S = VAL(C$)
271Ø PRINT @96Ø,STRING$(63," ");
272Ø RETURN
273Ø '
274Ø 'Subroutine to output command string.
275Ø LPRINT S$ ;
276Ø RETURN
277Ø '
278Ø 'Subroutine to clear screen & position cursor.
279Ø CLS : PRINT @32Ø+TB, "" ; : RETURN
3ØØØ FOR I=1 TO 4:FOR J=32 TO 126:LPRINT CHR$(J);:NEXT J
3Ø1Ø FOR J=16Ø TO 254:LPRINT CHR$(J);: NEXT J
3Ø15 LPRINT
3Ø2Ø NEXT I:RETURN
```

*Appendix E*

# *Kaypro, Osborne and Other CP/M Computers*

All that you need to connect Radix to an Osborne 1 or Kaypro computer is a cable. Your Radix dealer can provide the cable that you need.

## *Setting the Switches*

When connecting Radix to an Osborne 1, Kaypro, or other CP/M computer, we recommend that you set the DIP switches in Radix as shown below. (Although our chart indicates switch C-2 set for a parallel interface, a serial interface will work also.)

***Table E-1***
***Recommended DIP switch settings for Kaypro***

| Switch | Setting | Function |
|---|---|---|
| A-1 | ON | 11 inch page size |
| A-2 | ON | Normal print density |
| A-3 | ON | 10 CPI pitch |
| A-4 | ON | Normal characters |
| A-5 | ON | 1/6 inch line feed |
| A-6 | ON | U.S.A. Character set |
| A-7 | ON | |
| A-8 | ON | |
| C-1 | ON | Paper-out detector active |
| C-2 | OFF | Parallel interface |
| C-3 | OFF | 8-bit interface |
| C-4 | OFF | No auto line feed |

When you connect your printer to your Osborne 1 you must use the SETUP program to tell the computer whether Radix is connected to the Osborne 1's serial or parallel interface (either will work).

***Table E-2***
***Kaypro parallel cable***

| Radix | | | Kaypro | |
|---|---|---|---|---|
| **Pin No.** | **Function** | | **Pin No.** | **Function** |
| 1 | STROBE | ——— | 1 | STROBE |
| 2 | DATA1 | ——— | 2 | DATA1 |
| 3 | DATA2 | ——— | 3 | DATA2 |
| 4 | DATA3 | ——— | 4 | DATA2 |
| 5 | DATA4 | ——— | 5 | DATA2 |
| 6 | DATA5 | ——— | 6 | DATA2 |
| 7 | DATA6 | ——— | 7 | DATA2 |
| 8 | DATA7 | ——— | 8 | DATA2 |
| 9 | DATA8 | ——— | 9 | DATA8 |
| 11 | BUSY | ——— | 11 | BUSY |
| 16 | SIG GND | ——— | 16 | SIG GND |

***Table E-3***
***Osborne 1 parallel cable***

| Radix | | | Osborne 1 | |
|---|---|---|---|---|
| **Pin No.** | **Function** | | **Pin No.** | **Function** |
| 2 | DATA1 | ——— | 1 | DATA0 |
| 6 | DATA5 | ——— | 2 | DATA4 |
| 3 | DATA2 | ——— | 3 | DATA1 |
| 7 | DATA6 | ——— | 4 | DATA5 |
| 4 | DATA3 | ——— | 5 | DATA2 |
| 8 | DATA7 | ——— | 6 | DATA6 |
| 5 | DATA4 | ——— | 7 | DATA3 |
| 9 | DATA8 | ——— | 8 | DATA7 |
| 1 | STROBE | ——— | 11 | STROBE |
| 11 | BUSY | ——— | 15 | BUSY |
| 16 | SIG GND | ——— | 16 | SIG GND |

# Using MBASIC

Many CP/M computers use Microsoft BASIC (called MBASIC). If you have a CP/M-80 computer that uses Microsoft BASIC the program listings given here should work with your computer also.

MBASIC is a very close relative of the IBM-Microsoft BASIC used in this book. The only difference is that MBASIC "interprets" CHR$(9) and substitutes a group of spaces to simulate a tab. You can send a horizontal tab to Radix by using CHR$(137) instead of CHR$(9).

Some versions of Microsoft BASIC will add a carriage return and line feed at the end of every 80 (or sometimes 132) characters. To print lines longer than 80 (or 132) characters (as when doing dot graphics) you must define a wider printer width. The following statement will prevent the computer from inserting unwanted codes.

```
10 WIDTH LPRINT 255
```

### *Listing programs*

Microsoft BASIC uses the "L" prefix on several commands to direct them to the printer. To list programs on the printer, just type LLIST. To direct program output to the printer, use LPRINT in place of PRINT.

# Program Listings

The following programs are in Microsoft BASIC for the Kaypro.

### *Download character editing utility*

```
10 'Program to allow editing down-load characters.
20 'for the RADIX printer.
30 '
40 'Initialization.
50 DIM Z(8,12),MM(11)
60 WIDTH 255
70 AS=33 :
```

```
8Ø CS$=CHR$(91)+CHR$(93):SC$=STRING$(2,159):
   CR$=STRING$(2,127)
9Ø RAMNML$ = CHR$(27) + "$" + CHR$(1)
1ØØ RAMNMLOFF$ = CHR$(27) + "$" + CHR$(Ø)
11Ø RAMPRO$ = CHR$(27) + "X" + CHR$(1)
12Ø RAMPROOFF$ = CHR$(27) + "X" + CHR$(Ø)
13Ø DEF FNL$(ROW,COL) = CHR$(27) + "=" + CHR$(ROW+32) +
   CHR$(COL+32)
14Ø LPRINT CHR$(27) "@" ; : WIDTH "LPT1:",255
15Ø GOSUB 166Ø
16Ø '
17Ø 'Main loop.
18Ø A$=INKEY$:IF A$="" THEN 18Ø
19Ø IF A$ = "+" OR A$ = "=" THEN GOSUB 82Ø : GOTO 34Ø
   'Wider.
2ØØ IF A$ = "-" OR A$ = CHR$(95) THEN GOSUB 85Ø : GOTO
   34Ø 'Narrower.
21Ø IF A$ = "D" OR A$ = "d" THEN GOSUB 88Ø : GOTO 34Ø
   'Descender.
22Ø IF A$="Q" OR A$="q" THEN GOSUB 35Ø : END
23Ø IF A$="P" OR A$="p" THEN GOSUB 112Ø : GOTO 34Ø
24Ø IF A$="C" OR A$="c" THEN GOSUB 166Ø : GOTO 34Ø
25Ø IF A$="A" OR A$="a" THEN GOSUB 148Ø : GOTO 34Ø
26Ø IF A$="R" OR A$="r" THEN GOSUB 171Ø : GOTO 34Ø
27Ø IF A$=CHR$(8) THEN GOSUB 67Ø:GOTO 34Ø 'Left.
28Ø IF A$=CHR$(12) THEN GOSUB 69Ø:GOTO 34Ø 'Right.
29Ø IF A$=CHR$(1Ø) THEN GOSUB 71Ø:GOTO 34Ø 'Down.
3ØØ IF A$=CHR$(11) THEN GOSUB 73Ø:GOTO 34Ø 'Up.
31Ø IF A$=CHR$(13) THEN GOSUB 75Ø:GOTO 34Ø 'Insert.
32Ø IF A$=CHR$(127) THEN GOSUB 79Ø:GOTO 34Ø 'Delete.
33Ø PRINT CHR$(7);
34Ø GOTO 18Ø
35Ø PRINT CHR$(26);
36Ø RETURN
37Ø '
38Ø ' Subroutine to paint screen.
39Ø PRINT CHR$(26);
4ØØ GOSUB 156Ø
41Ø '
42Ø 'Draw grid.
43Ø FOR I=Ø TO 6:PRINT FNL$(5+I*2,6); 2^I;:NEXT I
44Ø '
45Ø 'Put in dots.
46Ø FOR H = 1 TO 11 : FOR J = 1 TO 7 : Z(J,H) = Ø
```

```
470 NEXT J : NEXT H
480 FOR H = 1 TO 11 : GOSUB 960 : NEXT H
490 X=1:Y=1:G=1:H=1
500 GOSUB 1060
510 '
520 'Paint menu.
530  PRINT FNL$(6,47) "P -- Print the character."
540  PRINT FNL$(7,47) "A -- Set ASCII code."
550  PRINT FNL$(8,47) "C -- Clear all dots."
560  PRINT FNL$(9,47) "Q -- Quit."
570  PRINT FNL$(10,47) "R -- Perform ROM copy."
580 PRINT FNL$(11,45) "Arrow keys move cursor"
590 PRINT FNL$(12,45) "RET -- place a dot.";
600 PRINT FNL$(13,45) "DEL -- remove a dot.";
610  PRINT FNL$(14,47) "+ -- make character wider." ;
620  PRINT FNL$(15,47) "- -- make character narrower." ;
630  PRINT FNL$(16,47) "D -- Toggle descender mode." ;
640 RETURN
650 '
660 'Edit subroutines.
670 GOSUB 1000:Y=Y-3:H=H-1:IF Y<1 THEN PRINT CHR$(7);
   :Y=1:H=1
680 GOSUB 1060:RETURN
690 GOSUB 1000:Y=Y+3:H=H+1:IF Y>31 THEN PRINT CHR$(7);
   :Y=31:H=11
700 GOSUB 1060:RETURN
710 GOSUB 1000:X=X+2:G=G+1:IF X>13 THEN PRINT CHR$(7);
   :X=13:G=7
720 GOSUB 1060:RETURN
730 GOSUB 1000:X=X-2:G=G-1:IF X<1 THEN PRINT CHR$(7);
   :X=1:G=1
740 GOSUB 1060:RETURN
750 IF Z(G,H-1)=1 OR Z(G,H+1)=1 THEN PRINT CHR$(7);
   :RETURN
760 Z(G,H) = 1
770 PRINT FNL$(X+4,Y+10) CR$ ;
780 GOSUB 910 : RETURN
790 Z(G,H)=0
800  PRINT FNL$(X+4,Y+10) CS$ ;
810 GOSUB 910 : RETURN
820 IF PROWID = 11 THEN PRINT CHR$(7);  : RETURN
830 PROWID = PROWID + 1
840 GOSUB 1560 : RETURN
850 IF PROWID = 4 THEN PRINT CHR$(7);  : RETURN
```

```
860 PROWID = PROWID - 1
870 GOSUB 1560 : RETURN
880 IF DESC = 1 THEN DESC = 0 : GOTO 900
890 DESC = 1
900 GOSUB 1560 : RETURN
910 '
920 'Subroutine to calculate a column value & print it.
930 MM(H) = 0 : FOR J=1 TO 7
940 MM(H)=MM(H)+Z(J,H)*2^(J-1)
950 NEXT J : GOSUB 960 : RETURN
960 '
970 'Subroutine to print a column value.
980  PRINT FNL$(19,7+3*H); RIGHT$("  "+STR$(MM(H)),3) ;
990 RETURN
1000 '
1010 'Subroutine to remove the cursor.
1020 PRINT FNL$(X+4, Y+10);
1030 IF Z(G,H) = 0 THEN PRINT "  " ;
1040 IF Z(G,H) = 1 THEN  PRINT SC$ ;
1050 RETURN
1060 '
1070 'Subroutine to place the cursor.
1080 PRINT FNL$(X+4,Y+10);
1090 IF Z(G,H)=1 THEN  PRINT CR$ ;
1100 IF Z(G,H)=0 THEN  PRINT CS$ ;
1110 RETURN
1120 '
1130 'Subroutine to print current character.
1140 GOSUB 1780
1150 LPRINT "ASCII code =" AS : LPRINT
1160 LPRINT REC$ ; 'Download the character.
1170 LPRINT CHR$(27) "B" CHR$(3) "Condensed"
1180 LPRINT RAMNML$ STRING$(21,AS)
1190 LPRINT RAMNMLOFF$
1200 LPRINT CHR$(27) "B" CHR$(2) "Elite"
1210 LPRINT RAMNML$ STRING$(15,AS)
1220 LPRINT RAMNMLOFF$
1230 LPRINT CHR$(27) "B" CHR$(1) "Pica"
1240 LPRINT RAMNML$ STRING$(12,AS)
1250 LPRINT RAMNMLOFF$
1260 LPRINT CHR$(27) "W" CHR$(1) "Expanded"
1270 LPRINT RAMNML$ STRING$(6,AS)
1280 LPRINT RAMNMLOFF$ CHR$(27) "W" CHR$(0)
1290 LPRINT "Character set (normal width)"
```

```
1300 LPRINT RAMNML$;
1310 FOR I=33 TO 126 : LPRINT CHR$(I); : NEXT : LPRINT
1320 FOR I=160 TO 254 : LPRINT CHR$(I); : NEXT : LPRINT
1330 LPRINT RAMNMLOFF$
1340 LPRINT "Proportional"
1350 LPRINT RAMPRO$ STRING$(15,AS)
1360 LPRINT RAMPROOFF$
1370 LPRINT "Character set (proportional)"
1380 LPRINT RAMPRO$;
1390 FOR I=33 TO 126 : LPRINT CHR$(I); : NEXT : LPRINT
1400 FOR I=160 TO 254 : LPRINT CHR$(I); : NEXT : LPRINT
1410 LPRINT RAMPROOFF$
1420 LPRINT : LPRINT : LPRINT
1430 LPRINT "Use this data statement to download this
   character."
1440 GOSUB 1780 : LPRINT "DATA 27" ;
1450 FOR I = 2 TO LEN(REC$)
1460 LPRINT "," STR$(ASC(MID$(REC$,I,1))) ;
1470 NEXT I : LPRINT : LPRINT : LPRINT : LPRINT : RETURN
1480 '
1490 'Subroutine to input desired character code.
1500 PRINT FNL$(23,5);
1510 INPUT; "Enter ASCII code (33-126 OR 160-254) --> "
   ; AS
1520 GOSUB 1740
1530 IF AS < 33 OR AS > 254 THEN PRINT CHR$(7);  :
   GOTO 1500
1540 IF AS < 160 AND AS > 126 THEN PRINT CHR$(7);  :
   GOTO 1500
1550 GOSUB 1560 : RETURN
1560 '
1570 'Subroutine to display header.
1580  PRINT FNL$(1,1) "ASCII CODE =" AS ;
1590 PRINT "(" CHR$(AS AND &H7F) ;
1600 IF AS > 127 THEN PRINT " + 128" ;
1610 PRINT ")          " ;
1620  PRINT FNL$(1,30) "DESCENDER =" DESC ;
1630  PRINT FNL$(3,10) STRING$(33, " ") ;
1640  PRINT FNL$(3,2) "WIDTH : " STRING$
   (PROWID*3, "*") ;
1650 RETURN
1660 '
1670 'Subroutine to clear current character.
1680 PROWID = 11 : DESC = 0
```

```
169Ø FOR H = 1 TO 11 : MM(H) = Ø : NEXT H
17ØØ GOSUB 37Ø : RETURN
171Ø '
172Ø 'Subroutine to perform a ROM copy.
173Ø LPRINT CHR$(27) "*" CHR$(Ø) ; : RETURN
174Ø '
175Ø 'Subroutine to erase query message.
176Ø PRINT FNL$(23,5) STRING$(7Ø," ") ;
177Ø RETURN
178Ø '
179Ø 'Subroutine to build command string.
18ØØ REC$ = CHR$(27) + "*" + CHR$(1)
181Ø REC$ = REC$ + CHR$(AS) + CHR$(DESC*16 + PROWID)
182Ø FOR I = 1 TO 11 : REC$ = REC$ + CHR$(MM(I)) : NEXT
   I
183Ø RETURN
```

### *Piechart program*

```
Ø 'Program to print a piechart on the RADIX.
2Ø '
3Ø 'Initialize program constants.
4Ø ESC$ = CHR$(27)      : LF$ =CHR$(1Ø)
5Ø FF$ = CHR$(12)       : VTAB$ = CHR$(11)
6Ø REVFF$ = ESC$ + FF$
7Ø 'Emphasized & expanded modes.
8Ø TITLE.ON$ = ESC$ + "E" + ESC$ + "W" + CHR$(1)
9Ø TITLE.OFF$ = ESC$ + "F" + ESC$ + "W" + CHR$(Ø)
1ØØ '
11Ø DIM BIT%(19Ø,36),A$(36),PCT%(25)
12Ø DIM TEXT$(48),PIECETEXT$(25)
13Ø MASK%(1) = 128      : MASK%(4) = 16
14Ø MASK%(2) = 64       : MASK%(5) = 8
15Ø MASK%(3) = 32       : MASK%(6) = 4
16Ø LX = 2Ø             : LY = 2Ø
17Ø LXFAC = 19Ø/LX      : LYFAC = 216/LY
18Ø FOR I= Ø TO 48
19Ø TEXT$(I) = SPACE$(79)
2ØØ NEXT I
21Ø GOSUB 1Ø4Ø
22Ø '
23Ø ' Plot curve
24Ø RAD = 9
25Ø X1 = 19             : Y1 = 1Ø
27Ø FOR ANG% = Ø TO 36Ø STEP 12
```

```
280 RANG = ANG%*6.28/360
290 X2 = RAD*COS(RANG)+10  : Y2 = RAD*SIN(RANG)+10
300 GOSUB 640
310 NEXT ANG%
320 FOR PIECE% = 1 TO NUMBER.PIECES%
330 X1 = 10             : Y1 = 10
340 TOTAL.PCT%=TOTAL.PCT%+PCT%(PIECE%)
350 ANG%=360*TOTAL.PCT%*.01
360 RANG = ANG%*6.28/360
370 X2 = RAD*COS(RANG)+10  : Y2 = RAD*SIN(RANG)+10
380 GOSUB 640
390 GOSUB 870
400 NEXT PIECE%
410 '
420 'Send chart title to printer.
440 LPRINT ESC$ "A" CHR$(6) REVFF$ VTAB$ ;
450 LPRINT TITLE.ON$ SPACE$(20-LEN(TITLE$)/2) ;
460 LPRINT TITLE$ TITLE.OFF$
470 LPRINT VTAB$ VTAB$ ;
480 FOR I = 0 TO 48
490 LPRINT TEXT$(I) : NEXT I
500 '
510 'Send bit image map to printer.
520 LPRINT REVFF$ VTAB$ VTAB$ VTAB$ ;
530 LPRINT LF$ LF$ LF$ LF$ LF$ LF$
540 FOR ROW% = 0 TO 35
550 LPRINT "                              " ;
560 LPRINT ESC$ "K" CHR$(190) CHR$(0) ;
570 FOR COL% = 1 TO 190
580 LPRINT CHR$(BIT%(COL%,ROW%)) ; : NEXT
590 LPRINT
600 PRINT CHR$(127) CHR$(127);
610 NEXT ROW%
620 LPRINT ESC$ "2" FF$
630 END
640 '
650 'Subroutine to draw a line from X1,Y1 to X2,Y2.
660 '
670 XL = X2 - X1        : YL = Y2 - Y1
680 NX = ABS(XL*LXFAC) : NY = ABS(YL*LYFAC)
690 IF NX < NY THEN NX = NY
700 NS% = INT(NX+1)
710 DX = XL/NS%         : DY = YL/NS%
720 FOR I% = 1 TO NS%
```

```
730 X1 = X1 + DX        : Y1 = Y1 + DY
740 GOSUB 780
750 NEXT I%
760 PRINT CHR$(8) "==>";
770 RETURN
780 '
790 'Subroutine to plot a point at X1,Y1.
800 '
810 XX = X1 * LXFAC     : YY = Y1 * LYFAC
820 COL% = INT(XX) + 1
830 ROW% = INT(YY/6)
840 XIT% = INT(YY - ROW% * 6)+1
850 BIT%(COL%,ROW%) = BIT%(COL%,ROW%) OR MASK%(XIT%)
860 RETURN
870 '
880 'Subroutine to arrange field descriptions.
890 '
900 MIDANG%=(ANG%+PREVANG%)/2
910 RANG = MIDANG%*6.28/360
920 X3 = INT(24*SIN(RANG)+.5) : Y3 = INT(20*COS(RANG))
930 X4 = 24 + X3              : Y4 = 42 + Y3
940 IF (MIDANG% > 70 AND MIDANG% < 110) THEN 990
950 IF (MIDANG% > 250 AND MIDANG% < 290) THEN 990
960 IF MIDANG%>270 OR MIDANG%<90 THEN 1010
970 MID$(TEXT$(X4),Y4-LEN(PIECETEXT$(PIECE%)))
   =PIECETEXT$(PIECE%)
980 GOTO 1020
990 MID$(TEXT$(X4),Y4-LEN(PIECETEXT$(PIECE%))\2)
   =PIECETEXT$(PIECE%)
1000 GOTO 1020
1010 MID$(TEXT$(X4),Y4) = PIECETEXT$(PIECE%)
1020 PREVANG%=ANG%
1030 RETURN
1040 '
1050 'Subroutine to query user for data.
1060 '
1070 PRINT CHR$(26) : PRINT : PRINT :
1080 INPUT "ENTER TITLE FOR CHART: ",TITLE$
1090 IF LEN(TITLE$) <= 40 THEN 1110
1100 PRINT "TITLE TOO LONG - 40 CHAR. MAX" : GOTO 1080
1110 AMT.SOFAR%=0       : AMT.LEFT%=100
1120 FOR I=1 TO 24
1130 PRINT CHR$(26);
```

```
114Ø PRINT "                ENTER PARAMETERS FOR
   PIECHART"
115Ø PRINT "                    TOTAL SO FAR :   ";
116Ø PRINT USING "###";AMT.SOFAR%
117Ø PRINT "                    TOTAL REMAINING: ";
118Ø PRINT USING "###";AMT.LEFT%
119Ø PRINT :PRINT :PRINT :PRINT
12ØØ INPUT "ENTER PERCENTAGE FOR FIELD:   ",PCT%(I)
121Ø IF PCT%(I)>AMT.LEFT% OR PCT%(I)=Ø THEN
   PCT%(I)=AMT.LEFT%
122Ø AMT.LEFT%=AMT.LEFT%-PCT%(I)
123Ø AMT.SOFAR%=AMT.SOFAR%+PCT%(I)
124Ø PRINT :PRINT
125Ø INPUT "ENTER DESCRIPTION OF FIELD:
   ",PIECETEXT$(I)
126Ø IF LEN(PIECETEXT$(I))<16 THEN 128Ø
127Ø PRINT "FIELD TOO LONG - 15 CHAR. MAX": GOTO 125Ø
128Ø IF AMT.LEFT%=Ø GOTO 13ØØ
129Ø NEXT I
13ØØ NUMBER.PIECES%=I
131Ø IF NUMBER.PIECES%=1 THEN 111Ø
132Ø PRINT CHR$(26);
133Ø RETURN
```

### *Printer setup utility*

```
1Ø 'Program to setup RADIX printer as directed.
2Ø '
3Ø 'Initialize.
4Ø ESC$ = CHR$(27) : TB = 25 : DIM TBS(256)
5Ø '
6Ø 'Display MAIN menu.
7Ø TITLE$ = "MAIN MENU"
8Ø GOSUB 228Ø
9Ø PRINT TAB(TB) "Ø. Exit."
1ØØ PRINT TAB(TB) "1. Select CHARACTER SET."
11Ø PRINT TAB(TB) "2. Select PRINTING MODES."
12Ø PRINT TAB(TB) "3. Select PITCH."
13Ø PRINT TAB(TB) "4. Select LINE SPACING."
14Ø PRINT TAB(TB) "5. Set MARGINS, TABS & FORMS."
15Ø GOSUB 237Ø
16Ø IF S<Ø OR S>5 THEN PRINT CHR$(7) : GOTO 15Ø
17Ø IF S = Ø THEN PRINT CHR$(26); : END
18Ø ON S GOSUB 2ØØ,47Ø,34Ø,123Ø,63Ø
19Ø GOTO 5Ø
```

```
200 '
210 'Subroutine to display CHARACTER SET menu.
220 TITLE$ = "CHARACTER SET MENU"
230 GOSUB 2280
240 PRINT TAB(TB) "0. Return to main menu."
250 PRINT TAB(TB) "1. Select NLQ character set."
260 PRINT TAB(TB) "2. Cancel NLQ character set."
270 PRINT TAB(TB) "3. Select ITALIC character set."
280 PRINT TAB(TB) "4. Cancel ITALIC character set."
290 GOSUB 2370
300 IF S<0 OR S>4 THEN PRINT CHR$(7) : GOTO 290
310 IF S = 0 THEN RETURN
320 ON S GOSUB 1170,1200,1580,1610
330 GOTO 200
340 '
350 'Subroutine to display PITCHES menu.
360 TITLE$ = "PITCHES MENU"
370 GOSUB 2280
380 PRINT TAB(TB) "0. Return to main menu."
390 PRINT TAB(TB) "1. Select PICA pitch."
400 PRINT TAB(TB) "2. Select ELITE pitch."
410 PRINT TAB(TB) "3. Select CONDENSED pitch."
420 GOSUB 2370
430 IF S<0 OR S>3 THEN PRINT CHR$(7) : GOTO 420
440 IF S = 0 THEN RETURN
450 ON S GOSUB 810,840,870
460 GOTO 340
470 '
480 'Subroutine to display PRINTING MODES menu.
490 TITLE$ = "PRINTING MODES MENU"
500 GOSUB 2280
510 PRINT TAB(TB) "0. Return to main menu."
520 PRINT TAB(TB) "1. Select EXPANDED mode."
530 PRINT TAB(TB) "2. Cancel EXPANDED mode."
540 PRINT TAB(TB) "3. Select EMPHASIZED mode."
550 PRINT TAB(TB) "4. Cancel EMPHASIZED mode."
560 PRINT TAB(TB) "5. Select DOUBLE-STRIKE mode."
570 PRINT TAB(TB) "6. Cancel DOUBLE-STRIKE mode."
580 GOSUB 2370
590 IF S<0 OR S>6 THEN PRINT CHR$(7) : GOTO 580
600 IF S = 0 THEN RETURN
610 ON S GOSUB 1520,1550,2160,2190,2220,2250
620 GOTO 470
630 '
```

```
640 'Subroutine to display MARGINS, TABS & FORMS menu.
650 TITLE$ = "MARGINS, TABS & FORMS MENU"
660 GOSUB 2280
670 PRINT TAB(TB) "0. Return to main menu."
680 PRINT TAB(TB) "1. Set HORIZONTAL TABS."
690 PRINT TAB(TB) "2. Set VERTICAL TABS."
700 PRINT TAB(TB) "3. Set LEFT MARGIN."
710 PRINT TAB(TB) "4. Set RIGHT MARGIN."
720 PRINT TAB(TB) "5. Set TOP MARGIN."
730 PRINT TAB(TB) "6. Set BOTTOM MARGIN."
740 PRINT TAB(TB) "7. Cancel TOP & BOTTOM MARGINS."
750 PRINT TAB(TB) "8. Set PAGE LENGTH."
760 GOSUB 2370
770 IF S<0 OR S>8 THEN PRINT CHR$(7) : GOTO 760
780 IF S = 0 THEN RETURN
790 ON S GOSUB 1810,2120,900,960,1020,1080,1140,1640
800 GOTO 630
810 '
820 'Subroutine to select PICA pitch.
830 S$ = ESC$ + "B" + CHR$(1) : GOSUB 2460 : RETURN
840 '
850 'Subroutine to select ELITE pitch.
860 S$ = ESC$ + "B" + CHR$(2) : GOSUB 2460 : RETURN
870 '
880 'Subroutine to select CONDENSED pitch.
890 S$ = ESC$ + "B" + CHR$(3) : GOSUB 2460 : RETURN
900 '
910 'Subroutine to set LEFT MARGIN.
920 GOSUB 2500
930 INPUT "Enter new left margin (1-255)" ; X
940 IF X < 1 OR X > 255 THEN PRINT CHR$(7) : GOTO 920
950 S$ = ESC$ + "M" + CHR$(X) : GOSUB 2460 : RETURN
960 '
970 'Subroutine to set right MARGIN
980 GOSUB 2500
990 INPUT "Enter new right margin (1-255)" ; X
1000 IF X < 1 OR X > 255 THEN PRINT CHR$(7) : GOTO 980
1010 S$ = ESC$ + "Q" + CHR$(X) : GOSUB 2460 : RETURN
1020 '
1030 'Subroutine to set TOP MARGIN.
1040 GOSUB 2500
1050 INPUT "Enter new top margin (1-16)" ; X
1060 IF X < 1 OR X > 16 THEN PRINT CHR$(7) : GOTO 1040
1070 S$ = ESC$ + "R" + CHR$(X) : GOSUB 2460 : RETURN
```

```
1080 '
1090 'Subroutine to set BOTTOM MARGIN.
1100 GOSUB 2500
1110 INPUT "Enter new bottom margin (1-127)" ; X
1120 IF X < 1 OR X > 127 THEN PRINT CHR$(7) : GOTO 1100
1130 S$ = ESC$ + "N" + CHR$(X) : GOSUB 2460 : RETURN
1140 '
1150 'Subroutine to CANCEL TOP & BOTTOM MARGINS.
1160 S$ = ESC$ + "O" : GOSUB 2460 : RETURN
1170 '
1180 'Subroutine to select NLQ character set.
1190 S$ = ESC$ + "B" + CHR$(4) : GOSUB 2460 : RETURN
1200 '
1210 'Subroutine to cancel NLQ character set.
1220 S$ = ESC$ + "B" + CHR$(5) : GOSUB 2460 : RETURN
1230 '
1240 'Subroutine to select LINE SPACING.
1250 TITLE$ = "LINE SPACING MENU"
1260 GOSUB 2280
1270 PRINT TAB(TB) "0. Return to main menu."
1280 PRINT TAB(TB) "1. Select 1/6 inch line spacing."
1290 PRINT TAB(TB) "2. Select 1/8 inch line spacing."
1300 PRINT TAB(TB) "3. Select 7 dot graphics spacing."
1310 PRINT TAB(TB) "4. Select n/144 inch spacing."
1320 GOSUB 2370
1330 IF S<0 OR S>4 THEN PRINT CHR$(7) : GOTO 1320
1340 IF S = 0 THEN RETURN
1350 ON S GOSUB 1370,1400,1430,1460
1360 GOTO 1230
1370 '
1380 'Subroutine to select 1/6 inch line spacing.
1390 S$ = ESC$ + "2" : GOSUB 2460 : RETURN
1400 '
1410 'Subroutine to select 1/8 inch line spacing.
1420 S$ = ESC$ + "0" : GOSUB 2460 : RETURN
1430 '
1440 'Subroutine to select 7 dot graphics spacing.
1450 S$ = ESC$ + "1" : GOSUB 2460 : RETURN
1460 '
1470 'Subroutine to select n/144 inch line spacing.
1480 GOSUB 2500
1490 INPUT "Enter line space in 1/144 ths of an inch"; X
1500 IF X < 0 OR X > 255 THEN PRINT CHR$(7) : GOTO 1480
1510 S$ = ESC$ + "3" + CHR$(X) : GOSUB 2460 : RETURN
```

```
152Ø '
153Ø 'Subroutine to select EXPANDED print.
154Ø S$ = ESC$ + "W" + CHR$(1) : GOSUB 246Ø : RETURN
155Ø '
156Ø 'Subroutine to cancel EXPANDED printing.
157Ø S$ = ESC$ + "W" + CHR$(Ø) : GOSUB 246Ø : RETURN
158Ø '
159Ø 'Subroutine to select ITALIC character set.
16ØØ S$ = ESC$ + "4" : GOSUB 246Ø : RETURN
161Ø '
162Ø 'Subroutine to cancel ITALIC character set.
163Ø S$ = ESC$ + "5" : GOSUB 246Ø : RETURN
164Ø '
165Ø 'Subroutine to set PAGE LENGTH.
166Ø GOSUB 25ØØ
167Ø PRINT "Page length in Inches or Lines (I,L)?"
168Ø PRINT TAB(TB) ;
169Ø A$ = INKEY$ : IF A$ = "" THEN 169Ø
17ØØ IF A$ = "I" OR A$ ="i" THEN 173Ø
171Ø IF A$ = "L" OR A$ ="l" THEN 177Ø
172Ø PRINT CHR$(7) : GOTO 169Ø
173Ø INPUT "Length of page in inches (1-32)" ; X
174Ø IF X < 1 OR X > 32 THEN PRINT CHR$(7) : GOTO 166Ø
175Ø S$ = ESC$ + "C" + CHR$(Ø) + CHR$(X)
176Ø GOSUB 246Ø : RETURN
177Ø INPUT "Length of page in lines (1-127)" ; X
178Ø IF X < 1 OR X > 127 THEN PRINT CHR$(7) : GOTO 166Ø
179Ø S$ = ESC$ + "C" + CHR$(X)
18ØØ GOSUB 246Ø : RETURN
181Ø '
182Ø 'Subroutine to set HORIZONTAL TABS.
183Ø S$ = ESC$ + "D" : MAX = 255 : GOSUB 184Ø : RETURN
184Ø '
185Ø 'Subroutine to set tabs, either horiz or vert.
186Ø GOSUB 25ØØ
187Ø PRINT "Would you like to set the tabs in"
188Ø PRINT TAB(TB) "Regular intervals, or specify"
189Ø PRINT TAB(TB) "each one Individually (R,I)"
19ØØ A$ = INKEY$ : IF A$ = "" THEN 19ØØ
191Ø IF A$ = "R" OR A$ = "r" THEN 2Ø6Ø
192Ø IF A$ = "I" OR A$ = "i" THEN 194Ø
193Ø PRINT CHR$(7) : GOTO 184Ø
194Ø PRINT : I = 2 : TBS(1) = -1
195Ø PRINT TAB(TB) "Enter the list of tabs, in"
```

```
196Ø PRINT TAB(TB) "ascending order. No more than" MAX
   "."
197Ø PRINT TAB(TB); : INPUT "Enter a tab" ; TBS(I)
198Ø IF TBS(I) < Ø OR TBS(I) > 255 THEN 193Ø
199Ø IF TBS(I) = Ø THEN I = 1 : GOTO 2Ø3Ø
2ØØØ IF TBS(I) <= TBS(I-1) THEN 193Ø
2Ø1Ø I = I + 1 : IF I > MAX THEN 193Ø
2Ø2Ø GOTO 197Ø
2Ø3Ø I = I + 1
2Ø4Ø S$ = S$ + CHR$(TBS(I)) : IF TBS(I) <> Ø THEN 2Ø3Ø
2Ø5Ø S$ = S$ + CHR$(Ø) : GOSUB 246Ø : RETURN
2Ø6Ø PRINT : PRINT TAB(TB) ; : INPUT "Enter interval" ;
   X
2Ø7Ø IF X < Ø OR X > 255 THEN 193Ø
2Ø8Ø FOR I = 1 TO 255 STEP X
2Ø9Ø MAX = MAX - 1 : IF MAX = Ø THEN 211Ø
21ØØ S$ = S$ + CHR$(I) : NEXT I
211Ø S$ = S$ + CHR$(Ø) : GOSUB 246Ø : RETURN
212Ø '
213Ø 'Subroutine to set VERTICAL TABS.
214Ø S$ = ESC$ + "P" : MAX = 2Ø : GOSUB 184Ø
215Ø RETURN
216Ø '
217Ø 'Subroutine to select EMPHASIZED printing.
218Ø S$ = ESC$ + "E" : GOSUB 246Ø : RETURN
219Ø '
22ØØ 'Subroutine to cancel EMPHASIZED printing.
221Ø S$ = ESC$ + "F" : GOSUB 246Ø : RETURN
222Ø '
223Ø 'Subroutine to select DOUBLE-STRIKE printing.
224Ø S$ = ESC$ + "G" : GOSUB 246Ø : RETURN
225Ø '
226Ø 'Subroutine to cancel DOUBLE-STRIKE printing.
227Ø S$ = ESC$ + "H" : GOSUB 246Ø : RETURN
228Ø '
229Ø 'Subroutine to print a menu title.
23ØØ PRINT CHR$(26);
231Ø PRINT : PRINT : PRINT
232Ø PRINT TAB(27) "--- RADIX PRINTER SETUP ---"
233Ø PRINT
234Ø PRINT TAB((8Ø-LEN(TITLE$))/2) TITLE$
235Ø PRINT : PRINT
236Ø RETURN
237Ø '
238Ø 'Subroutine to input menu selection.
```

```
2390 PRINT ESC$ "=" CHR$(20+32) CHR$(18+32);
2400 PRINT "Enter selection or press P for print
   sample."
2410 C$ = INKEY$ : IF C$ = "" THEN 2410
2420 IF C$ = "P" OR C$ = "p" THEN GOSUB 2530 : GOTO 2370
2430 IF C$ < "0" OR C$ > "9" THEN PRINT CHR$(7) : GOTO
   2390
2440 S = VAL(C$)
2450 RETURN
2460 '
2470 'Subroutine to output command string.
2480 LPRINT S$ ;
2490 RETURN
2500 '
2510 'Subroutine to clear screen & position cursor.
2520 PRINT CHR$(26) ESC$ "=" CHR$(10+32) CHR$(TB+32); :
   RETURN
2530 '
2540 ' Subroutine to print sample
2550 FOR I = 1 TO 4 : FOR J = 33 TO 127
2560 LPRINT CHR$(J) ;
2570 NEXT : LPRINT : NEXT
2580 RETURN
```

*Appendix F*

# *The Parallel Interface*

Radix has both a parallel interface and a serial interface to communicate with the computer that it is connected to. The operating specifications of the parallel interface are as follows:

| | |
|---|---|
| Data transfer rate: | 1,000 to 6,000 characters per second |
| Synchronization: | Via externally supplied $\overline{\text{STROBE}}$ pulses |
| Handshaking: | $\overline{\text{ACK}}$ and BUSY signals |
| Logic level: | Compatible with TTL level |

Radix's parallel interface connects to the computer by a 36 pin connector on the back of the printer. This connector mates with an Amphenol 57-30360 connector. The functions of the various pins are summarized in Table F-1.

## *Functions of the Connector Signals*

Communications between the computer and the Radix use many of the pins of the connector. To understand how the system of communications works we need to look at the functions of the various signals carried by the pins of the interface connector.

Pin 1 carries the $\overline{\text{STROBE}}$ pulse signal from the computer to the printer. This signal is normally held high by the computer. When the computer has data ready for the printer it sets this signal to a low value for at least 0.5 microseconds. When the printer sees this pulse on the strobe pin, it reads the data that the computer supplies on pins 2 through 9. Each of these lines carries one bit of information. A logical "1" is represented by a high signal level, and a logical "0" is represented by a low signal level. The computer must maintain these signals for a period beginning at least 0.5 microseconds before the strobe pulse starts and continuing for at least 0.5 microseconds after the strobe pulse ends.

When the Radix has successfully received the byte of data from the computer it sets pin 10 low for approximately 9 microseconds. This signal acknowledges the receipt of the data and so is called the $\overline{\text{ACK}}$ (for "acknowledge") signal.

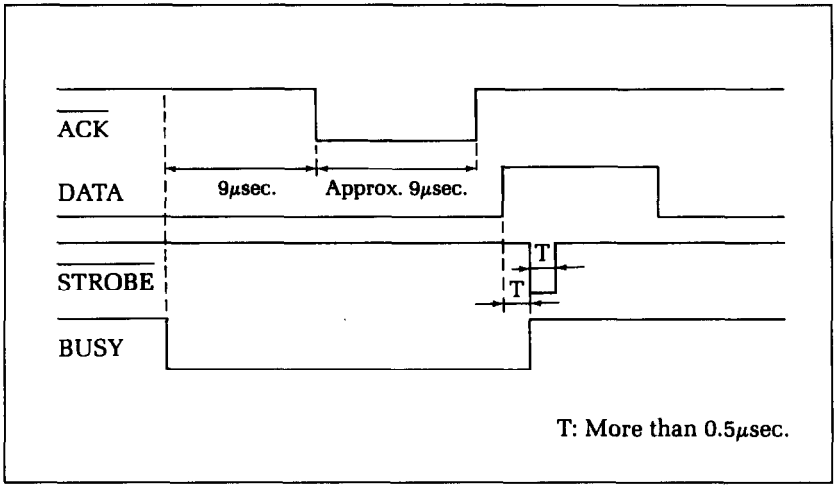


**Figure F-1.** *Radix interface timing diagram.*

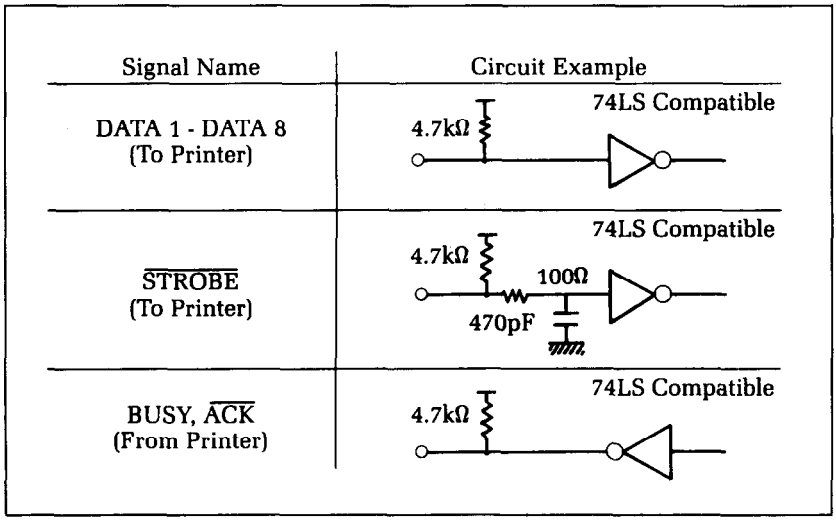


**Figure F-2.** *Typical interface circuit.*

***Table F-1***
***Parallel interface pin functions***

| Pin No. | Signal Name | Direction | Function |
|---|---|---|---|
| 1 | $\overline{\text{STROBE}}$ | IN | Signals when data is ready to be read. Signal goes from HIGH to LOW (for at least 0.5 microseconds) when data is available. |
| 2 | DATA1 | IN | These signals provide the information of the first to eighth bits of parallel data. Each signal is at a HIGH level for a logical 1 and at a LOW level for a logical 0. |
| 3 | DATA2 | IN | |
| 4 | DATA3 | IN | |
| 5 | DATA4 | IN | |
| 6 | DATA5 | IN | |
| 7 | DATA6 | IN | |
| 8 | DATA7 | IN | |
| 9 | DATA8 | IN | |
| 10 | $\overline{\text{ACK}}$ | OUT | A 9 microsecond LOW pulse acknowledges receipt of data. |
| 11 | BUSY | OUT | When this signal goes LOW the printer is ready to accept data. |
| 12 | PAPER OUT | OUT | This signal is normally LOW. It will go HIGH if Radix runs out of paper. This signal can be held LOW permanently by turning DIP switch C-1 off. |
| 13 | SELECTED | OUT | This signal is HIGH when the printer is on-line. |
| 14-15 | N/C | | Unused. |
| 16 | SIGNAL GND | | Signal ground. |
| 17 | CHASSIS GND | | Printer's chassis ground, isolated from logic ground. |
| 18 | +5VDC | OUT | External supply of +5VDC. |
| 19-30 | GND | | Twisted pair return signal ground level. |
| 31 | $\overline{\text{RESET}}$ | IN | When this signal goes LOW the printer is reset to its power-on condition. |
| 32 | $\overline{\text{ERROR}}$ | OUT | This signal is normally HIGH. This signal goes LOW to signal that the printer cannot print due to an error condition. |
| 33 | EXT GND | | External ground. |
| 34-36 | N/C | | Unused. |

Pin 11 reports when the Radix is not able to receive data. The signal is called BUSY. When this signal is high, Radix cannot receive data. This signal will be high during data transfer, when the printer is off-line and when an error condition exists.

Radix will report that it has run out of paper by making the PAPER OUT signal on pin 12 high. This pin can be held low by turning DIP switch C-1 off. When the printer is in the on-line state pin 13 is held high. This signal (SELECTED) tells the computer that the printer is ready to receive data.

Pins 14, 15, and 34-36 are not used, while pins 16, 17, 19-30 and 33 are grounded. Pin 18 is connected to the +5VDC supply in the printer.

Pin 31 can be used to reset the printer. If this signal ($\overline{\text{RESET}}$) goes low the printer will reinitialize. Pin 32 is used to report error conditions in the printer. This signal ($\overline{\text{ERROR}}$) is high during normal operation and goes low to report that the printer cannot print due to an error condition.

*Appendix G*

# *Serial Interface Specifications*

Radix provides a very flexible RS232C serial interface. It can communicate at rates from 150 to 19,200 baud (bits per second) and supports four different kinds of *handshaking*. This interface can also function as a 20mA current loop interface. The operating specifications of the interface are as follows:

| | |
|---|---|
| Data transfer rate: | 150-19200 |
| Word length: | 1 start bit |
| | 7 or 8 data bits |
| | Odd, even or no parity |
| | 1 or 2 stop bits |
| Signal levels: | Mark or logical 1, – 3 to – 15 volts or current ON |
| | Space or logical 0, + 3 to + 15 volts or current OFF |
| Handshaking: | Serial busy, 1 byte mode |
| | Serial busy, 1 block mode |
| | ACK mode |
| | XON/XOFF mode |

***Note:*** 19200 baud can be used only with a RS232C interface; it cannot be used with a 20mA current loop interface.

Radix has a DB-25 female connector on the back to connect to a computer. The functions of the pins are summarized in Table G-1.

## *Configuring the Serial Interface*

DIP switch B controls the configuration of the serial interface. Switch B is located under Radix's front cover. Table G-2 describes the functions of the individual switches in DIP switch B.

## *Table G-1*
## *Serial interface pin functions*

| Pin No. | Signal Name | Direction | Function |
|---|---|---|---|
| 1 | GND | — | Printer's chassis ground. |
| 2 | TXD | OUT | This pin carries data from the printer. |
| 3 | RXD | IN | This pin carries data to the printer. |
| 4 | RTS | OUT | This is ON when the printer is ready to receive data. |
| 5 | CTS | IN | This pin is ON when the computer is ready to send data. |
| 6 | DSR | IN | This pin is ON when the computer is ready to send data. Radix does not check this pin. |
| 7 | GND | — | Signal ground. |
| 8 | DCD | IN | This pin is ON when the computer is ready to send data. |
| 9 | TTY TXDR | — | This pin is the return path for data transmitted from the printer on the 20mA current loop. |
| 10 | TTY TXD | OUT | This pin carries data from the printer on the 20mA current loop. |
| 11 | RCH | OUT | This is the signal line for the serial busy protocols. This pin goes OFF when Radix's buffer fills, and ON when Radix is ready to receive data. In the busy protocols this line carries the same signal as pin 20. |
| 12 | N/C | | Unused |
| 13 | GND | — | Signal ground |
| 14-16 | N/C | | Unused |
| 17 | TTY TXDR | — | This pin is the return path for data transmitted from the printer on the 20mA current loop. |
| 18 | TTY RXDR | — | This pin is the return path for data transmitted to the printer on the 20mA current loop. |
| 19 | TTY RXD | IN | This pin carries data to the printer on the 20mA current loop. |
| 20 | DTR | OUT | Radix turns this pin ON when it is ready to receive data. |
| 21-22 | N/C | | Unused. |
| 23 | TTY RXDR | — | This pin is the return path for data transmitted to the printer on the 20mA current loop. |
| 24 | TTY TXD | OUT | This pin carries data from the printer on the 20mA current loop. |
| 25 | TTY RXD | IN | This pin carries data to the printer on the 20mA current loop. |

***Table G-2***
***DIP switch B***

| Switch | ON | OFF |
|---|---|---|
| B-1 | 2 stop bits | 1 stop bit |
| B-2 | 7 data bits | 8 data bits |
| B-3 | Parity checked | No parity |
| B-4 | Handshaking protocols—see Table G-3 | |
| B-5 | | |
| B-6 | Odd parity | Even parity |
| B-7 | Data transfer rate—see Table G-4 | |
| B-8 | | |
| B-9 | | |
| B-10 | Not used | |

***Table G-3***
***Handshaking protocols***

| Protocol | Switch B-4 | Switch B-5 |
|---|---|---|
| Serial busy, 1 byte mode | OFF | OFF |
| Serial busy, 1 block mode | ON | OFF |
| ACK mode | OFF | ON |
| XON/XOFF mode | ON | ON |

***Table G-4***
***Data transfer rates***

| Baud rate | Switch B-7 | Switch B-8 | Switch B-9 |
|---|---|---|---|
| 150 | OFF | OFF | OFF |
| 300 | OFF | OFF | ON |
| 600 | OFF | ON | OFF |
| 1200 | OFF | ON | ON |
| 2400 | ON | OFF | OFF |
| 4800 | ON | OFF | ON |
| 9600 | ON | ON | OFF |
| 19200 | ON | ON | ON |

# *Radix's Serial Protocols*

Radix has four serial protocols selected by DIP switches B-4 and B-5. Figure G-2 shows a typical byte of serial data and Figure G-3 shows timing charts for the 4 protocols.

### *Serial busy protocols*

In the serial busy protocols, Radix uses DTR (pin 20) and RCH (pin 11) to signal to the computer when it is able to accept data. These two pins go ON when Radix is ready to accept data. In the 1 byte mode they go OFF after each character is received. In the 1 block mode they only go OFF when Radix's buffer approaches capacity. In both cases they will stay OFF if the buffer is too full to accept more data.

### *XON/XOFF protocol*

The XON/XOFF protocol uses the ASCII characters ⟨DC1⟩ and ⟨DC3⟩ (sometimes called XON and XOFF, respectively) to communicate with the computer. When Radix's buffer approaches capacity Radix will send a DC3 (ASCII 19) on TXD (pin 2) to tell the computer that it must stop sending data. When Radix is able to receive more data it sends a DC1 (ASCII 17) on TXD. The computer can then send more data until Radix sends another DC3.

### *ACK protocol*

In the ACK protocol, Radix sends an ACK (ASCII 6) on TXD (pin 2) each time that it is prepared to receive a byte of data.

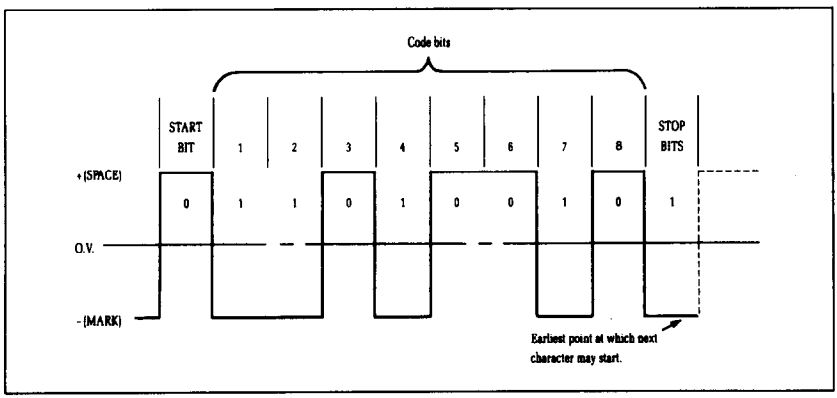


**Figure G-1.** *Typical data byte on the serial interface.*

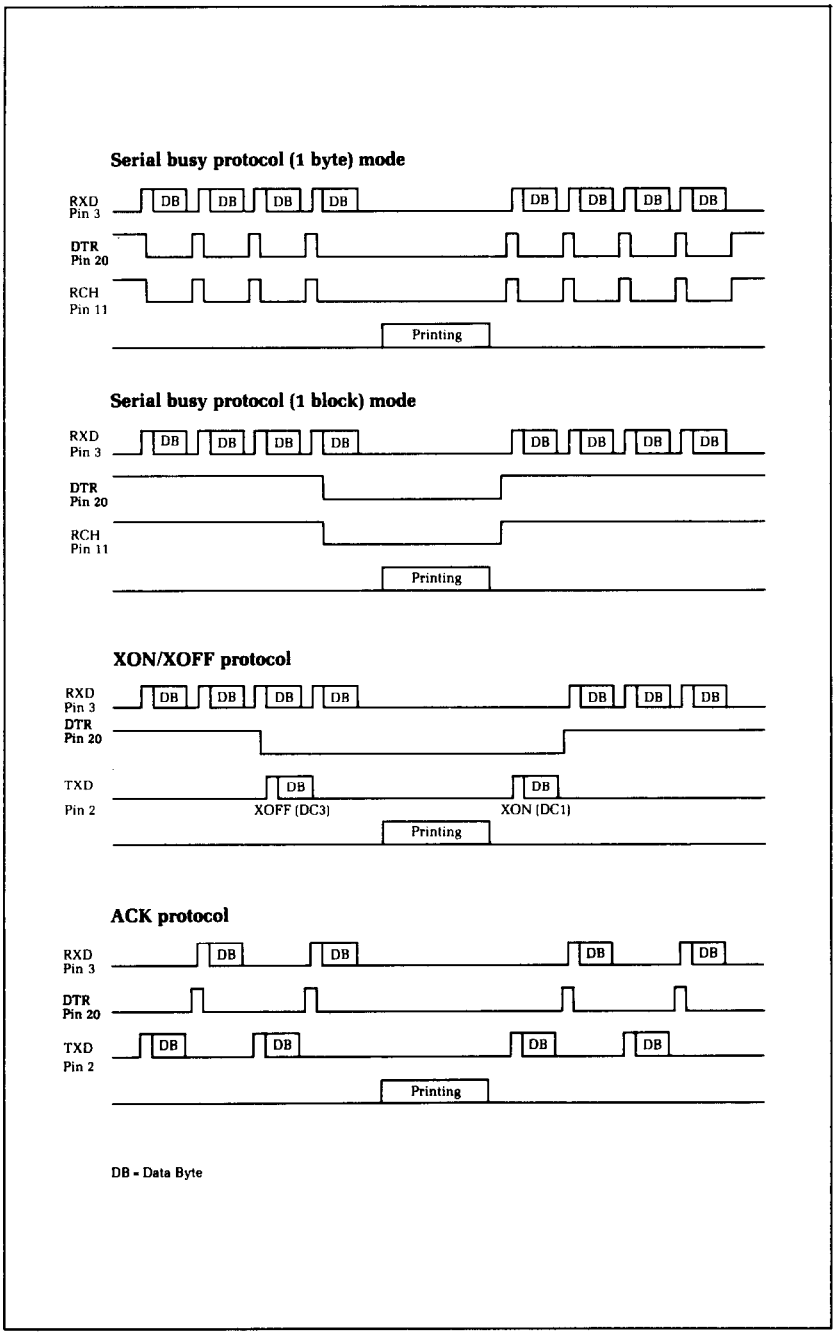


**Figure G-2.** *Serial protocol timing charts.*

*Appendix H*

# *DIP Switch Settings*

The DIP (dual in-line package) switches control some of the functions of Radix. A DIP switch actually contains several individual switches. Radix has one DIP switch with 8 individual switches in it, one with 10 individual switches, and one DIP switch with 4 individual switches. Figure H-1 is a drawing of a typical DIP switch.

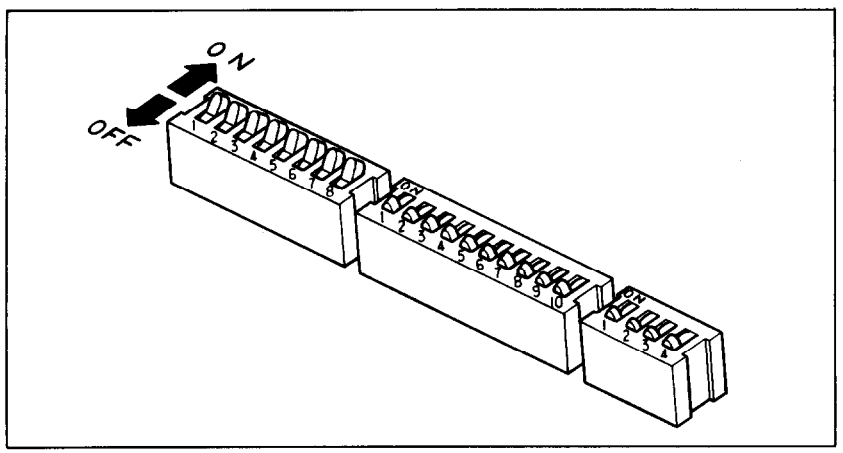


**Figure H-1.** *A DIP switch is actually a series of several small switches.*

All three DIP switches are readily accessible from the top. They are located in the compartment with the print head, and can be seen by opening the front cover. To change the setting of a switch, use a ballpoint pen or a similar object. The "on" position for a switch is towards the back of the printer; "off" is towards the front.

Never change the settings of any of the DIP switches when the power is on. Turn off both the printer and your computer.

Table H-1 summarizes the functions of DIP switches A and C.

DIP switch B controls the serial interface and is covered in Appendix G. The individual switches on DIP switch A are called A-1 through A-8; those on switch C are C-1 through C-4.

***Table H-1***
***DIP switch settings***

| Switch | ON | OFF |
|---|---|---|
| **Switch A** | | |
| A-1 | 11" page length | 12" page length |
| A-2 | Normal print | Emphasized print |
| A-3 | 10 CPI (pica pitch) | 17 CPI (condensed pitch) |
| A-4 | Normal | NLQ |
| A-5 | 1/6" line feed | 1/8" line feed |
| A-6 | International character set selection — see Table H-2 | |
| A-7 | | |
| A-8 | | |
| **Switch C** | | |
| C-1 | Paper-out detector on | Ignore paper-out |
| C-2 | Serial interface | Parallel interface |
| C-3 | 7-bit interface | 8-bit interface |
| C-4 | Auto LF with CR | LF must be from host |

DIP switch A controls the default settings for printing functions. DIP switch C controls the interface.

# Switch Functions

**Switch** **Function**

A-1 Switch A-1 sets the default page length for Radix. If switch A-1 is ON, the page length is set to 11". When switch A-1 is OFF the page length is set to 12". This switch is set ON at the factory.

A-2 This switch selects either normal or emphasized print for the default. If this switch is ON then Radix will print normal type when the power is turned on. If this switch is OFF then Radix will print emphasized type when the power is turned on. This switch is set ON at the factory. This switch has no effect if switch A-4 is off.

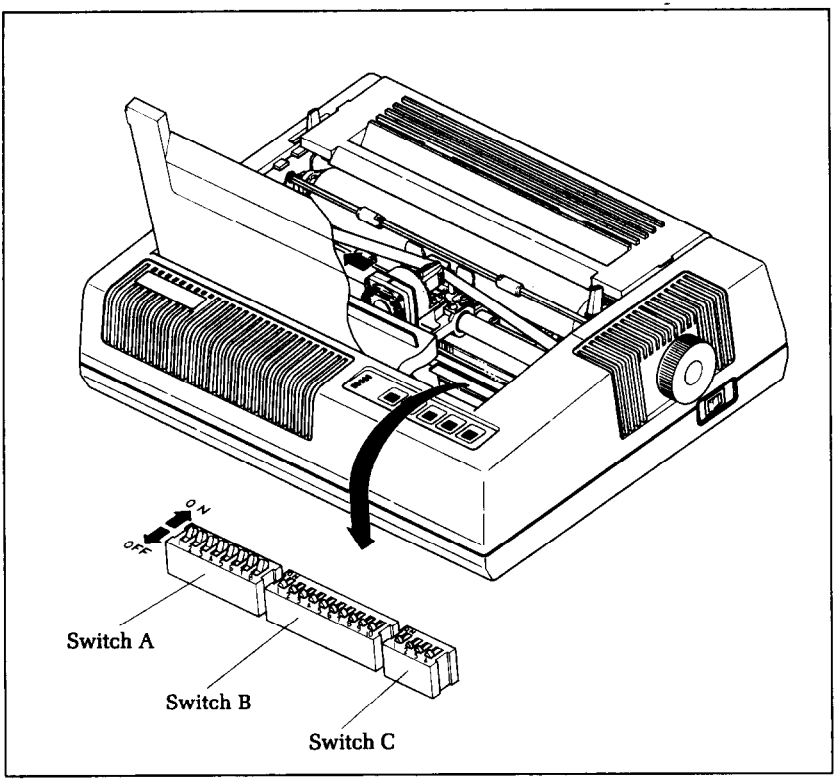


**Figure H-2.** *Radix's DIP switches are located under the front cover.*

A-3 This switch selects the default character pitch. If this switch is ON the default pitch is 10 CPI. If this switch is OFF the default pitch is 17 CPI. This switch is set ON at the factory. This switch has no effect if switch A-4 is off.

A-4 Switch A-4 selects the default character style. If this switch is ON then the default character style is normal characters. If this switch is OFF then the default character style is near letter quality. If this switch is OFF then switches A-2 and A-3 have no effect. This switch is set ON at the factory.

A-5 This switch sets the default line spacing. When this switch is ON the default line spacing is set to 1/6 inch. This means that Radix will advance the paper 1/6 inch each time it receives a line feed. When this switch is OFF the default line spacing is 1/8 inch. This switch is set ON at the factory.

A-6 – A-8 These three switches determine the default international character set as shown in Table H-2. These switches are all set ON at the factory.

***Table H-2***
***International character sets***

| Switch | USA | England | Germany | Denmark | France | Sweden | Italy | Spain |
|---|---|---|---|---|---|---|---|---|
| A-6 | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| A-7 | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| A-8 | ON | ON | ON | ON | OFF | OFF | OFF | OFF |

C-1 This switch disables the paper-out sensor. If this switch is ON the printer will signal the computer when it runs out of continuous paper and will stop printing. If this switch is OFF the printer will ignore the paper-out sensor and will continue printing. This switch is set ON at the factory.

C-2 This switch selects the active interface. Turn this switch ON to use the serial interface. Turn this switch OFF to use the parallel interface. This switch is set OFF at the factory.

C-3 This switch controls the eighth bit of the parallel interface. If this switch is ON the printer will only read the first seven bits on the parallel interface and ignores the eighth bit. If this switch is OFF all eight bits will be read. This switch is set OFF at the factory.

C-4 When this switch is ON, Radix will automatically advance the paper one line every time it receives a carriage return. When this switch is OFF, the computer must send a line feed command every time the paper is to advance. (Most BASICs send a line feed with every carriage return, therefore, this switch should usually be off.) This switch is set OFF at the factory.

## *Appendix I*

# *ASCII Codes*

### *Standard and Italic Characters*

| Decimal | Character | | Function | Decimal | Character | | |
|---|---|---|---|---|---|---|---|
| 0 | NUL | | End tab settings | 47 | / | / | |
| 7 | BEL | | Bell | 48 | 0 | 0 | |
| 8 | BS | | Backspace | 49 | 1 | 1 | |
| 9 | HT | | Horizontal tab | 50 | 2 | 2 | |
| 10 | LF | | Line feed | 51 | 3 | 3 | |
| 11 | VT | | Vertical tab | 52 | 4 | 4 | |
| 12 | FF | | Form feed | 53 | 5 | 5 | |
| 13 | CR | | Carriage return | 54 | 6 | 6 | |
| 14 | SO | | Expanded print on | 55 | 7 | 7 | |
| 15 | SI | | Condensed print on | 56 | 8 | 8 | |
| 17 | DC1 | | On line | 57 | 9 | 9 | |
| 18 | DC2 | | Pica pitch | 58 | : | : | |
| 19 | DC3 | | Off line | 59 | ; | ; | |
| 20 | DC4 | | Expanded print off | 60 | < | < | |
| 27 | ESC | | Escape | 61 | = | = | |
| 30 | RS | | End macro | 62 | > | > | |
| 32 | | | Space | 63 | ? | ? | |
| 33 | ! | ! | | 64 | @ | @ | * |
| 34 | " | " | | 65 | A | A | |
| 35 | # | # | * | 66 | B | B | |
| 36 | $ | $ | | 67 | C | C | |
| 37 | % | % | | 68 | D | D | |
| 38 | & | & | | 69 | E | E | |
| 39 | ' | ' | Apostrophe | 70 | F | F | |
| 40 | ( | ( | | 71 | G | G | |
| 41 | ) | ) | | 72 | H | H | |
| 42 | * | * | | 73 | I | I | |
| 43 | + | + | | 74 | J | J | |
| 44 | , | , | Comma | 75 | K | K | |
| 45 | - | - | Hyphen | 76 | L | L | |
| 46 | . | . | Period | 77 | M | M | |

*These characters may be different if you are using an international character set other than the USA set. The characters for each set are shown on the next page.

| Decimal | Character | | |
|---|---|---|---|
| 78 | N | *N* | |
| 79 | O | *O* | |
| 80 | P | *P* | |
| 81 | Q | *Q* | |
| 82 | R | *R* | |
| 83 | S | *S* | |
| 84 | T | *T* | |
| 85 | U | *U* | |
| 86 | V | *V* | |
| 87 | W | *W* | |
| 88 | X | *X* | |
| 89 | Y | *Y* | |
| 90 | Z | *Z* | |
| 91 | [ | *[* | * |
| 92 | \ | ** | * |
| 93 | ] | *]* | * |
| 94 | ^ | *^* | * |
| 95 | _ | *_* | |
| 96 | ` | *`* | * |
| 97 | a | *a* | |
| 98 | b | *b* | |
| 99 | c | *c* | |
| 100 | d | *d* | |
| 101 | e | *e* | |
| 102 | f | *f* | |

| Decimal | Character | | |
|---|---|---|---|
| 103 | g | *g* | |
| 104 | h | *h* | |
| 105 | i | *i* | |
| 106 | j | *j* | |
| 107 | k | *k* | |
| 108 | l | *l* | |
| 109 | m | *m* | |
| 110 | n | *n* | |
| 111 | o | *o* | |
| 112 | p | *p* | |
| 113 | q | *q* | |
| 114 | r | *r* | |
| 115 | s | *s* | |
| 116 | t | *t* | |
| 117 | u | *u* | |
| 118 | v | *v* | |
| 119 | w | *w* | |
| 120 | x | *x* | |
| 121 | y | *y* | |
| 122 | z | *z* | |
| 123 | { | *{* | * |
| 124 | \| | *\|* | * |
| 125 | } | *}* | * |
| 126 | ~ | *~* | * |
| 127 | DEL | | Delete |

*These characters may be different if you are using an international character set other than the USA set. The characters for each set are shown below.

### *International Character Sets*

| Decimal | USA | England | Germany | Denmark | France | Sweden | Italy | Spain |
|---|---|---|---|---|---|---|---|---|
| 35 | # | £ | # | # | £ | # | # | # |
| 64 | @ | @ | § | @ | à | É | § | @ |
| 91 | [ | [ | Ä | Æ | ° | Ä | ° | ¡ |
| 92 | \ | \ | Ö | Ø | ç | Ö | ç | Ñ |
| 93 | ] | ] | Ü | Å | § | Å | é | ¿ |
| 94 | ^ | ^ | ^ | ^ | ^ | Ü | ^ | ^ |
| 96 | ` | ` | ` | ` | ` | é | ù | ` |
| 123 | { | { | ä | æ | é | ä | à | ¨ |
| 124 | \| | \| | ö | ø | ù | ö | ò | ñ |
| 125 | } | } | ü | à | è | à | è | } |
| 126 | ~ | ~ | ß | ~ | ¨ | ü | ì | ~ |

## Special Characters

| Decimal | Character | Function |
|---|---|---|
| 128 | | |
| 135 | BEL | Bell |
| 136 | BS | Backspace |
| 137 | HT | Horizontal tab |
| 138 | LF | Line feed |
| 139 | VT | Vertical tab |
| 140 | FF | Form feed |
| 141 | CR | Carriage return |
| 142 | SO | Expanded print on |
| 143 | SI | Condensed print on |
| 145 | DC1 | On line |
| 146 | DC2 | Pica pitch |
| 147 | DC3 | Off line |
| 148 | DC4 | Expanded print off |
| 155 | ESC | Escape |
| 158 | RS | End macro |
| 160 | | |
| 161 | | |
| 162 | | |
| 163 | | |
| 164 | | |
| 165 | | |
| 166 | | |
| 167 | | |
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| 182 | | |
| 183 | | |

| Decimal | Character |
|---|---|
| 184 | |
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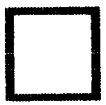
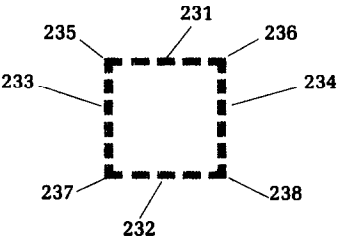
| 217 | |
| 218 | |
| 219 | |
| 220 | |
| 221 | |
| 222 | |
| 223 | |

## Block Graphics Characters

| Decimal | Character | Decimal | Character |
|---|---|---|---|
| 224 | Space | 240 | ┌ |
| 225 | ▘ | 241 | ─ |
| 226 | ▝ | 242 | ┐ |
| 227 | ▀ | 243 | ┬ |
| 228 | ▖ | 244 | ├ |
| 229 | ▌ | 245 | │ |
| 230 | ▞ | 246 | └ |
| 231 | ▛ | 247 | ┘ |
| 232 | ▗ | 248 | ┴ |
| 233 | ▚ | 249 | ┤ |
| 234 | ▐ | 250 | ┼ |
| 235 | ▜ | 251 | ◤ |
| 236 | ▄ | 252 | ◢ |
| 237 | ▙ | 253 | ◥ |
| 238 | ▟ | 254 | ◣ |
| 239 | ■ | 255 | |

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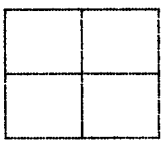

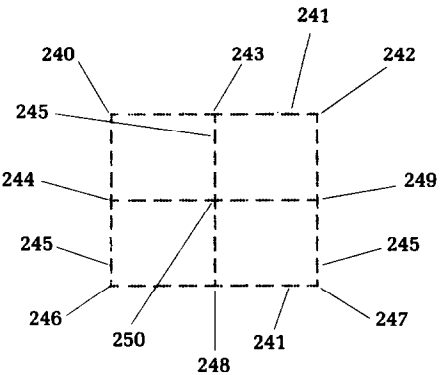
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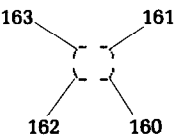
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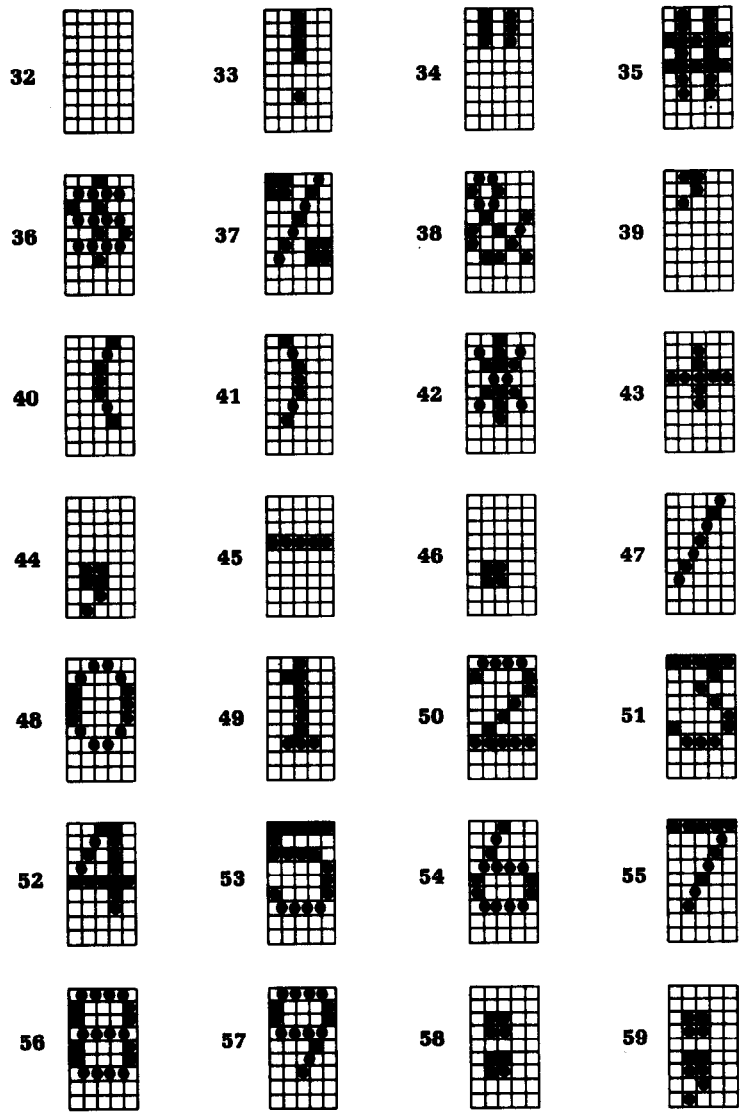
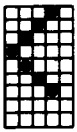
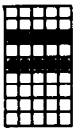
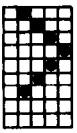
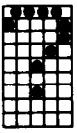
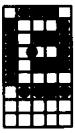
*Appendix J*

# *Character Style Charts*

## *Standard Characters*



60 
61 
62 
63 

64 
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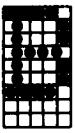
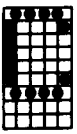
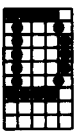
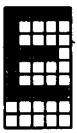
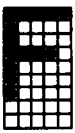
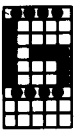
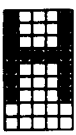
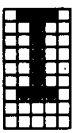
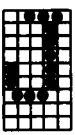
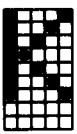
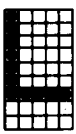
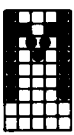
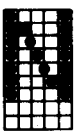
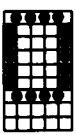
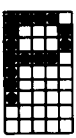
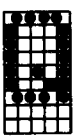
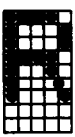
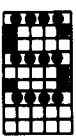
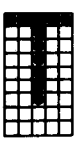
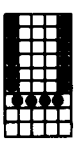
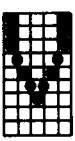
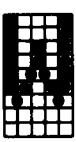
66 
67 

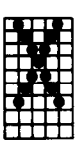
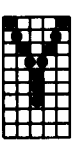
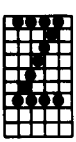
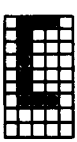
68 
69 
70 
71 

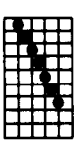
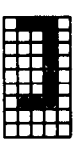
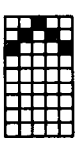
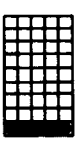
72 
73 
74 
75 

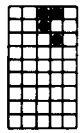
76 
77 
78 
79 

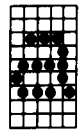
80 
81 
82 
83 

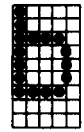
84 
85 
86 
87 

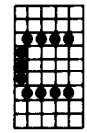
88 
89 
90 
91 

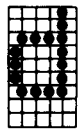
92 
93 
94 
95 

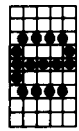
96 

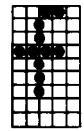
97 

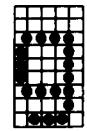
98 

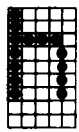
99 

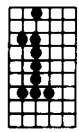
100 

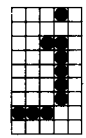
101 

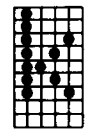
102 

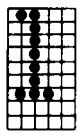
103 

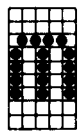
104 

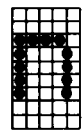
105 

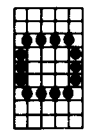
106 

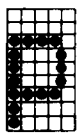
107 

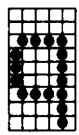
108 

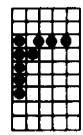
109 

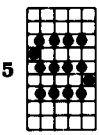
110 

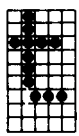
111 

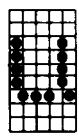
112 

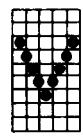
113 

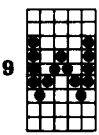
114 

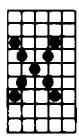
115 

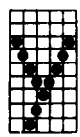
116 

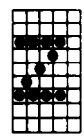
117 

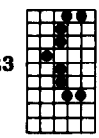
118 

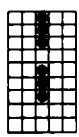
119 

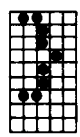
120 

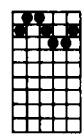
121 

122 

123 

124 

125 

126 

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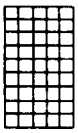
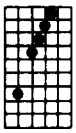
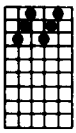
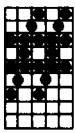
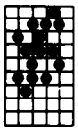
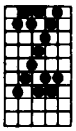
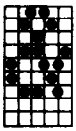
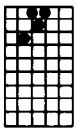
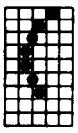
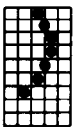
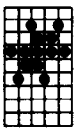
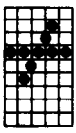
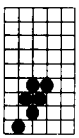
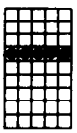
32 
33 
34 
35 

36 
37 
38 
39 

40 
41 
42 
43 

44 
45 
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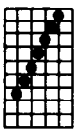
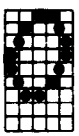
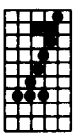
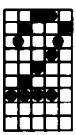
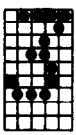
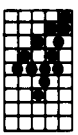
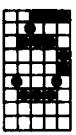
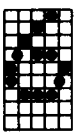
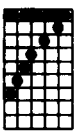
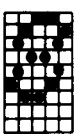
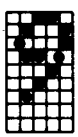
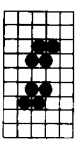
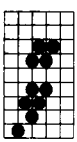
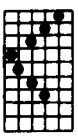
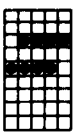
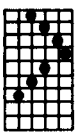
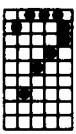
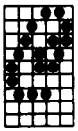
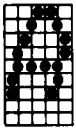
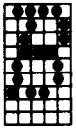
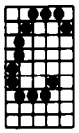
47 

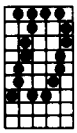
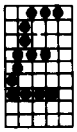
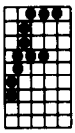
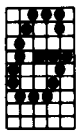
48 
49 
50 
51 

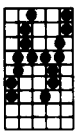
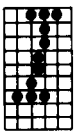
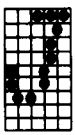
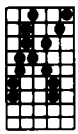
52 
53 
54 
55 

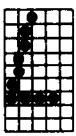
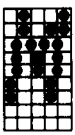
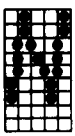
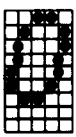
56 
57 
58 
59 

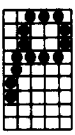
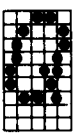
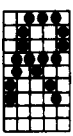
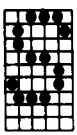
60 
61 
62 
63 

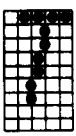
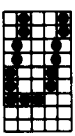
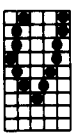
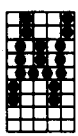
64 
65 
66 
67 

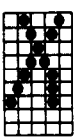
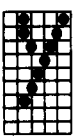
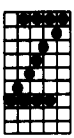
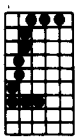
68 
69 
70 
71 

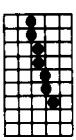
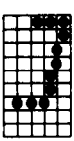
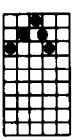
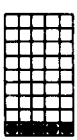
72 
73 
74 
75 

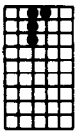
76 
77 
78 
79 

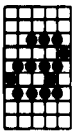
80 
81 
82 
83 

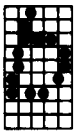
84 
85 
86 
87 

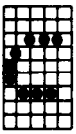
88 
89 
90 
91 

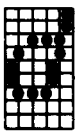
92 
93 
94 
95 

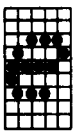
96 

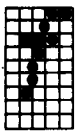
97 

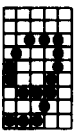
98 

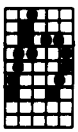
99 

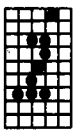
100 

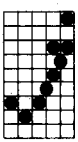
101 

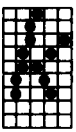
102 

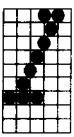
103 

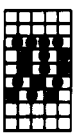
104 

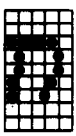
105 

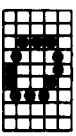
106 

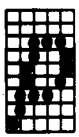
107 

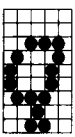
108 

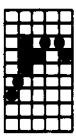
109 

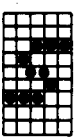
110 

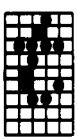
111 

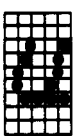
112 

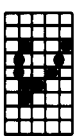
113 

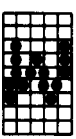
114 

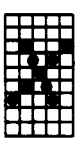
115 

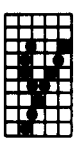
116 

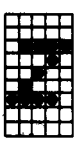
117 

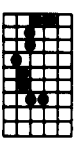
118 

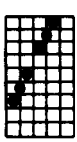
119 

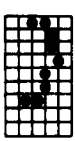
120 

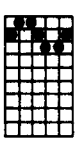
121 

122 

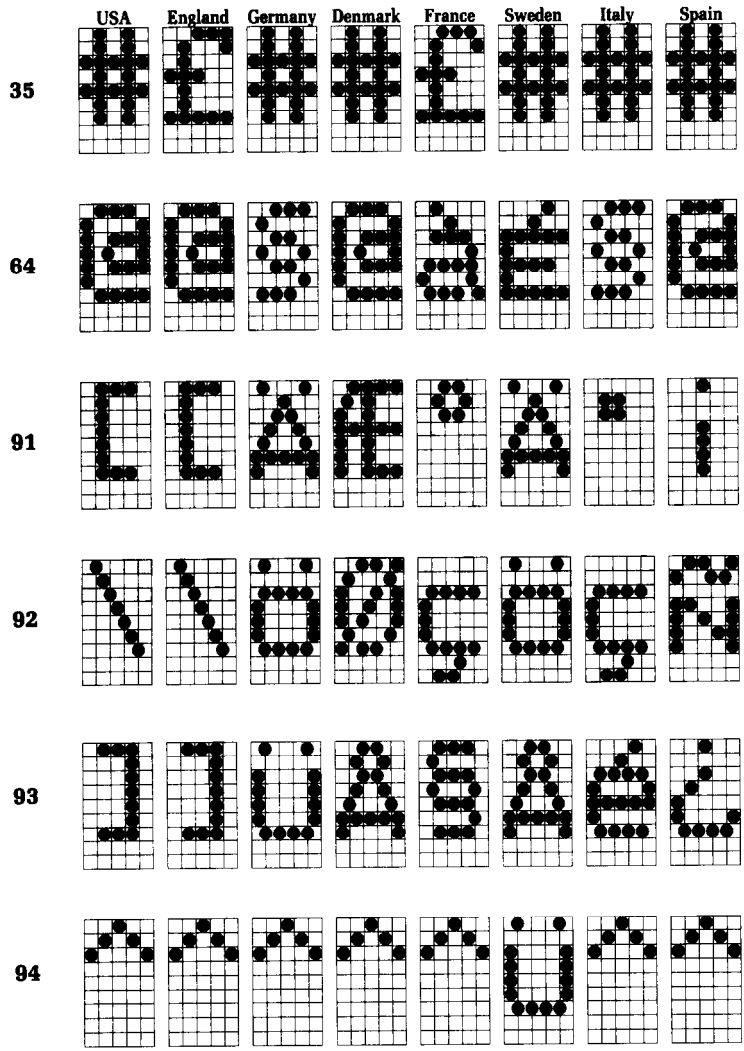
123 

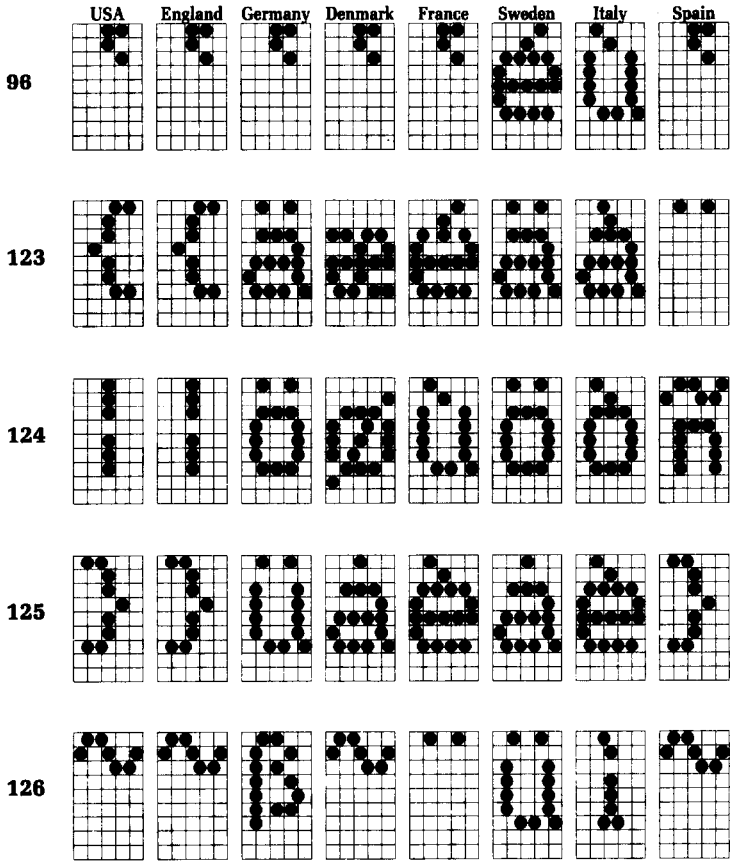
124 

125 

126 

## *International Characters*




USA
England
Germany
Denmark
France
Sweden
Italy
Spain
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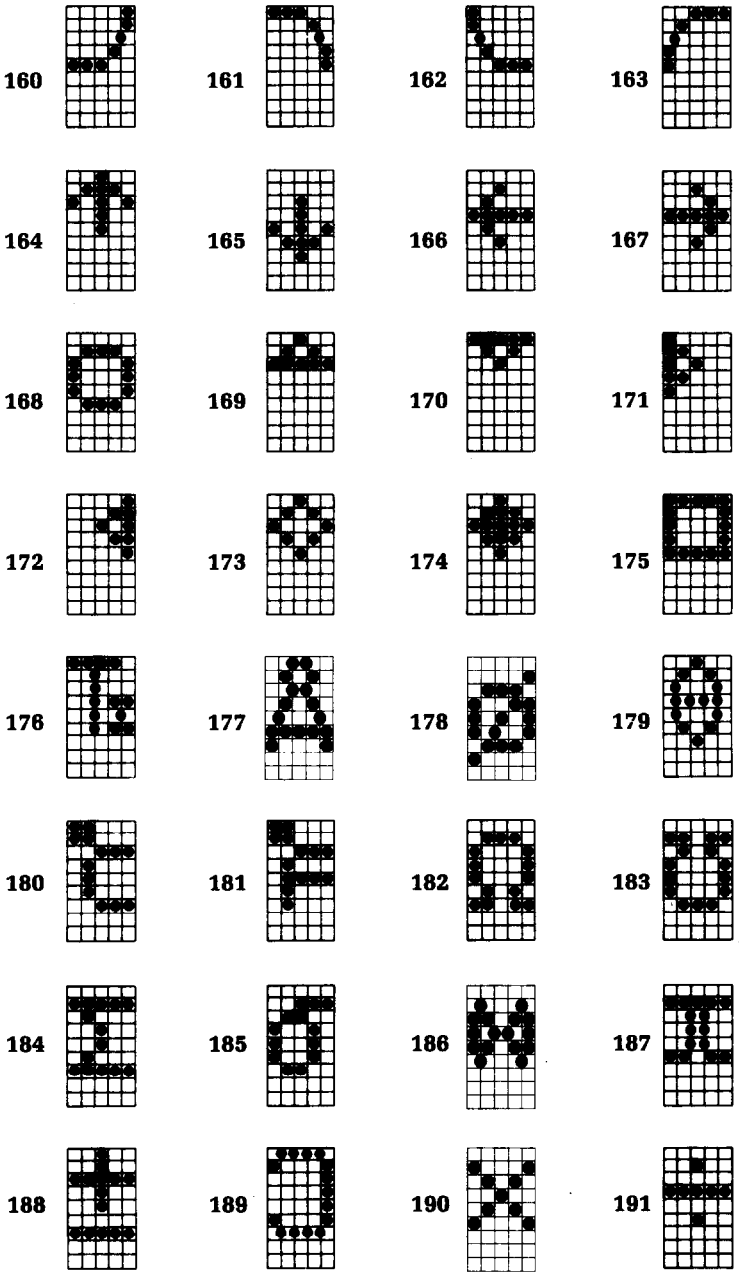
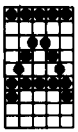
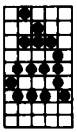
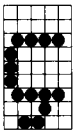
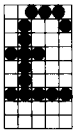
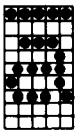
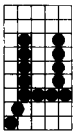
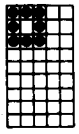
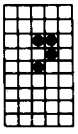
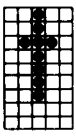
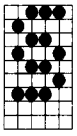
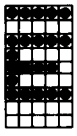
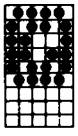
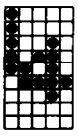
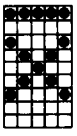
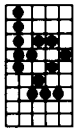
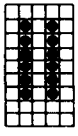
## *Special Characters*

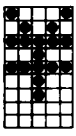
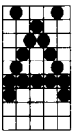
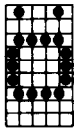
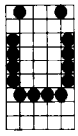


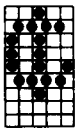
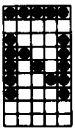
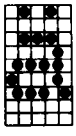
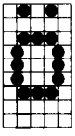
192 
193 
194 
195 

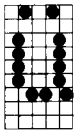
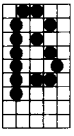
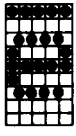
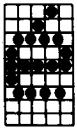
196 
197 
198 
199 

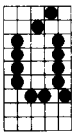
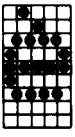
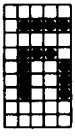
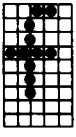
200 
201 
202 
203 

204 
205 
206 
207 

208 
209 
210 
211 

212 
213 
214 
215 

216 
217 
218 
219 

220 
221 
222 
223 

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*Appendix K*

# *Function Code Reference*

The purpose of this Appendix is to provide a quick reference for the various functions available on the Radix-10 and Radix-15. The descriptions of the codes appear in the following format:

| | |
|---|---|
| PURPOSE: | **Tells what the function code does.** |
| CODE:<br>(decimal ASCII)<br>(hex ASCII) | Control code mnemonic<br>ASCII decimal equivalent<br>Hexadecimal equivalent |
| REMARKS: | Details how the command is used. |
| REFERENCE: | Tells which chapter of the manual describes the command in greater detail |

There are several commands that require that you specify a value (or values) to Radix. In these cases, we have used an italic "n" or "m" to indicate a variable. You should insert the ASCII code for proper value here.

## *Commands to Control Print Style*

These commands are used to control the font style, the print pitch, and special effects.

## *Font style controls*

PURPOSE: **Select the standard character set.**

| CODE: | ⟨ESC⟩ | "5" |
|---|---|---|
| (decimal ASCII) | 27 | 53 |
| (hex ASCII) | 1B | 35 |

REMARKS: This command causes the printer to cancel the italic character set and select instead the standard character set. You can select the standard character set as the power-on default by turning DIP switch A-4 on.

REFERENCE: Chapter 7

PURPOSE: **Select the italic character set.**

| CODE: | ⟨ESC⟩ | "4" |
|---|---|---|
| (decimal ASCII) | 27 | 52 |
| (hex ASCII) | 1B | 34 |

REMARKS: This command selects the italic character set.

REFERENCE: Chapter 7

PURPOSE: **Select an international character set.**

| CODE: | ⟨ESC⟩ | "7" | n |
|---|---|---|---|
| (decimal ASCII) | 27 | 55 | n |
| (hex ASCII) | 1B | 37 | n |

REMARKS: This command causes the printer to select an international character set determined by the value of n as shown in the table below:

| n | Character set |
|---|---|
| 0 | U.S.A. |
| 1 | England |
| 2 | Germany |
| 3 | Denmark |
| 4 | France |
| 5 | Sweden |
| 6 | Italy |
| 7 | Spain |

You can select a particular international character set as a power-on default by adjusting the settings of DIP switches A-6, A-7, and A-8.

REFERENCE: Chapter 10

PURPOSE: **Select the NLQ (Near Letter Quality) character set.**

| CODE: | ⟨ESC⟩ | "B" | 4 |
|---|---|---|---|
| (decimal ASCII) | 27 | 66 | 4 |
| (hex ASCII) | 1B | 42 | 4 |

REMARKS: This command causes all subsequent printing to be done with the NLQ (Near Letter Quality) character set. This character set cannot be used in conjunction with other font styles or special print modes except for underlining. You can set NLQ characters as the power-on default by turning DIP switch A-4 off.

REFERENCE: Chapter 7

PURPOSE: **Cancel the NLQ character set.**

| CODE: | ⟨ESC⟩ | "B" | 5 |
|---|---|---|---|
| (decimal ASCII) | 27 | 66 | 5 |
| (hex ASCII) | 1B | 42 | 05 |

REMARKS: This command causes the printer to cancel the NLQ character set and return to the standard (also known as "draft") character set.

REFERENCE: Chapter 7

## *Font pitch controls*

PURPOSE: **Set the print pitch to pica (10 characters/ inch).**

| CODE: | ⟨ESC⟩ | "B" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 66 | 1 |
| (hex ASCII) | 1B | 42 | 01 |

REMARKS: This command causes all subsequent printing to be done in pica type. This command also sets the maximum number of print columns to 80 on the Radix-10 and 136 on the Radix-15. You can select pica type as the power-on default by turning DIP switch A-3 on.

REFERENCE: Chapter 7

PURPOSE: **Set the print pitch to elite (12 characters/ inch).**

| CODE: | ⟨ESC⟩ | "B" | 2 |
|---|---|---|---|
| (decimal ASCII) | 27 | 66 | 2 |
| (hex ASCII) | 1B | 42 | 02 |

REMARKS: This command causes all subsequent printing except NLQ characters to be done in elite type. This command also sets the maximum number of print columns to 96 on the Radix-10 and 163 on the Radix-15.

REFERENCE: Chapter 7

PURPOSE: **Set the print pitch to condensed (17 characters/inch).**

| CODE: | ⟨ESC⟩ | "B" | 3 |
|---|---|---|---|
| (decimal ASCII) | 27 | 66 | 3 |
| (hex ASCII) | 1B | 42 | 03 |

REMARKS: This command causes all subsequent printing except NLQ characters to be done in condensed type of 17 characters per inch. This command also sets the maximum number of print columns to 136 on the Radix-10 and 233 on the Radix-15. You can select condensed type as the power-on default by turning DIP switch A-3 off.

REFERENCE: Chapter 7

PURPOSE: **Set the print pitch to pica (10 characters/inch).**

| CODE: | ⟨DC2⟩ |
|---|---|
| (decimal ASCII) | 18 |
| (hex ASCII) | 12 |

REMARKS: This command is the same as ⟨ESC⟩ "B" 1, but can be used in applications where a single-character command is required.

REFERENCE: Chapter 7

PURPOSE: **Set the print pitch to condensed (17 characters/inch).**

| CODE: | ⟨SI⟩ |
|---|---|
| (decimal ASCII) | 15 |
| (hex ASCII) | 0F |

REMARKS: This command is the same as ⟨ESC⟩ "B" 3, but can be used in applications where a single-character command is required.

REFERENCE: Chapter 7

PURPOSE: **Set the print pitch to condensed (17 characters/inch).**

| CODE: | ⟨ESC⟩ | ⟨SI⟩ |
|---|---|---|
| (decimal ASCII) | 27 | 15 |
| (hex ASCII) | 1B | 0F |

REMARKS: Same as ⟨SI⟩, above.

REFERENCE: Chapter 7

PURPOSE: **Set the printer to expanded print.**

| CODE: | ⟨ESC⟩ | "W" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 87 | 1 |
| (hex ASCII) | 1B | 57 | 01 |

REMARKS: This command causes all subsequent printing except NLQ characters to be in expanded type. The size of the type is determined by the normal type size at the time the command is sent:

| | Normal | Expanded |
|---|---|---|
| Pica | 10 CPI | 5 CPI |
| Elite | 12 CPI | 6 CPI |
| Condensed | 17 CPI | 8.5 CPI |

REFERENCE: Chapter 7

PURPOSE: **Set the printer to expanded print for the remainder of the current line.**

| CODE: | ⟨SO⟩ |
|---|---|
| (decimal ASCII) | 14 |
| (hex ASCII) | 0E |

REMARKS: This command causes the printer to print expanded characters until a carriage return is sent. It can also be cancelled with ⟨DC4⟩. The character widths are shown above in the description of the ⟨ESC⟩ "W" 1 command.

REFERENCE: Chapter 7

PURPOSE: **Set the printer to expanded print for the remainder of the current line.**

| CODE: | ⟨ESC⟩ | ⟨SO⟩ |
|---|---|---|
| (decimal ASCII) | 27 | 14 |
| (hex ASCII) | 1B | 0E |

REMARKS: Same as ⟨SO⟩, above.

REFERENCE: Chapter 7

PURPOSE: **Cancels expanded print.**

| CODE: | ⟨ESC⟩ | "W" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 87 | 0 |
| (hex ASCII) | 1B | 57 | 00 |

REMARKS: This command resets the print size to whatever it was before being set to expanded print.

REFERENCE: Chapter 7

PURPOSE: **Cancels expanded print.**

| CODE: | ⟨DC4⟩ |
|---|---|
| (decimal ASCII) | 20 |
| (hex ASCII) | 14 |

REMARKS: This command cancels one line expanded printing set with ⟨SO⟩.

REFERENCE: Chapter 7

## *Special print modes*

PURPOSE: **Select double-strike printing.**

| CODE: | ⟨ESC⟩ | "G" |
|---|---|---|
| (decimal ASCII) | 27 | 71 |
| (hex ASCII) | 1B | 47 |

REMARKS: This command causes all subsequent characters except NLQ characters to be printed in double-strike. Double-strike causes all characters to be printed once, the paper moved up 1/144 inch, the characters reprinted, and the paper moved back down 1/144 inch.

REFERENCE: Chapter 7

PURPOSE: **Cancel double-strike printing.**

| CODE: | ⟨ESC⟩ | "H" |
|---|---|---|
| (decimal ASCII) | 27 | 72 |
| (hex ASCII) | 1B | 48 |

REMARKS: This command cancels double-strike printing and returns the printer to its previous print style.

REFERENCE: Chapter 7

PURPOSE: **Select emphasized printing.**

| CODE: | ⟨ESC⟩ | "E" |
|---|---|---|
| (decimal ASCII) | 27 | 69 |
| (hex ASCII) | 1B | 45 |

REMARKS: This command causes all subsequent characters except NLQ characters to be printed in emphasized print. Emphasized print can only be used with pica-sized characters, or enlarged pica-sized characters (10 CPI and 5 CPI), and cannot be used with superscripts or subscripts. You can select emphasized printing as the power-on default by turning DIP switch A-2 off.

REFERENCE: Chapter 7

PURPOSE: **Cancel emphasized printing.**

| CODE: | ⟨ESC⟩ | "F" |
|---|---|---|
| (decimal ASCII) | 27 | 70 |
| (hex ASCII) | 1B | 46 |

REMARKS: This command cancels emphasized printing and returns the printer to normal printing. You can select normal printing as the power-on default by turning DIP switch A-2 on.

REFERENCE: Chapter 7

PURPOSE: **Select underlining.**

| CODE: | ⟨ESC⟩ | "-" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 45 | 1 |
| (hex ASCII) | 1B | 2D | 01 |

REMARKS: This command causes all subsequent characters printed to be automatically underlined. Spaces are also underlined.

REFERENCE: Chapter 7

PURPOSE: **Cancel underlining.**

| CODE: | ⟨ESC⟩ | "-" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 45 | 0 |
| (hex ASCII) | 1B | 2D | 00 |

REMARKS: This command cancels underlining and returns the printer to its previous print style.

REFERENCE: Chapter 7

PURPOSE: **Select superscripts.**

| CODE: | ⟨ESC⟩ | "S" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 83 | 0 |
| (hex ASCII) | 1B | 53 | 00 |

REMARKS: This command causes all subsequent characters to be printed as superscripts. While in superscript mode, the normal bi-directional printing is cancelled and replaced with uni-directional printing. Printing is also set to double-strike mode. Superscripts may be used in conjunction with the italic font, and in pica, elite, and condensed pitches. It may not, however, be used in conjunction with emphasized print, enlarged print, or NLQ characters.

REFERENCE: Chapter 7

PURPOSE: **Select subscripts.**

| CODE: | ⟨ESC⟩ | "S" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 83 | 1 |
| (hex ASCII) | 1B | 53 | 01 |

REMARKS: This command causes all subsequent characters to be printed as subscripts. The same conditions and restrictions apply for subscripts as do for superscripts.

REFERENCE: Chapter 7

PURPOSE: **Cancel superscripts and subscripts.**

| CODE: | ⟨ESC⟩ | "T" |
|---|---|---|
| (decimal ASCII) | 27 | 84 |
| (hex ASCII) | 1B | 54 |

REMARKS: This command cancels either superscript or subscript mode. It also cancels the uni-directional printing and double-strike which the mode had set.

REFERENCE: Chapter 7

# *Commands to Control Vertical Position of Print Head*

These commands are used to move the paper relative to the location of the print head. By moving the paper up or down, the print head, in effect, moves the opposite direction (down or up) on the page.

## *Line feed controls*

PURPOSE: **Advance the paper one line (Line Feed).**

| CODE: | ⟨LF⟩ |
|---|---|
| (decimal ASCII) | 10 |
| (hex ASCII) | 0A |

REMARKS: The actual distance advanced by the line feed is set either through the setting of DIP switch A-5 or through various codes which can be sent (see below). When DIP switch C-4 is "on" a line feed is automatically generated whenever the printer receives a carriage return.

REFERENCE: Chapter 8

PURPOSE: **Reverse the paper one line.**

| CODE: | ⟨ESC⟩ | ⟨LF⟩ |
|---|---|---|
| (decimal ASCII) | 27 | 10 |
| (hex ASCII) | 1B | 0A |

REMARKS: This command causes the printer to reverse the paper (in effect moving the print head up on the sheet) one line. The actual distance traveled is set either through the setting of DIP switch A-5 or through various codes which can be sent (see below).

REFERENCE: Chapter 8

PURPOSE: **Change the line spacing to 1/8 inch.**

| CODE: | ⟨ESC⟩ | "0" |
|---|---|---|
| (decimal ASCII) | 27 | 48 |
| (hex ASCII) | 1B | 30 |

REMARKS: This command sets the distance the paper advances or reverses during all subsequent line feeds to 1/8 inch. You can select 1/8 inch line spacing as the power-on default by turning DIP switch A-5 off.

REFERENCE: Chapter 8

PURPOSE: **Change the line spacing to 7/72 inch.**

| CODE: | ⟨ESC⟩ | "1" |
|---|---|---|
| (decimal ASCII) | 27 | 49 |
| (hex ASCII) | 1B | 31 |

REMARKS: This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 7/72 inch.

REFERENCE: Chapter 8

PURPOSE: **Change the line spacing to 1/6 inch.**

| CODE: | ⟨ESC⟩ | "2" |
|---|---|---|
| (decimal ASCII) | 27 | 50 |
| (hex ASCII) | 1B | 32 |

REMARKS: This command sets the actual distance the paper advances or reverses during all subsequent line feeds to 1/6 inch. You can select 1/6 inch line spacing as the power-on default by turning DIP switch A-5 on.

REFERENCE: Chapter 8

PURPOSE: **Change the line spacing to n/72 inch.**

| CODE: | ⟨ESC⟩ | "A" | n |
|---|---|---|---|
| (decimal ASCII) | 27 | 65 | n |
| (hex ASCII) | 1B | 41 | n |

REMARKS: This command sets the distance the paper advances or reverses during all subsequent line feeds to n/72 inch. The value of n must be between 0 and 255.

REFERENCE: Chapter 8

PURPOSE: **Change the line spacing to n/144 inch.**

| CODE: | ⟨ESC⟩ | "3" | n |
|---|---|---|---|
| (decimal ASCII) | 27 | 51 | n |
| (hex ASCII) | 1B | 33 | n |

REMARKS: This command sets the actual distance the paper advances or reverses during all subsequent line feeds to n/144 inch. The value of n must be between 0 and 255.

REFERENCE: Chapter 8

PURPOSE: **Send a one-time line feed of n/144 inch.**

| CODE: | ⟨ESC⟩ | "J" | n |
|---|---|---|---|
| (decimal ASCII) | 27 | 74 | n |
| (hex ASCII) | 1B | 4A | n |

REMARKS: This command causes the printer to advance the paper n/144 inch and return the print head to the left margin. It does not change the current value of the line spacing. The value of n must be between 0 and 255.

REFERENCE: Chapter 8

PURPOSE: **Send a one-time reverse line feed of n/144 inch.**

| CODE: | ⟨ESC⟩ | "j" | n |
|---|---|---|---|
| (decimal ASCII) | 27 | 106 | n |
| (hex ASCII) | 1B | 6A | n |

REMARKS: This command causes the printer to reverse the paper n/144 inch and return the print head to the left margin. It does not change the current value of the line spacing. The value of n must be between 0 and 255.

REFERENCE: Chapter 8

## *Form feed controls*

PURPOSE: **Advance paper to top of next page (Form Feed).**

| CODE: | ⟨FF⟩ |
|---|---|
| (decimal ASCII) | 12 |
| (hex ASCII) | 0C |

REMARKS: The actual length of a page ejected by a form feed is set either by the setting of DIP switch A-1 or through various codes which can be sent (see below).

REFERENCE: Chapter 8

PURPOSE: **Reverse the paper to the top of the current page.**

| CODE: | ⟨ESC⟩ | ⟨FF⟩ |
|---|---|---|
| (decimal ASCII) | 27 | 12 |
| (hex ASCII) | 1B | OC |

REMARKS: This command causes the printer to reverse the paper to the top of the current printing page (or form).

REFERENCE: Chapter 8

PURPOSE: **Set page length to *n* lines.**

| CODE: | ⟨ESC⟩ | "C" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 67 | *n* |
| (hex ASCII) | 1B | 43 | *n* |

REMARKS: This command sets the length of all subsequent pages to *n* lines. The value of *n* must be between 1 and 127.

REFERENCE: Chapter 8

PURPOSE: **Set page length to *n* inches.**

| CODE: | ⟨ESC⟩ | "C" | 0 | *n* |
|---|---|---|---|---|
| (decimal ASCII) | 27 | 67 | 0 | *n* |
| (hex ASCII) | 1B | 43 | 00 | *n* |

REMARKS: This command sets the length of all subsequent pages to *n* inches. The value of *n* must be between 1 and 32. You can select a power-on default form length of 11 inches or 12 inches by setting DIP switch A-1.

REFERENCE: Chapter 8

PURPOSE: **Set the top margin.**

| CODE: | ⟨ESC⟩ | "R" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 82 | *n* |
| (hex ASCII) | 1B | 52 | *n* |

REMARKS: This command sets the margin at the top of the page to *n*-1 lines. Printing will start on line *n*. The default value for *n* upon power-on is 1. The value of *n* must be between 1 and 16.

REFERENCE: Chapter 8

PURPOSE: **Set the bottom margin.**

| CODE: | ⟨ESC⟩ | "N" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 78 | *n* |
| (hex ASCII) | 1B | 4E | *n* |

REMARKS: This command sets the margin at the bottom of the page to *n* lines. The printer will automatically execute a form feed when the number of lines left on a page is equal to *n*. The value of *n* must be between 1 and 127. This command is sometimes referred to as "skip-over-perforation."

REFERENCE: Chapter 8

PURPOSE: **Cancel top and bottom margins.**

| CODE: | ⟨ESC⟩ | "O" |
|---|---|---|
| (decimal ASCII) | 27 | 79 |
| (hex ASCII) | 1B | 4F |

REMARKS: This command cancels both the top margin set by ⟨ESC⟩ "R" *n* and the bottom margin set by ⟨ESC⟩ "N" *n*.

REFERENCE: Chapter 8

## *Vertical tabs*

PURPOSE: **Advance paper to the next vertical tab position.**

| CODE: | ⟨VT⟩ |
|---|---|
| (decimal ASCII) | 11 |
| (hex ASCII) | 0B |

REMARKS: This command causes the paper to be advanced to the next vertical tab position, or the top of the next page, whichever it finds first. The vertical tab positions are set upon power on at lines 6, 12, 18, 24, 30, 36, 42, 48, 54, and 60.

REFERENCE: Chapter 9

PURPOSE: **Set vertical tab positions.**

| CODE: | ⟨ESC⟩ | "P" | *n1 n2 n3...* | 0 |
|---|---|---|---|---|
| (decimal ASCII) | 27 | 80 | *n1 n2 n3...* | 0 |
| (hex ASCII) | 1B | 50 | *n1 n2 n3...* | 00 |

REMARKS: This command cancels all current vertical tab positions and sets those defined at lines *n1, n2, n3,* etc. The maximum number of vertical tab positions allowed is 20. The ASCII 0 character is used as a command terminator. Each vertical tab position must be between 1 and 255, and they must be specified in ascending order.

REFERENCE: Chapter 9

PURPOSE: **Advance the paper *n* lines.**

| CODE: | ⟨ESC⟩ | "a" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 97 | *n* |
| (hex ASCII) | 1B | 61 | *n* |

REMARKS: This command causes the printer to advance the paper *n* lines. It does not, however, change the current value of the vertical tab positions. The value of *n* must be between 1 and 255.

REFERENCE: Chapter 8, Chapter 9

# *Commands to Control Horizontal Position of Print Head*

PURPOSE: **Return print head to home position (Carriage Return).**

| CODE: | ⟨CR⟩ |
|---|---|
| (decimal ASCII) | 13 |
| (hex ASCII) | 0D |

REMARKS: This command returns the print head to the home position (the left margin). If DIP switch C-4 has been set on, then this command will also cause a line feed character to be generated after the carriage return, thereby advancing to the beginning of the next print line automatically.

REFERENCE: Chapter 8

PURPOSE: **Set the left print margin.**

| CODE: | ⟨ESC⟩ | "M" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 77 | *n* |
| (hex ASCII) | 1B | 4D | *n* |

REMARKS: This command sets the home position returned to during the execution of all subsequent carriage returns to be print position *n*. The power on default for *n* is 1. The value of *n* must be between 1 and 255. For Radix-10 the maximum print position for pica pitch is 80, for elite is 96, and for condensed pitch is 136. For Radix-15 the maximum print position for pica pitch is 136, for elite is 163, and for condensed pitch is 233.

REFERENCE: Chapter 9

PURPOSE: **Set the right print margin.**

| CODE: | ⟨ESC⟩ | "Q" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 81 | *n* |
| (hex ASCII) | 1B | 51 | *n* |

REMARKS: This command sets the right hand print margin to print position *n*. After execution of this command, any attempt to print beyond print position *n* will cause the printer to automatically generate a carriage return and a line feed before printing the remainder of the line. The value for *n* must be between 1 and 255.

REFERENCE: Chapter 9

PURPOSE: **Move the print head to the next horizontal tab position.**

| CODE: | ⟨HT⟩ |
|---|---|
| (decimal ASCII) | 9 |
| (hex ASCII) | 09 |

REMARKS: This command causes the print head to advance to the next horizontal tab position. The horizontal tab positions are set at power-on to print positions 10, 20, 30, etc. (to the maximum print position).

REFERENCE: Chapter 9

PURPOSE: **Set horizontal tab positions.**

| CODE: | ⟨ESC⟩ | "D" | *n1 n2 n3...* | 0 |
|---|---|---|---|---|
| (decimal ASCII) | 27 | 68 | *n1 n2 n3...* | 0 |
| (hex ASCII) | 1B | 44 | *n1 n2 n3...* | 00 |

REMARKS: This command cancels all current horizontal tab positions and sets those defined at print positions *n1*, *n2*, *n3*, etc. The maximum number of horizontal tab positions allowed is 255. The ASCII 0 character is used as a command terminator. Each horizontal tab position must be between 1 and 255, and they must be specified in ascending order.

REFERENCE: Chapter 9

PURPOSE: **Skip *n* print positions.**

| CODE: | ⟨ESC⟩ | "b" | *n* |
|---|---|---|---|
| (decimal ASCII) | 27 | 98 | *n* |
| (hex ASCII) | 1B | 62 | *n* |

REMARKS: This command causes the print head to advance *n* print positions to the right. It does not, however, change the current value of the horizontal tab positions. The value of *n* must be between 1 and 255.

REFERENCE: Chapter 9

PURPOSE: **Move the print head back one print position (backspace).**

| CODE: | ⟨BS⟩ |
|---|---|
| (decimal ASCII) | 8 |
| (hex ASCII) | 08 |

REMARKS: This command shifts the print head one column to the left. If the print head is at the home position, the command is ignored. This command can be used to overstrike characters.

REFERENCE: Chapter 10

# *Download Character Commands*

PURPOSE: **Define download characters into RAM.**

CODE:

| | | | |
|---|---|---|---|
| ⟨ESC⟩ | "*" | 1 | *n1 n2 m1 m2 m3 m4 m5 m6 m7 m8 m9 m10 m11* |
| 27 | 42 | 1 | *n1 n2 m1 m2 m3 m4 m5 m6 m7 m8 m9 m10 m11* |
| 1B | 2A | 01 | *n1 n2 m1 m2 m3 m4 m5 m6 m7 m8 m9 m10 m11* |

REMARKS: This command is used to set up a user-defined character and store it into RAM for later use. RAM is cleared during power down. The value of *n1* is the position in RAM that this character is to occupy. It must be between 33 and 126 or between 160 and 254. That is, it must fall within the range of printable characters. The value of *n2* determines the attributes and width of the character. *m1* thru *m11* determine which dots form the character.

REFERENCE: Chapter 11

PURPOSE: **Copy standard character ROM fonts into RAM.**

| | | | |
|---|---|---|---|
| CODE: | ⟨ESC⟩ | "*" | 0 |
| (decimal ASCII) | 27 | 42 | 0 |
| (hex ASCII) | 1B | 2A | 00 |

REMARKS: This command takes all of the characters in the standard ASCII character set (those with ASCII values between 33 and 126; characters with ASCII values above 160 are *not* copied to RAM) and copies them into RAM. This is helpful prior to defining characters in RAM because it allows standard ROM characters to be printed on the same line as download characters.

REFERENCE: Chapter 11

PURPOSE: **Select download character set with proportional spacing.**

| CODE: | ⟨ESC⟩ | "X" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 88 | 1 |
| (hex ASCII) | 1B | 58 | 01 |

REMARKS: This command selects the download character set using the proportional spacing defined in the character attribute data.
***Note:*** Download characters *cannot* be mixed with other characters on the same line.

REFERENCE: Chapter 11

PURPOSE: **Cancel download character set with proportional spacing.**

| CODE: | ⟨ESC⟩ | "X" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 88 | 0 |
| (hex ASCII) | 1B | 58 | 00 |

REMARKS: This command cancels the download character set and selects the standard ASCII character set.

REFERENCE: Chapter 11

PURPOSE: **Select download character set with normal spacing.**

| CODE: | ⟨ESC⟩ | "$" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 36 | 1 |
| (hex ASCII) | 1B | 24 | 01 |

REMARKS: This command causes the printer to select the download character set using normal spacing and ignoring the proportional width data.
***Note:*** Download characters *cannot* be mixed with other characters on the same line.

REFERENCE: Chapter 11

PURPOSE: **Cancel download character set with normal spacing.**

| CODE: | ⟨ESC⟩ | "$" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 36 | 0 |
| (hex ASCII) | 1B | 24 | 00 |

REMARKS: This command cancels the download character set and selects the standard ASCII character set.

REFERENCE: Chapter 11

# *Commands to Control Graphics*

PURPOSE: **Print normal-density graphics.**

| CODE: | ⟨ESC⟩ | "K" | *n1 n2 m1 m2 m3...* |
|---|---|---|---|
| (decimal ASCII) | 27 | 75 | *n1 n2 m1 m2 m3...* |
| (hex ASCII) | 1B | 4B | *n1 n2 m1 m2 m3...* |

REMARKS: This command selects 60 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* represent the number of graphics characters to be printed, where the total number of characters = *n2* times 256 + *n1*. The correct number of graphic data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 12

PURPOSE: **Print double-density graphics.**

| CODE: | ⟨ESC⟩ | "L" | *n1 n2 m1 m2 m3...* |
|---|---|---|---|
| (decimal ASCII) | 27 | 76 | *n1 n2 m1 m2 m3...* |
| (hex ASCII) | 1B | 4C | *n1 n2 m1 m2 m3...* |

REMARKS: This command selects 120 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* are the same as in normal density graphics. The correct number of graphic data bytes (*m1, m2,* etc.) must follow *n2*. The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 12

PURPOSE: **Print double-density graphics with double-speed.**

| CODE: | ⟨ESC⟩ | "y" | *n1 n2 m1 m2 m3...* |
|---|---|---|---|
| (decimal ASCII) | 27 | 121 | *n1 n2 m1 m2 m3...* |
| (hex ASCII) | 1B | 79 | *n1 n2 m1 m2 m3...* |

REMARKS: This command selects 120 dots-per-inch, column-scan, bit-image graphics mode with double-speed. The values of *n1* and *n2* are the same as in normal density graphics. The correct number of graphic data bytes (*m1, m2,* etc.) must follow n2. The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 12

PURPOSE: **Print quadruple-density graphics.**

| CODE: | ⟨ESC⟩ | "z" | *n1 n2 m1 m2 m3...* |
|---|---|---|---|
| (decimal ASCII) | 27 | 122 | *n1 n2 m1 m2 m3...* |
| (hex ASCII) | 1B | 7A | *n1 n2 m1 m2 m3...* |

REMARKS: This command selects 240 dots-per-inch, column-scan, bit-image graphics mode. The values of *n1* and *n2* are the same as in normal density graphics. The correct number of graphic data bytes (*m1*, *m2*, etc.) must follow *n2*. The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 12

## *Macro Instruction Commands*

PURPOSE: **Define macro instruction.**

| CODE: | ⟨ESC⟩ | "+" | ... | ⟨RS⟩ |
|---|---|---|---|---|
| (decimal ASCII) | 27 | 43 | ... | 30 |
| (hex ASCII) | 1B | 2B | ... | 1E |

REMARKS: This command cancels any existing macro instruction, and replaces it with the instruction defined. The maximum number of characters allowed in the macro instruction is 16. The ⟨RS⟩ character marks the end of the macro definition.

REFERENCE: Chapter 10

PURPOSE: **Execute macro instruction.**

| CODE: | ⟨ESC⟩ | "!" |
|---|---|---|
| (decimal ASCII) | 27 | 33 |
| (hex ASCII) | 1B | 21 |

REMARKS: This command executes a macro instruction that was previously defined.

REFERENCE: Chapter 10

# Other Commands

PURPOSE: **Set the value of the eighth data bit to logical 1.**

| CODE: | ⟨ESC⟩ | ">" |
|---|---|---|
| (decimal ASCII) | 27 | 62 |
| (hex ASCII) | 1B | 3E |

REMARKS: This command forces the eighth data bit of each subsequent character sent to the printer to logical 1. This code allows users with a 7-bit interface to access those characters whose ASCII code is greater than 127. This code should not be used to transmit printer control codes.

REFERENCE: Chapter 10

PURPOSE: **Set the value of the eighth data bit to logical 0.**

| CODE: | ⟨ESC⟩ | "=" |
|---|---|---|
| (decimal ASCII) | 27 | 61 |
| (hex ASCII) | 1B | 3D |

REMARKS: This command forces the eighth data bit of each subsequent character sent to the printer to logical 0. This code should not be used to transmit printer control codes.

REFERENCE: Chapter 10

PURPOSE: **Accept the value of the eighth data bit as is.**

| CODE: | ⟨ESC⟩ | "#" |
|---|---|---|
| (decimal ASCII) | 27 | 35 |
| (hex ASCII) | 1B | 23 |

REMARKS: This command cancels either setting of the eighth data bit. The printer will use the value of the eighth data bit that is sent from the computer. This code allows users with a 7-bit interface to resume normal functions after accessing those characters whose ASCII code is greater than 127.

REFERENCE: Chapter 10

PURPOSE: **Delete the last character sent.**

| CODE: | ⟨DEL⟩ |
|---|---|
| (decimal ASCII) | 127 |
| (hex ASCII) | 7F |

REMARKS: This command deletes the last character received. This command is ignored if the last character received has already been printed, or if the last character received was all or part of a function code.

REFERENCE: Chapter 10

PURPOSE: **Set printer off line.**

| CODE: | ⟨DC3⟩ |
|---|---|
| (decimal ASCII) | 19 |
| (hex ASCII) | 13 |

REMARKS: This command causes the printer to set itself off line, disregarding all subsequent characters and function codes, with the exception of ⟨DC1⟩, which will return the printer to an on line state. This is not the same as pushing the ON-LINE button. When the ON-LINE light is out the printer will not respond to ⟨DC1⟩.

REFERENCE: Chapter 10

PURPOSE: **Set printer on line.**

| CODE: | ⟨DC1⟩ |
|---|---|
| (decimal ASCII) | 17 |
| (hex ASCII) | 11 |

REMARKS: This code resets the printer to an on line state, thus allowing it receive and process all subsequent characters and function codes. This is not the same as pushing the ON-LINE button. When the ON-LINE light is out the printer will not respond to ⟨DC1⟩.

REFERENCE: Chapter 10

PURPOSE: **Sound printer bell.**

| CODE: | ⟨BEL⟩ |
|---|---|
| (decimal ASCII) | 7 |
| (hex ASCII) | 07 |

REMARKS: This command causes the printer tone to sound for approximately one-fourth second.

REFERENCE: Chapter 10

PURPOSE: **Disable the printer bell.**

| CODE: | ⟨ESC⟩ | "Y" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 89 | 0 |
| (hex ASCII) | 1B | 59 | 00 |

REMARKS: This command causes the printer to ignore the ⟨BEL⟩ character.

REFERENCE: Chapter 10

PURPOSE: **Enable the printer bell.**

| CODE: | ⟨ESC⟩ | "Y" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 89 | 1 |
| (hex ASCII) | 1B | 59 | 01 |

REMARKS: This command causes the printer to respond to the ⟨BEL⟩ character normally by sounding the printer bell.

REFERENCE: Chapter 10

PURPOSE: **Disable paper-out detector.**

| CODE: | ⟨ESC⟩ | "8" |
|---|---|---|
| (decimal ASCII) | 27 | 56 |
| (hex ASCII) | 1B | 38 |

REMARKS: This command causes the printer to disregard the signal sent by the paper-out detector. The paper-out signal normally sounds the printer bell and stops printing until paper is inserted and the printer is reset. DIP switch C-1 can also be set to disable the paper-out detector.

REFERENCE: Chapter 10

PURPOSE: **Enable paper-out detector.**

| CODE: | ⟨ESC⟩ | "9" |
|---|---|---|
| (decimal ASCII) | 27 | 57 |
| (hex ASCII) | 1B | 39 |

REMARKS: This command restores the function of the paper-out detector.

REFERENCE: Chapter 10

PURPOSE: **Select uni-directional printing.**

| CODE: | ⟨ESC⟩ | "U" | 1 |
|---|---|---|---|
| (decimal ASCII) | 27 | 85 | 1 |
| (hex ASCII) | 1B | 55 | 01 |

REMARKS: This command causes all subsequent lines to be printed in uni-directional printing. Uni-directional printing is useful in printing tables or charts, since it ensures that vertical columns of characters will be in alignment.

REFERENCE: Chapter 10

PURPOSE: **Cancel uni-directional printing.**

| CODE: | ⟨ESC⟩ | "U" | 0 |
|---|---|---|---|
| (decimal ASCII) | 27 | 85 | 0 |
| (hex ASCII) | 1B | 55 | 00 |

REMARKS: This command cancels uni-directional printing, and returns to the standard bi-directional printing, which is considerably faster.

REFERENCE: Chapter 10

PURPOSE: **Initialize printer.**

| CODE: | ⟨ESC⟩ | "@" |
|---|---|---|
| (decimal ASCII) | 27 | 64 |
| (hex ASCII) | 1B | 40 |

REMARKS: This command reinitializes the printer. The print buffer is cleared, and the form length, character pitch, character set, line feed pitch, and international character set are all reset to the values defined by their respective DIP switches.
The main difference between the ⟨ESC⟩ "@" command and turning the printer off and back on is that download character RAM and the macro instruction are preserved with this command.

REFERENCE: Chapter 10

*Appendix L*

# *Command Summary in Numeric Order*

| **Control code** | **Function** |
|---|---|
| CHR$(0) | Ends tab settings |
| CHR$(7) | Sounds bell |
| CHR$(8) | Backspace |
| CHR$(9) | Horizontal tab |
| CHR$(10) | Line feed |
| CHR$(11) | Vertical tab |
| CHR$(12) | Form feed |
| CHR$(13) | Carriage return |
| CHR$(14) | One line expanded print |
| CHR$(15) | Condensed print |
| CHR$(17) | On line |
| CHR$(18) | Pica type |
| CHR$(19) | Off line |
| CHR$(20) | Cancels one line expanded print |
| CHR$(27) | Escape **(indicated as ⟨ESC⟩ below)** |
| CHR$(30) | Ends macro instruction definition |
| CHR$(127) | Delete last character |
| ⟨ESC⟩ CHR$(10) | Reverse line feed |
| ⟨ESC⟩ CHR$(12) | Reverse feed to top of page |
| ⟨ESC⟩ CHR$(14) | One line expanded print |
| ⟨ESC⟩ CHR$(15) | Condensed print |
| ⟨ESC⟩ "!" | Use macro |
| ⟨ESC⟩ "#" | Accept eighth bit as is |
| ⟨ESC⟩ "$" CHR$(0) | Cancel normal download characters |
| ⟨ESC⟩ "$" CHR$(1) | Use normal download characters |
| ⟨ESC⟩ "*" CHR$(0) | Copy ROM characters to download RAM |
| ⟨ESC⟩ "*" CHR$(1) *n1 n2 m1 m2 . . . m11* | Define download character |
| ⟨ESC⟩ "+" . . . CHR$(30) | Define macro |

| | |
|---|---|
| ⟨ESC⟩ "-" CHR$(0) | Stop underlining |
| ⟨ESC⟩ "-" CHR$(1) | Start underlining |
| ⟨ESC⟩ "0" | 1/8 inch line feed |
| ⟨ESC⟩ "1" | 7/72 inch line feed |
| ⟨ESC⟩ "2" | 1/6 inch line feed |
| ⟨ESC⟩ "3" *n* | *n*/144 inch line feed |
| ⟨ESC⟩ "4" | Italic print |
| ⟨ESC⟩ "5" | Cancel italic print |
| ⟨ESC⟩ "7" *n* | Select international character set |
| ⟨ESC⟩ "8" | Ignore paper-out signal |
| ⟨ESC⟩ "9" | Enable paper-out signal |
| ⟨ESC⟩ "=" | Set eighth bit to 0 |
| ⟨ESC⟩ ">" | Set eighth bit to 1 |
| ⟨ESC⟩ "@" | Reset the printer |
| ⟨ESC⟩ "A" *n* | *n*/72 inch line feed |
| ⟨ESC⟩ "B" CHR$(1) | Pica print |
| ⟨ESC⟩ "B" CHR$(2) | Elite print |
| ⟨ESC⟩ "B" CHR$(3) | Condensed print |
| ⟨ESC⟩ "B" CHR$(4) | Select NLQ (Near Letter Quality) characters |
| ⟨ESC⟩ "B" CHR$(5) | Cancel NLQ characters |
| ⟨ESC⟩ "C" *n* | Set page length to *n* lines |
| ⟨ESC⟩ "C" CHR$(0) *n* | Set page length to *n* inches |
| ⟨ESC⟩ "D" . . . CHR$(0) | Set horizontal tabs |
| ⟨ESC⟩ "E" | Emphasized print |
| ⟨ESC⟩ "F" | Cancel emphasized print |
| ⟨ESC⟩ "G" | Double-strike print |
| ⟨ESC⟩ "H" | Cancel double-strike print |
| ⟨ESC⟩ "J" *n* | Single line feed of *n*/144 inches |
| ⟨ESC⟩ "K" *n1 n2* | Single density graphics |
| ⟨ESC⟩ "L" *n1 n2* | Double density graphics |
| ⟨ESC⟩ "M" *n* | Set left margin at column *n* |
| ⟨ESC⟩ "N" *n* | Set bottom margin at *n* lines |
| ⟨ESC⟩ "O" | Cancel top and bottom margins |
| ⟨ESC⟩ "P" . . . CHR$(0) | Set vertical tabs |
| ⟨ESC⟩ "Q" *n* | Set right margin at column *n* |
| ⟨ESC⟩ "R" *n* | Set top margin at line *n* |
| ⟨ESC⟩ "S" CHR$(0) | Superscript on |
| ⟨ESC⟩ "S" CHR$(1) | Subscript on |
| ⟨ESC⟩ "T" | Cancel super and subscripts |
| ⟨ESC⟩ "U" CHR$(0) | Bidirectional print |
| ⟨ESC⟩ "U" CHR$(1) | Unidirectional print |
| ⟨ESC⟩ "W" CHR$(0) | Cancel enlarged print |
| ⟨ESC⟩ "W" CHR$(1) | Enlarged print |

| | |
|---|---|
| ⟨ESC⟩ "X" CHR$(0) | Cancel proportional download characters |
| ⟨ESC⟩ "X" CHR$(1) | Use proportional download characters |
| ⟨ESC⟩ "Y" CHR$(0) | Disable bell |
| ⟨ESC⟩ "Y" CHR$(1) | Enable bell |
| ⟨ESC⟩ "a" *n* | Advance *n* line feeds |
| ⟨ESC⟩ "b" *n* | Tab over *n* columns |
| ⟨ESC⟩ "j" *n* | Reverse line feed of *n*/144 inches |
| ⟨ESC⟩ "y" n1 n2 | Double speed, double density graphics |
| ⟨ESC⟩ "z" n1 n2 | Quadruple density graphics |

## *Appendix M*

# *ASCII Code Conversion Chart*

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Control character | Character |
|---|---|---|---|---|
| 0 | 00 | 0000 0000 | Ctrl-@ | NUL |
| 1 | 01 | 0000 0001 | Ctrl-A | |
| 2 | 02 | 0000 0010 | Ctrl-B | |
| 3 | 03 | 0000 0011 | Ctrl-C | |
| 4 | 04 | 0000 0100 | Ctrl-D | |
| 5 | 05 | 0000 0101 | Ctrl-E | |
| 6 | 06 | 0000 0110 | Ctrl-F | |
| 7 | 07 | 0000 0111 | Ctrl-G | BEL |
| 8 | 08 | 0000 1000 | Ctrl-H | BS |
| 9 | 09 | 0000 1001 | Ctrl-I | HT |
| 10 | 0A | 0000 1010 | Ctrl-J | LF |
| 11 | 0B | 0000 1011 | Ctrl-K | VT |
| 12 | 0C | 0000 1100 | Ctrl-L | FF |
| 13 | 0D | 0000 1101 | Ctrl-M | CR |
| 14 | 0E | 0000 1110 | Ctrl-N | SO |
| 15 | 0F | 0000 1111 | Ctrl-O | SI |
| 16 | 10 | 0001 0000 | Ctrl-P | |
| 17 | 11 | 0001 0001 | Ctrl-Q | DC1 |
| 18 | 12 | 0001 0010 | Ctrl-R | DC2 |
| 19 | 13 | 0001 0011 | Ctrl-S | DC3 |
| 20 | 14 | 0001 0100 | Ctrl-T | DC4 |
| 21 | 15 | 0001 0101 | Ctrl-U | |
| 22 | 16 | 0001 0110 | Ctrl-V | |
| 23 | 17 | 0001 0111 | Ctrl-W | |
| 24 | 18 | 0001 1000 | Ctrl-X | |
| 25 | 19 | 0001 1001 | Ctrl-Y | |
| 26 | 1A | 0001 1010 | Ctrl-Z | |
| 27 | 1B | 0001 1011 | | ESC |
| 28 | 1C | 0001 1100 | | |
| 29 | 1D | 0001 1101 | | |
| 30 | 1E | 0001 1110 | | RS |
| 31 | 1F | 0001 1111 | | |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 32 | 20 | 0010 0000 | SP |
| 33 | 21 | 0010 0001 | ! |
| 34 | 22 | 0010 0010 | " |
| 35 | 23 | 0010 0011 | # |
| 36 | 24 | 0010 0100 | $ |
| 37 | 25 | 0010 0101 | % |
| 38 | 26 | 0010 0110 | & |
| 39 | 27 | 0010 0111 | ' |
| 40 | 28 | 0010 1000 | ( |
| 41 | 29 | 0010 1001 | ) |
| 42 | 2A | 0010 1010 | * |
| 43 | 2B | 0010 1011 | + |
| 44 | 2C | 0010 1100 | , |
| 45 | 2D | 0010 1101 | - |
| 46 | 2E | 0010 1110 | . |
| 47 | 2F | 0010 1111 | / |
| 48 | 30 | 0011 0000 | 0 |
| 49 | 31 | 0011 0001 | 1 |
| 50 | 32 | 0011 0010 | 2 |
| 51 | 33 | 0011 0011 | 3 |
| 52 | 34 | 0011 0100 | 4 |
| 53 | 35 | 0011 0101 | 5 |
| 54 | 36 | 0011 0110 | 6 |
| 55 | 37 | 0011 0111 | 7 |
| 56 | 38 | 0011 1000 | 8 |
| 57 | 39 | 0011 1001 | 9 |
| 58 | 3A | 0011 1010 | : |
| 59 | 3B | 0011 1011 | ; |
| 60 | 3C | 0011 1100 | < |
| 61 | 3D | 0011 1101 | = |
| 62 | 3E | 0011 1110 | > |
| 63 | 3F | 0011 1111 | ? |
| 64 | 40 | 0100 0000 | @ |
| 65 | 41 | 0100 0001 | A |
| 66 | 42 | 0100 0010 | B |
| 67 | 43 | 0100 0011 | C |
| 68 | 44 | 0100 0100 | D |
| 69 | 45 | 0100 0101 | E |
| 70 | 46 | 0100 0110 | F |
| 71 | 47 | 0100 0111 | G |
| 72 | 48 | 0100 1000 | H |
| 73 | 49 | 0100 1001 | I |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 74 | 4A | 0100 1010 | J |
| 75 | 4B | 0100 1011 | K |
| 76 | 4C | 0100 1100 | L |
| 77 | 4D | 0100 1101 | M |
| 78 | 4E | 0100 1110 | N |
| 79 | 4F | 0100 1111 | O |
| 80 | 50 | 0101 0000 | P |
| 81 | 51 | 0101 0001 | Q |
| 82 | 52 | 0101 0010 | R |
| 83 | 53 | 0101 0011 | S |
| 84 | 54 | 0101 0100 | T |
| 85 | 55 | 0101 0101 | U |
| 86 | 56 | 0101 0110 | V |
| 87 | 57 | 0101 0111 | W |
| 88 | 58 | 0101 1000 | X |
| 89 | 59 | 0101 1001 | Y |
| 90 | 5A | 0101 1010 | Z |
| 91 | 5B | 0101 1011 | [ |
| 92 | 5C | 0101 1100 | \ |
| 93 | 5D | 0101 1101 | ] |
| 94 | 5E | 0101 1110 | ^ |
| 95 | 5F | 0101 1111 | _ |
| 96 | 60 | 0110 0000 | ` |
| 97 | 61 | 0110 0001 | a |
| 98 | 62 | 0110 0010 | b |
| 99 | 63 | 0110 0011 | c |
| 100 | 64 | 0110 0100 | d |
| 101 | 65 | 0110 0101 | e |
| 102 | 66 | 0110 0110 | f |
| 103 | 67 | 0110 0111 | g |
| 104 | 68 | 0110 1000 | h |
| 105 | 69 | 0110 1001 | i |
| 106 | 6A | 0110 1010 | j |
| 107 | 6B | 0110 1011 | k |
| 108 | 6C | 0110 1100 | l |
| 109 | 6D | 0110 1101 | m |
| 110 | 6E | 0110 1110 | n |
| 111 | 6F | 0110 1111 | o |
| 112 | 70 | 0111 0000 | p |
| 113 | 71 | 0111 0001 | q |
| 114 | 72 | 0111 0010 | r |
| 115 | 73 | 0111 0011 | s |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 116 | 74 | 0111 0100 | t |
| 117 | 75 | 0111 0101 | u |
| 118 | 76 | 0111 0110 | v |
| 119 | 77 | 0111 0111 | w |
| 120 | 78 | 0111 1000 | x |
| 121 | 79 | 0111 1001 | y |
| 122 | 7A | 0111 1010 | z |
| 123 | 7B | 0111 1011 | { |
| 124 | 7C | 0111 1100 | \| |
| 125 | 7D | 0111 1101 | } |
| 126 | 7E | 0111 1110 | ~ |
| 127 | 7F | 0111 1111 | DEL |
| 128 | 80 | 1000 0000 | |
| 129 | 81 | 1000 0001 | |
| 130 | 82 | 1000 0010 | |
| 131 | 83 | 1000 0011 | |
| 132 | 84 | 1000 0100 | |
| 133 | 85 | 1000 0101 | |
| 134 | 86 | 1000 0110 | |
| 135 | 87 | 1000 0111 | BEL |
| 136 | 88 | 1000 1000 | BS |
| 137 | 89 | 1000 1001 | HT |
| 138 | 8A | 1000 1010 | LF |
| 139 | 8B | 1000 1011 | VT |
| 140 | 8C | 1000 1100 | FF |
| 141 | 8D | 1000 1101 | CR |
| 142 | 8E | 1000 1110 | SO |
| 143 | 8F | 1000 1111 | SI |
| 144 | 90 | 1001 0000 | |
| 145 | 91 | 1001 0001 | DC1 |
| 146 | 92 | 1001 0010 | DC2 |
| 147 | 93 | 1001 0011 | DC3 |
| 148 | 94 | 1001 0100 | DC4 |
| 149 | 95 | 1001 0101 | |
| 150 | 96 | 1001 0110 | |
| 151 | 97 | 1001 0111 | |
| 152 | 98 | 1001 1000 | |
| 153 | 99 | 1001 1001 | |
| 154 | 9A | 1001 1010 | |
| 155 | 9B | 1001 1011 | ESC |
| 156 | 9C | 1001 1100 | |
| 157 | 9D | 1001 1101 | |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 158 | 9E | 1001 1110 | RS |
| 159 | 9F | 1001 1111 | |
| 160 | A0 | 1010 0000 | |
| 161 | A1 | 1010 0001 | |
| 162 | A2 | 1010 0010 | |
| 163 | A3 | 1010 0011 | |
| 164 | A4 | 1010 0100 | |
| 165 | A5 | 1010 0101 | |
| 166 | A6 | 1010 0110 | |
| 167 | A7 | 1010 0111 | |
| 168 | A8 | 1010 1000 | |
| 169 | A9 | 1010 1001 | |
| 170 | AA | 1010 1010 | |
| 171 | AB | 1010 1011 | |
| 172 | AC | 1010 1100 | |
| 173 | AD | 1010 1101 | |
| 174 | AE | 1010 1110 | |
| 175 | AF | 1010 1111 | |
| 176 | B0 | 1011 0000 | |
| 177 | B1 | 1011 0001 | |
| 178 | B2 | 1011 0010 | |
| 179 | B3 | 1011 0011 | |
| 180 | B4 | 1011 0100 | |
| 181 | B5 | 1011 0101 | |
| 182 | B6 | 1011 0110 | |
| 183 | B7 | 1011 0111 | |
| 184 | B8 | 1011 1000 | |
| 185 | B9 | 1011 1001 | |
| 186 | BA | 1011 1010 | |
| 187 | BB | 1011 1011 | |
| 188 | BC | 1011 1100 | |
| 189 | BD | 1011 1101 | |
| 190 | BE | 1011 1110 | |
| 191 | BF | 1011 1111 | |
| 192 | C0 | 1100 0000 | |
| 193 | C1 | 1100 0001 | |
| 194 | C2 | 1100 0010 | |
| 195 | C3 | 1100 0011 | |
| 196 | C4 | 1100 0100 | |
| 197 | C5 | 1100 0101 | |
| 198 | C6 | 1100 0110 | |
| 199 | C7 | 1100 0111 | |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 200 | C8 | 1100 1000 | ┼ |
| 201 | C9 | 1100 1001 | ╔ |
| 202 | CA | 1100 1010 | ╩ |
| 203 | CB | 1100 1011 | ╦ |
| 204 | CC | 1100 1100 | ╠ |
| 205 | CD | 1100 1101 | ═ |
| 206 | CE | 1100 1110 | ╬ |
| 207 | CF | 1100 1111 | ¤ |
| 208 | D0 | 1101 0000 | ð |
| 209 | D1 | 1101 0001 | Ð |
| 210 | D2 | 1101 0010 | Ê |
| 211 | D3 | 1101 0011 | Ë |
| 212 | D4 | 1101 0100 | È |
| 213 | D5 | 1101 0101 | ı |
| 214 | D6 | 1101 0110 | Í |
| 215 | D7 | 1101 0111 | Î |
| 216 | D8 | 1101 1000 | Ï |
| 217 | D9 | 1101 1001 | ┘ |
| 218 | DA | 1101 1010 | ┌ |
| 219 | DB | 1101 1011 | ▌ |
| 220 | DC | 1101 1100 | ▄ |
| 221 | DD | 1101 1101 | ¦ |
| 222 | DE | 1101 1110 | Ì |
| 223 | DF | 1101 1111 | ▀ |
| 224 | E0 | 1110 0000 | Ó |
| 225 | E1 | 1110 0001 | ß |
| 226 | E2 | 1110 0010 | Ô |
| 227 | E3 | 1110 0011 | Ò |
| 228 | E4 | 1110 0100 | õ |
| 229 | E5 | 1110 0101 | Õ |
| 230 | E6 | 1110 0110 | µ |
| 231 | E7 | 1110 0111 | þ |
| 232 | E8 | 1110 1000 | Þ |
| 233 | E9 | 1110 1001 | Ú |
| 234 | EA | 1110 1010 | Û |
| 235 | EB | 1110 1011 | Ù |
| 236 | EC | 1110 1100 | ý |
| 237 | ED | 1110 1101 | Ý |
| 238 | EE | 1110 1110 | ¯ |
| 239 | EF | 1110 1111 | ´ |
| 240 | F0 | 1111 0000 | ≡ |
| 241 | F1 | 1111 0001 | ± |

**Standard ASCII Codes**

| Decimal | Hexadecimal | Binary | Character |
|---|---|---|---|
| 242 | F2 | 1111 0010 | ≥ |
| 243 | F3 | 1111 0011 | ≤ |
| 244 | F4 | 1111 0100 | ⌠ |
| 245 | F5 | 1111 0101 | ⌡ |
| 246 | F6 | 1111 0110 | ÷ |
| 247 | F7 | 1111 0111 | ≈ |
| 248 | F8 | 1111 1000 | ° |
| 249 | F9 | 1111 1001 | ∙ |
| 250 | FA | 1111 1010 | · |
| 251 | FB | 1111 1011 | √ |
| 252 | FC | 1111 1100 | ⁿ |
| 253 | FD | 1111 1101 | ² |
| 254 | FE | 1111 1110 | ■ |
| 255 | FF | 1111 1111 | |

*Appendix N*

# *Technical Specifications*

***Printing***

| | |
|---|---|
| Printing method | Serial impact dot matrix |
| Printing speed | 200 characters per second in 10 CPI |
| Print buffer | 16 K bytes |
| Paper feed | 12 lines/second (at 1/6 inch line spacing)<br>Sprocket or friction feed |
| Printing direction | Bidirectional, logic seeking<br>Unidirectional in bit image and NLQ modes |
| Character set | 96 standard ASCII characters<br>96 italic characters<br>96 near letter quality (NLQ) characters<br>88 international characters<br>64 special symbols<br>32 block graphics characters<br>189 user-defined characters |
| Character size | 2.4 mm x 2.0 mm standard<br>10 CPI characters |
| Character matrix | Standard characters: 9 dot x 9 dot<br>Block graphics: 6 dot x 6 dot<br>User defined: 7 dot x 4 to 11 dot<br>Near letter quality: 17 dot x 9 dot<br>Bit image modes: 7 or 8 dot x 60 dots/in.<br>7 or 8 dot x 120 dots/in.<br>7 or 8 dot x 240 dots/in. |
| Line spacing | 1/6, 1/8 inch or 7/72 inch standard<br>n/72 inch or n/144 inch programmable |

| Column width | | Radix-10 | Radix-15 |
|---|---|---|---|
| | Pica | 80 | 136 |
| | Elite | 96 | 163 |
| | Condensed | 136 | 233 |
| | Pica expanded | 40 | 68 |
| | Elite expanded | 48 | 81 |
| | Condensed expanded | 68 | 116 |

Special features

240 CPS white spacing
Automatic single sheet insertion
Near letter quality printing
Pause and feed buttons
Reverse paper feed
Short form tear-off
Easy access format switches
Self-test
Downloadable characters (proportional and standard)
Dual interface
Macro instruction
Continuous underlining
7 or 8 bit selectable interface
Ultra hi resolution bit image graphics
Vertical and horizontal tabs
Skip over perforation
15.5" carriage (Radix-15 only)

| ***Paper*** | | Radix-10 | Radix-15 |
|---|---|---|---|
| Paper type | Single sheets | 5.5-8.5 in. wide | 5.5-14.5 in. wide |
| | Continuous paper | 4-10 in. wide | 4-15.5 in. wide |
| Thickness | One-part forms | 0.07-0.10 mm | 0.07-0.10 mm |
| | Max. 3-part forms | 0.28 mm max. | 0.28 mm max. |

| ***Printer*** | | Radix-10 | Radix-15 |
|---|---|---|---|
| Dimensions | Height | 117 mm (4.6 in.) | 117 mm (4.6 in.) |
| | Width | 414 mm (16.3 in.) | 556 mm (21.9 in.) |
| | Depth | 345 mm (13.6 in.) | 345 mm (13.6 in.) |
| Weight | | 9.1 kg (20.1 lb.) | 11.1 kg (24.5 lb.) |

Power: 120 VAC ± 10% 60Hz, approx. 160W

Ribbon: Star Micronics ribbon cartridge
Radix-10: #80980070; Radix-15: #80980080
Sub-cassette: Radix-10: #80900220;
Radix-15: #80900230

### *Parallel interface*

| | |
|---|---|
| Interface | Centronics-compatible, 7 or 8 bit |
| Synchronization | By externally supplied strobe pulses |
| Handshaking | By ACK or BUSY signals |
| Logic level | TTL |
| Connector | 57-30360 Amphenol |

### *Serial interface*

| | |
|---|---|
| Interface | Asynchronous RS-232C/20 mA current loop |
| Bit rate | 300, 600, 1200, 2400, 4800, 9600, 19200 baud |
| Word length | 1 start bit<br>7 or 8 data bits<br>Odd, even or no parity<br>1 or 2 stop bits |
| Handshaking | Serial busy, 1 byte mode<br>Serial busy, 1 block mode<br>ACK mode<br>XON/XOFF mode |

# Index

## *DIP Switch Settings*

| Switch | ON | OFF | SETTING |
|---|---|---|---|
| **DIP Switch A** | | | |
| A-1 | 11" page length | 12" page length | |
| A-2 | Normal print | Emphasized print | |
| A-3 | 10 CPI (pica pitch) | 17 CPI (condensed pitch) | |
| A-4 | Normal | NLQ | |
| A-5 | 1/6" line feed | 1/8" line feed | |
| A-6 | International character set selection-see below | | |
| A-7 | | | |
| A-8 | | | |
| **DIP Switch B** | | | |
| B-1 | 2 stop bits | 1 stop bit | |
| B-2 | 7 data bits | 8 data bits | |
| B-3 | Parity checked | No parity | |
| B-4 | Handshaking protocols-see below | | |
| B-5 | | | |
| B-6 | Odd parity | Even parity | |
| B-7 | Data transfer rate-see below | | |
| B-8 | | | |
| B-9 | | | |
| B-10 | Not used | | |
| **DIP Switch C** | | | |
| C-1 | Paper-out detector on | Ignore paper-out | |
| C-2 | Serial interface | Parallel interface | |
| C-3 | 7-bit interface | 8-bit interface | |
| C-4 | Auto LF with CR | LF must be from host | |

## *International character sets*

| Switch | USA | England | Germany | Denmark | France | Sweden | Italy | Spain |
|---|---|---|---|---|---|---|---|---|
| A-6 | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| A-7 | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| A-8 | ON | ON | ON | ON | OFF | OFF | OFF | OFF |

## *Handshaking protocols*

| Protocol | Switch B-4 | Switch B-5 |
|---|---|---|
| Serial busy, 1 byte mode | OFF | OFF |
| Serial busy, 1 block mode | ON | OFF |
| ACK mode | OFF | ON |
| XON/XOFF mode | ON | ON |

## *Data transfer rates*

| Baud rate | Switch B-7 | Switch B-8 | Switch B-9 |
|---|---|---|---|
| 150 | OFF | OFF | OFF |
| 300 | OFF | OFF | ON |
| 600 | OFF | ON | OFF |
| 1200 | OFF | ON | ON |
| 2400 | ON | OFF | OFF |
| 4800 | ON | OFF | ON |
| 9600 | ON | ON | OFF |
| 19200 | ON | ON | ON |

Use the "setting" column to record the way the switches are set in your printer.