Appendix F

Atari 400/800 Computers

The best way to connect your Atari to Delta is with the Universal/Atari Parallel Interface by Star Micronics. It comes complete with its own cable. Or Delta will connect to the Atari 850 interface, using a cable that is available from your dealer.

Setting the switches

We recommend that you set the DIP switches in Delta as shown below when connecting it to an Atari 400 or 800.

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

Using Atari BASIC

While the Atari computers don’t have any real problems in using the full capabilities of Delta, there are a couple of fairly unique things to keep in mind. Atari BASIC requires that all strings be dimensioned. The maximum string length is 99 characters, so Atari users must break up their dot graphics strings into 99 character sections.
Atari 850 Interface Module Parallel Cable

<table>
<thead>
<tr>
<th>Delta</th>
<th>Atari 850</th>
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<tbody>
<tr>
<td>Pin No.</td>
<td>Function</td>
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<tr>
<td>1</td>
<td>STROBE</td>
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<tr>
<td>2</td>
<td>DATA1</td>
</tr>
<tr>
<td>3</td>
<td>DATA2</td>
</tr>
<tr>
<td>4</td>
<td>DATA3</td>
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<td>5</td>
<td>DATA4</td>
</tr>
<tr>
<td>6</td>
<td>DATA5</td>
</tr>
<tr>
<td>7</td>
<td>DATA6</td>
</tr>
<tr>
<td>8</td>
<td>DATA7</td>
</tr>
<tr>
<td>11</td>
<td>BUSY</td>
</tr>
<tr>
<td>16</td>
<td>SIG GND</td>
</tr>
<tr>
<td>9</td>
<td>DATA8</td>
</tr>
</tbody>
</table>

To join two strings together, as when building a string of dot graphics data, the following format must be used:

A$(LEN(A$)+1)=B$

(This adds B$ to the end of A$.)

The Atari adds spaces to print lines when you use the LPRINT command. We recommend that you use the PRINT # command instead. You must open the printer as a device first. For example:

1$ OPEN #4,8,0,"P"
2$ PRINT #4;"TESTING"

It's a good idea to close the printer when your program is done using it, like this:

9$ CLOSE #4

Atari BASIC also requires that you use semicolons between elements in a print statement where most BASICS will accept a
space. Your print commands must look like this:

40 PRINT CHR$(27); "B"; CHR$(3); "CONDESED"

Listing programs

Listing BASIC programs to Delta from an Atari computer is relatively easy; just add "P:" to the normal LIST command so that it looks like this:

LIST "P:"

Program listings

The following programs were translated to work with the Atari 400 and 800 computers.

Chart program

10 REM ATARI 400 & 800 & 1200XL
20 DIM BL$(6),FD$(4)
30 TRUE=1;FALSE=0
100 OPEN #4,8,0,"P"
120 GOSUB 1@00
130 PRINT #4;"*REGULAR*"
140 GOSUB 2000
150 PRINT #4;"*DOUBLE STRIKE*"
160 PRINT #4;CHR$(27);"G";
170 GOSUB 2000
180 PRINT #4;"*EMPHASIZED*";
190 EM=TRUE
200 GOSUB 2@00
210 PRINT #4;"*DOUBLE STRIKE & EMPHASIZED*"
220 PRINT #4;CHR$(27);"G";CHR$(27);"E";
230 GOSUB 2000
240 CLOSE #4
250 END
1000 PRINT #4;CHR$(27);"@"
1010 PRINT #4;CHR$(14);" NORMAL ENLARGED "
1020 PRINT #4;CHR$(27);"-";CHR$(1);
1030 PRINT #4;CHR$(27);"B";CHR$(3);"CONDENSED ";
1040 PRINT #4;CHR$(27);"B";CHR$(2);" ELITE ";
1050 PRINT #4;CHR$(27);"B";CHR$(1);" PICA ";
1060 PRINT #4;CHR$(27);"B";CHR$(3);"CONDENSED ";
1070 PRINT #4;CHR$(27);"B";CHR$(2);" ELITE ";
1080 PRINT #4;CHR$(27);"B";CHR$(1);" PICA "
1090 PRINT #4;CHR$(27);"@":RETURN
2000 IT=FALSE:PRINT #4;CHR$(27);"5";
2010 UN=FALSE:PRINT #4;CHR$(27);"-";CHR$(0);
2020 EN=FALSE:PRINT #4;CHR$(27);"W";CHR$(0);
2030 PI=FALSE
2040 PRINT #4;CHR$(27);"B";CHR$(3);:GOSUB 2130
2050 PRINT #4;CHR$(27);"B";CHR$(2);:GOSUB 2130
2060 PRINT #4;CHR$(27);"B";CHR$(1);:PI=TRUE:GOSUB 2130
2070 IF EN=TRUE THEN PRINT #4:GOTO 2090
2080 PRINT #4;CHR$(27);"W";CHR$(1);:EN=TRUE:GOTO 2030
2090 IF UN=TRUE THEN PRINT #4:GOTO 2110
2100 PRINT #4;CHR$(27);"-";CHR$(1);:UN=TRUE:GOTO 2020
2110 IF IT=TRUE THEN PRINT #4;CHR$(27);"@":RETURN
2120 PRINT #4;CHR$(27);"4";:IT=TRUE:GOTO 2010
2130 BL$=" ":FD$="...."
2140 IF EM=FALSE THEN PRINT #4;"ABcd":GOTO 2190
2150 IF PI=FALSE THEN PRINT #4;FD$;GOTO 2170
2160 PRINT #4;"ABcd";
2170 IF EN=TRUE THEN PRINT #4;" ":RETURN
2180 IF EN=FALSE THEN PRINT #4;BL$;:RETURN
2190 IF EN=TRUE THEN PRINT #4;" ":RETURN
2200 PRINT #4;CHR$(27);"S";CHR$(0);"Xx";
2210 PRINT #4;CHR$(27);"S";CHR$(1);"Yy";"
2220 PRINT #4;CHR$(27);"T";
2230 PRINT #4;CHR$(27);"Xx";
2240 PRINT #4;CHR$(1);"Yy"; "
2250 PRINT #4;CHR$(27);"T";
2260 PRINT #4;CHR$(27);"Xx";
2270 PRINT #4;CHR$(1);"Yy";
2280 PRINT #4;CHR$(27);"T";
2290 RETURN

Special character chart program

10 REM PRINT SPECIAL CHAR SET
20 OPEN #4,8,0, "P"
30 FOR J=160 to 255 STEP 8
40 FOR I=J TO J+7
50 PRINT #4;I;"= ";CHR$(I);" ";
60 NEXT I:PRINT #4:NEXT J
70 CLOSE #4

Macro program

5 REM DEFINE MACRO INSTRUCTION
10 OPEN #4,8,0,"P"
20 PRINT #4,CHR$(27);"+"
30 PRINT #4,CHR$(18);"+";
40 PRINT #4,CHR$(27);"W";CHR$(@);  
50 PRINT #4,CHR$(27);"F";  
60 PRINT #4,CHR$(27);"H";  
70 PRINT #4,CHR$(27);"-";CHR$(@);  
80 PRINT #4,CHR$(27);"T";  
90 PRINT #4,CHR$(27);"S";  
95 PRINT #4,CHR$(30)  

Bridge hand program  
10 OPEN #4,8,0,"P"  
20 GOSUB 1000  
30 GOSUB 2000  
40 GOSUB 3000  
50 GOSUB 4000  
60 CLOSE #4  
70 END  
1000 REM INITIALIZE VARIABLES  
1010 DIM HA(4),DE(52),CA$(50),SU$(20)  
1020 SU$="SHDC"  
1030 CA$=" 2 3 4 5 6 7 8 9 10 J Q K A"  
1035 FOR I=0 TO 4:HA(I)=@:NEXT I  
1040 RETURN  
2000 REM INITIALIZE PRINTER  
2010 PRINT #4;CHR$(27);CHR$(68);CHR$(20);CHR$(40);CHR$(0);  
2020 PRINT #4;CHR$(27);CHR$(43);CHR$(27);CHR$(36);CHR$(0);  
2030 PRINT #4;CHR$(27);CHR$(69);CHR$(30)  
2035 PRINT #4;CHR$(27);CHR$(42);CHR$(0)  
2040 FOR I=1 TO 4  
2050 PRINT #4;CHR$(27);CHR$(42);CHR$(1)  
2060 FOR J=1 TO 13  
2070 READ X:PRINT #4;CHR$(X);  
2080 NEXT J  
2090 NEXT I  
2100 PRINT #4  
2110 RETURN  
2120 DATA 72,11,4,10,20,10,52,72,52,10,20,10,4  
2130 DATA 83,11,16,8,20,8,86,41,86,8,20,8,16  
2140 DATA 67,11,8,16,8,18,65,62,65,18,8,16,8  
2150 DATA 68,11,8,0,28,0,62,65,62,0,28,0,8  
3000 REM DEAL CARD  
3010 FOR CA=1 TO 52
3020 X=INT(RND(0)*4+1)
3030 IF HA(X)=13 THEN 3020
3035 HA(X)=HA(X)+1
3040 DE(CA)=X
3050 NEXT CA
3060 RETURN
4000 REM PRINT FOUR HANDS
4010 PRINT #4;CHR$(27);"!";CHR$(9);"NORTH"
4020 PRINT #4;CHR$(27);"$";CHR$(1);CHR$(27);
   CHR$(70);
4030 HA=1
4040 FOR SU=0 TO 3
4050 PRINT #4;CHR$(9);
4060 GOSUB 4300
4070 PRINT #4
4080 NEXT SU
4090 PRINT #4;CHR$(27);"!";"WEST";CHR$(9);CHR$(9);
   "EAST"
4100 PRINT #4;CHR$(27);"$";CHR$(1);CHR$(27);
   CHR$(70);
4110 FOR SU=0 TO 3
4120 HA=2
4130 GOSUB 4300
4140 PRINT #4;CHR$(9);CHR$(9);
4150 HA=3
4160 GOSUB 4300
4170 PRINT #4
4180 NEXT SU
4190 PRINT #4;CHR$(27);"!";CHR$(9);"SOUTH"
4200 PRINT #4;CHR$(27);"$";CHR$(1);CHR$(27);
   CHR$(70);
4210 HA=4
4220 FOR SU=0 TO 3
4230 PRINT #4;CHR$(9);
4240 GOSUB 4300
4250 PRINT #4
4260 NEXT SU
4270 PRINT #4;CHR$(27);"$";CHR$(0);CHR$(27);CHR$(70)
4280 RETURN
4290 REM PRINT ONE LINE
4300 PRINT #4;SU$(SU+1,SU+1);
4310 FOR CA=13 TO 1 STEP -1
4320 IF DE(SU*13+CA)=HA THEN PRINT #4;
   CA$(CA*3,CA*3+2);
4330 NEXT CA
4340 RETURN

**Numeral program**

10 REM PROGRAM TO DEFINE AND PRINT NUMERALS
20 OPEN #4,8,0,"P"
30 FOR N1=160 TO 200
40 PRINT #4;CHR$(27);CHR$(42);CHR$(N1);
50 PRINT #4;CHR$(N1);
60 READ N2
70 PRINT #4;CHR$(N2);
80 FOR S=1 TO 11
90 READ MS
100 PRINT#4;CHR$(MS);
110 NEXT S
120 NEXT N1
130 PRINT #4;CHR$(27);CHR$(88);CHR$(1)
135 PRINT #4;CHR$(27);"1"
140 FOR I=160 TO 200 STEP 4
150 PRINT #4;CHR$(I);CHR$(I+1);CHR$(2@);"@"
160 NEXT I
165 PRINT #4
170 FOR I=162 TO 200 STEP 4
180 PRINT #4;CHR$(I);CHR$(I+1);CHR$(200);
190 NEXT I
200 PRINT #4;CHR$(27);"@"
210 CLOSE #4
220 END

340 REM ZERO
350 DATA 11,0,96,16,104,16,44,30,14,0,2,1
360 DATA 11,2,1,2,1,6,8,38,88,32,8,32
370 DATA 11,3,12,9,12,51,0,96,0,96,0,96
380 DATA 11,0,32,0,48,0,28,3,12,3,4,3
390 REM ONE
400 DATA 11,0,0,0,0,0,4,0,4,0,4,126
410 DATA 9,12,114,12,114,12,2,0,0,0,0
420 DATA 11,64,0,64,0,64,0,64,32,80,47,80
430 DATA 9,47,80,47,64,0,64,0,64,0,0,0
440 REM TWO
450 DATA 11,0,0,0,0,0,12,16,14,0,6,0
460 DATA 11,3,0,3,0,70,56,70,56,4,24,0
470 DATA 11,64,0,64,32,64,32,80,32,80,40,64
480 DATA 11,44,64,38,65,34,65,32,80,32,88,0
490 REM THREE
Download utility program

5 DIM CS$(1), SC$(1), Z(9,13), MM(11), MM$(11), SS$(1), BL$(40), SH$(35), PR$(35)
6 DIM PD$(35), AS$(35), AN$(1)
10 CS$="@"; SC$="*"; SS$="0"
15 BL$=" (40 characters) "
16 AS$="ASCII (33-126) (160-254) --> "
17 SH$="IF SHIFTED ENTER 1 ELSE 0 --> "
PR$="NORMAL OR PROPORTIONAL --
PD$="PROPORTIONAL DATA (4-11) --
GOSUB 2000
IF KEY=47 THEN GRAPHICS 0:END
IF KEY=10 THEN GOSUB 680:GOTO 30
IF KEY=42 THEN GOSUB 900:GOSUB 260:GOTO 30
GOTO 30
IF Z(G,H)=0 THEN POSITION Y+5,X+2:PRINT " ";GOSUB 3000
IF Z(G,H)=1 THEN POSITION Y+5,X+2:PRINT SC$;:GOSUB 3000
RETURN
IF Z(G,H)=1 THEN POSITION Y+5,X+2:PRINT SS$;:GOSUB 3000
RETURN
REM EDIT LEVEL
X=1:Y=1:G=1:H=1
FOR I=1 TO 11:MM(I)=0:NEXT I
FOR I=1 TO 12:FOR J=1 TO 8:Z(J,I)=0:NEXT J:NEXT I
GOSUB 2000
IF KEY=0 THEN GOSUB 390:GOTO 370
IF KEY=40 THEN GOSUB 410:GOTO 370
IF KEY=58 THEN GOSUB 430:GOTO 370
IF KEY=11 THEN GOSUB 450:GOTO 370
IF KEY=13 THEN GOSUB 470:GOTO 370
IF KEY=18 THEN GOSUB 490:GOTO 370
IF KEY=47 THEN GOSUB 500:GOTO 380
GOTO 270
RETURN
GOSUB 120:Y=Y-3:H=H-1:IF Y<1 THEN Y=1:H=1
GOSUB 150:RETURN
GOSUB 120:Y=Y+3:H=H+1:IF Y>31 THEN Y=31:H=11
GOSUB 150:RETURN
GOSUB 120:X=X+2:G=G+1:IF X>13 THEN X=13:G=7
GOSUB 150:RETURN
GOSUB 120:X=X-2:G=G-1:IF X<1 THEN X=1:G=1
GOSUB 150:RETURN
IF Z(G,H-1)=1 OR Z(G,H+1)=1 THEN RETURN
Z(G,H)=1:POSITION Y+5,X+2:PRINT SS$;:GOSUB 3000:RETURN
500 REM GET OUT OF EDIT MODE
510 IF Z(G,H)=1 THEN POSITION Y+5,X+2:PRINT SC$;:GOSUB 3000:
  RETURN
520 IF Z(G,H)=0 THEN POSITION Y+5,X+2:PRINT " ";:GOSUB 3000
525 FOR I=1 TO 11:FOR J=1 TO 7:
    MM(I)=MM(I)+Z(J,I)*(INT (2*(J-1))+1)
  NEXT J:NEXT I
530 FOR I=1 TO 11:POSITION 2+1*3,18:PRINT MM(I):-;
  NEXT I
540 FOR I=1 To 7:FOR J=1 To 11:Z(I,J)=0:NEXT J:NEXT I
550 GOSUB 660:RETURN
560 FOR I=1 To 7:FOR J=1 To 11:Z(I,J)=0:NEXT J:NEXT I
570 POSITION 1,23:PRINT "EDIT PRINTER QUIT";
575 RETURN
580 REM PRINT MODE
590 GOSUB 7000:PRINT PR$;:INPUT AN$
600 IF AN$="N" THEN PR=0:GOTO 750
610 IF AN$="P" THEN 730
620 GOSUB 7000:PRINT PD$;:INPUT PR
630 IF PR(4 OR PR)11 THEN 730
640 GOSUB 7000:PRINT SH$;:INPUT SH
650 IF SH(0 OR SH)1 THEN GOTO 750
660 GOSUB 7000:PRINT AS$;:INPUT AS
670 IF (AS(33 OR AS)126) AND (AS(160 OR AS)254) THEN
  730
700 GOSUB 7000
710 IF SH=1 THEN SH=16
720 N1=AS:N2=PR+SH
730 FOR I=1 TO 11:MM$(LEN(MM$)+1)=CHR$(MM(I)):NEXT I
740 OPEN #4,8,0,"P"
735 PRINT #4,CHR$(27);"*";CHR$(1);CHR$(N1);CHR$(N2);MM$
740 IF AN$="N" THEN PRINT #4,CHR$(27);"$";CHR$(1):
  GOTO 860
750 PRINT #4,CHR$(27);"X";CHR$(1)
760 FOR I=1 TO 20:PRINT #4,CHR$(N1);" ";NEXT I:
  PRINT #4
Atari 400/800 Commuters

Delta Plot program

2 GRAPHICS 0
3 PRINT "":"PRINT "":"PRINT "
4 PRINT " THIS PROGRAM TAKES ABOUT"
5 PRINT " 1 MINUTE TO RUN, PLEASE"
6 PRINT " TURN ON YOUR PRINTER AND "

870 PRINT #4;CHR$(14);FOR I=1 TO 10:PRINT #4;
CHR$(N1);" ";NEXT I:PRINT #4
880 PRINT #4;CHR$(15);FOR I=1 TO 20:PRINT #4;
CHR$(N1);" ";NEXT I:PRINT #4
890 IF AN$="N" THEN PRINT #4;CHR$(27);"$";CHR$(0):
GOTO 895
892 PRINT #4;CHR$(27);"X";CHR$(0)
895 PRINT #4;CHR$(27);"@";CLOSE #4;GOSUB 660;MM$="":
RETURN
900 GRAPHICS 0
904 PRINT
905 PRINT " M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11"
910 FOR I=0 TO 7:PRINT " ";FOR J=1 TO 11
915 PRINT !--;:NEXT J:PRINT !:IF I(7 THEN PRINT
INT(2^I)+1:NEXT I
920 PRINT :PRINT :PRINT
930 PRINT "R)IGHT L)EFT D)OWN U)P "
940 PRINT "I)NSERT C)LEAR Q)UIT"
950 POSITION 6,3:PRINT CS$;
955 GOSUB 3000
960 RETURN
2000 REM SINGLE CHAR INPUT
2010 KEY=PEEK(764):IF KEY=255 THEN 2010
2020 POKE 764,255
2030 RETURN
3000 POSITION 35,21
3010 PRINT " ";
3020 RETURN
4000 POSITION 15,18
4010 PRINT "PLEASE STAND BY";
4020 RETURN
5000 POSITION 1,18
5010 FOR I=1 TO 5:PRINT BL$;:NEXT I
5020 RETURN
7000 POSITION 1,20
7010 PRINT BL$;
7020 POSITION 1,20
7030 RETURN
7 PRINT " STAND BY .............."
8 PRINT " ":PRINT " ":PRINT " "
10 FOR I=1536 TO 1553
20 READ O
30 POKE I,O
40 NEXT I
50 DATA 104,104,133,205,104,133,204
60 DATA 104,5,205,133,213,104,5,204
70 DATA 133,212,96
100 REM MICRO- PLOT
110 DIM M(76,14),MASK(6)
120 DIM AS(100)
130 DIM BS(10)
132 FOR I=0 TO 14
133 FOR J=1 TO 76
134 M(J,I)=0
135 NEXT J
136 NEXT I
1000 REM SET PROGRAM CONSTANT
1010 MASK(1)=128:MASK(4)=16
1020 MASK(2)=64:MASK(5)=8
1030 MASK(3)=32:MASK(6)=4
1040 LX=20:LY=20
1050 XFAC=72/LX:YFAC=87/LY
2000 REM PLOT CURVE
2010 LET RAD=9
2020 X1=19:Y1=10
2030 FOR ANG=0 TO 360 STEP 10
2040 R1=ANG*6.28/360
2050 X2=RAD*COS(R1)+10
2055 Y2=RAD*SIN(R1)+10
2060 GOSUB 4000
2070 NEXT ANG
3000 REM SEND BIT IMAGE TO PRINTER
3005 OPEN #4,8,0,"P"
3010 PRINT #4;CHR$(27);"A";CHR$(6)
3020 FOR ROW=0 TO 14
3030 AS=""
3040 PRINT #4;CHR$(27);"K";CHR$(75);CHR$(0);
3050 FOR COL=1 TO 75
3054 RE=INT(M(COL,ROW))
3055 BS=CHR$(RE)
3060 AS$(LEN(AS$)+1)=BS
3070 NEXT COL
3080 PRINT #4;AS$;" "

3090 NEXT ROW
3100 PRINT #4;CHR$(27);"A";CHR$(12)
3110 CLOSE #4
3150 END
4000 REM DRAW A LINE FROM X1,Y1 TO X2,Y2
4010 XL=X2-X1;YL=Y2-Y1
4020 NX=ABS(XL*XFAC);NY=ABS(YL*YFAC)
4030 IF NX<NY THEN NX=NY
4040 NS=INT(NX+1)
4050 DX=XL/NS
4055 DY=YL/NS
4060 FOR I=1 TO NS
4070 X1=X1+DX;Y1=Y1+DY
4080 GOSUB 5000
4090 NEXT I
4100 RETURN
5000 REM PLOT A POINT AT X1,Y1
5010 XX=X1*XFAC;YY=Y1*YFAC
5020 COL=INT(XX)+1
5030 ROW=INT(YY/6)
5040 XIT=INT(YY-ROW*6)+1
5050 A1=M(COL,ROW)
5060 A2=MASK(XIT)
5070 M(COL,ROW)=USR(1536,A1,A2)
5080 RETURN

Pie chart program

2 GRAPHICS ø
3 PRINT "PLEASE STAND BY"
10 FOR I=1536 TO 1553
20 READ 0
30 POKE I,0
40 NEXT I
50 DATA 104,104,133,205,104,133,204
60 DATA 104,5,205,133,213,104,5,204
70 DATA 133,212,96
100 REM MICRO-PILOT
110 DIM M(76,11),MASK(6),BL$(80),N$(99)
120 DIM AS$(100),TS$(99),TT(20),RR(20),TI$(99)
130 DIM BS$(10),PT$(10),T1$(99),T2$(99)
132 FOR I=ø TO 11
133 FOR J=1 TO 76
134 M(J,I)=ø
135 NEXT J
136 NEXT I
140 GOSUB 7000
141 GRAPHICS 0
142 PRINT "":PRINT "":PRINT "":PRINT ""
143 PRINT " THIS PROGRAM TAKES ABOUT"
144 PRINT " 2 MINUTES TO RUN, PLEASE"
145 PRINT " TURN ON YOUR PRINTER AND"
146 " STAND BY ................"
147 PRINT "":PRINT "":PRINT "":PRINT ""
150 T1$=" (40 characters) "
160 T1$(LEN(T1$)+1)=T1$
170 T2$=T1$
180 BL$=" (40 characters) "
190 BL$(LEN(BL$)+1)=BL$
195 FOR I=1 TO 20:TT(I)=1:NEXT I
198 FOR I=1 TO 20:RR(I)=0:NEXT I
1000 REM SET PROGRAM CONSTANT
1010 MASK(1)=128:MASK(4)=16
1020 MASK(2)=64:MASK(5)=8
1030 MASK(3)=32:MASK(6)=4
1040 LX=20:LY=20
1050 XFAC=72/LX:YFAC=75/LY
2000 REM PLOT CURVE
2010 LET RAD=9
2020 X1=19:Yl=10
2030 FOR ANG=0 TO 360 STEP 5
2040 R1=ANG*6.28/360
2050 X2=RAD*COS(R1)+10
2055 Y2=RAD*SIN(R1)+10
2060 GOSUB 4000
2070 NEXT ANG
2080 FOR PI=1 TO NP
2090 X1=10:Y1=10
2100 TP=TP+PCT(PI)
2110 ANG=360*TP*0.01
2120 R1=ANG*6.28/360
2130 X2=RAD*COS(R1)+10:Y2=RAD*SIN(R1)+10
2140 GOSUB 4000
2160 GOSUB 6000
2170 NEXT PI
2180 IF LEN(T1$)<99 THEN T1$(LEN(T1$)+1)="":GOTO 2180
2190 IF LEN(T2$)<99 THEN T2$(LEN(T2$)+1)="":GOTO 2190
3000 REM SEND BIT IMAGE TO PRINTER
3005 OPEN #4,8,0,"P"
3010 PRINT #4;CHR$(27);"A";CHR$(3)
3012 WW=LEN(TI$)
3013 VV=INT((80-WW)/2)
3014 PRINT #4;BL$(1,VV);TI$:FOR I=1 TO 25:PRINT #4:
      NEXT I
3015 PRINT #4;BL$(1,TT(1));T1$(1,9);CHR$(10)
3016 PRINT #4;BL$(1,TT(2));T1$(10,19);CHR$(10)
3017 PRINT #4;BL$(1,TT(3));T1$(20,29);CHR$(10)
3020 FOR ROW=0 TO 11
3030 A$=""
3035 PRINT #4;BL$(1,35);
3040 PRINT #4;CHR$(27);"K";CHR$(75);CHR$(0);
3050 FOR COL=1 TO 75
3055 RE=INT(M(COL,ROW))
3055 B$=CHR$(RE)
3060 A$(LEN(A$)+1)=B$
3070 NEXT COL
3080 PRINT #4;TT(2);T2$(60,69);CHR$(12)
3090 PRINT #4;TT(3);T2$(70,79);CHR$(12)
3097 PRINT #4;TT(4);T2$(80,89)
3100 PRINT #4;CHR$(27);"A";CHR$(12)
3110 CLOSE #4
3150 END
4000 REM DRAW A LINE FROM X1,Y1 TO Y2,Y2
4010 XL=X2-X1:YL=Y2-Y1
4020 NX=ABS(XL*XFAC):NY=ABS(YL*YFAC)
4030 IF NX(NY THEN NX=NY
4040 NEXT ROW
4050 PRINT #4;BL$(1,TT(16));T2$(60,69);CHR$(10)
4060 PRINT #4;BL$(1,TT(17));T2$(70,79);CHR$(10)
4070 PRINT #4;BL$(1,TT(18));T2$(80,89)
4100 PRINT #4;CHR$(27);"A";CHR$(12)
4110 CLOSE #4
4150 END
5050 A1=M(COL,ROW)
5060 A2=MASK(XIT)
5070 M(COL,ROW)=USR(1536,A1,A2)
5080 RETURN
6000 REM
6010 MA=(ANG+PA)/2
6020 R1=MA*6.28/360
6030 X3=INT(8*SIN(R1))
6035 Y3=INT(10*COS(R1))
6040 X4=10+X3:Y4=40+Y3
6041 GOSUB 9000:RR(PI)=X4
6045 IF MA>270 OR MA<90 THEN TT(X4)=Y4:GOTO 6050
6047 TT(X4)=Y4-10
6050 IF X4>9 THEN GOSUB 6500:GOTO 6060
6052 DD=(X4-1)*10+1
6054 DF=(PI-1)*10+1
6056 T1$(DD,DD+9)=T$(DF,DF+9)
6060 PA=ANG
6070 RETURN
6500 X4=X4-9
6502 DD=(X4-1)*10+1
6504 DF=(PI-1)*10+1
6506 T2$(DD,DD+9)=T$(DF,DF+9)
6508 RETURN
7000 GRAPHICS 0
7001 PRINT "TITLE CAN BE UP TO 80 CHARACTERS LONG"
7002 PRINT "ENTER TITLE ";:INPUT T1$
7004 IF LEN(T1$)>80 THEN T1$=T1$(1,80)
7005 AS=0:AL=100:FL=9:OO=1
7010 GRAPHICS 1
7020 PRINT "YOU CAN HAVE UP TO 9 FIELDS AND EACH FIELD CAN BE UP TO NINE CHARACTERS LONG"
7025 IF LEN(T1$)<99 THEN T1$(LEN(T1$)+1)=" ":GOTO 7025
7030 PRINT "AMOUNT SO FAR ";:AS
7040 PRINT "AMOUNT LEFT ";:AL
7050 PRINT "FIELD LEFT ";:FL
7060 PRINT :PRINT
7070 PRINT "FIELD SIZE ";:INPUT FS
7080 IF FS>AL OR FS=0 THEN FS=AL
7090 AL=AL-FS:AS=AS+FS
7100 PRINT "ENTER FIELD NAME ";:INPUT N$
7110 IF LEN(N$)>9 THEN N$=N$(1,9)
7120 IF LEN(N$)<9 THEN N$(LEN(N$)+1)=" ":GOTO 7120
7130 PCT(OO)=FS
7140 TR=(OO-1)*10+1
```
7150 T$(TR,TR+9)=N$
7160 OO=OO+1
7170 IF OO>9 THEN PCT(OO-1)=PCT(OO-1)+AL:GOTO 7200
7180 IF AL=0 THEN 7200
7185 FL=FL-1
7190 GOTO 7010
7200 NP=OO-1
7210 GRAPHICS 0
7220 RETURN
8000 HH=(ROW-6)*10+1
8010 PRINT #4;BL$(1,TT(ROW+4));T2$(HH,HH+9)
8020 RETURN
9000 FOR I=1 TO PI
9010 IF RR(I)=X4 THEN YY=1
9020 NEXT I
9025 IF YY=0 THEN 9080
9030 IF YY=1 THEN X4=X4-1
9040 IF X4<1 THEN X4=X4+2
9050 YY=0:GOTO 9000
9080 RETURN
```
Appendix G

Commodore VIC-20 and C-64 Computers

The best way to connect Delta to your Commodore computer is with a Universal/Commodore Parallel Interface by Star Micronics. Or you can use many of the other available parallel interface adapters for the Commodore computers.

Setting the switches

We recommend that you set the DIP switches in Delta as shown below when connecting it to a Commodore computer.

Recommended DIP Switch Settings for Commodore VIC-20 and C-64

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

Using Commodore BASIC

Commodore computers can use the full capabilities of Delta. Commodore BASIC does, however, have a few differences from other BASICS.

Commodore BASIC has no LPRINT statement. You must
open the printer as a file and then direct your print statements to that file, like this:

```
10 OPEN 4,4
20 PRINT#4, "TESTING"
```

When the program is done printing, you should clear the buffer and close the file like this:

```
90 PRINT#4 : CLOSE 4
```

**Listing programs**

To list a program on the Commodore computers you must open the printer as a file and redirect screen output to the printer before issuing the LIST command. The correct sequence looks like this:

```
OPEN 4,4
CMD 4
LIST
```

When you are done listing your program you must close the printer channel to stop sending output to the printer. To do this, type:

```
PRINT#4 : CLOSE 4
```

**Program listings**

The following programs have been converted to run on Commodore computers.

**Chart program**

```
10 REM COMMODORE 64 <> DELTA 10
100 OPEN4,4:CMD4
110 GOSUB 1000
120 GOSUB 2000
130 PRINT "*REGULAR*"
140 GOSUB 3000
```
150 PRINT "*DOUBLE STRIKE*"
160 PRINT DS$;
170 GOSUB 3000
180 PRINT "*EMPHASIZED*"
190 EM=TRUE
200 GOSUB 3000
210 PRINT "*DOUBLE STRIKE & EMPHASIZED*"
220 PRINT DS$;EM$;
230 GOSUB 3000
240 PRINT#4:CLOSE4
250 END
1000 REM
1010 IT$=CHR$(27)+CHR$(52)
1020 RO$=CHR$(27)+CHR$(53)
1030 EM$=CHR$(27)+CHR$(87)+CHR$(1)
1040 ND$=CHR$(27)+CHR$(72)
1050 DS$=CHR$(27)+CHR$(71)
1060 UN$=CHR$(27)+CHR$(45)+CHR$(1)
1070 RO$=CHR$(27)+CHR$(87)+CHR$(0)
1080 NW$=CHR$(27)+CHR$(87)+CHR$(0)
1090 PI$=CHR$(27)+CHR$(66)+CHR$(1)
1100 EL$=CHR$(27)+CHR$(66)+CHR$(2)
1110 PS$=CHR$(27)+CHR$(66)+CHR$(3)
1120 IT=FALSE:PRINT RO$;
1130 UN=FALSE:PRINT UN$;
1140 EM=FALSE:PRINT EM$;
1150 IT=FALSE:PRINT IT$;
1160 RO=FALSE:PRINT RO$;
1170 EM=FALSE:PRINT EM$;
1180 IT=FALSE:PRINT IT$;
1190 RETURN
2000 PRINT RA$;
2010 PRINT EN$;" NORMAL ENLARGED "
2020 PRINT RA$;UN$;
2030 PRINT CO$;"CONDENSED ";
2040 PRINT EL$;" ELITE ";
2050 PRINT PI$;" PICA ";
2060 PRINT CO$;"CONDENSED ";
2070 PRINT EL$;" ELITE ";
2080 PRINT PI$;" PICA ";RA$;
2090 RETURN
3000 IT=FALSE:PRINT RO$;
3010 UN=FALSE:PRINT UN$;
3020 EN=FALSE:PRINT NW$;
3030 PI=FALSE:
3040 PRINT CO$;:GOSUB 3130
3050 PRINT EL$;:GOSUB 3130
3060 PRINT PI$;:PI=TRUE:GOSUB 3130
3070 IF EN=TRUE THEN PRINT:GOTO 3090
3080 PRINT EN$;:EN=TRUE:GOTO 3030
3090 IF UN=TRUE THEN PRINT:GOTO 3110
3100 PRINT UN$;:UN=TRUE:GOTO 3020
3110 IF IT=TRUE THEN PRINT RA$:RETURN
3120 PRINT IT$;:IT=TRUE:GOTO 3010
3130 BL$="":FD$="...."
3140 IF EM=FALSE THEN PRINT "AB"+CHR$(99)+CHR$(100);:GOTO 3190
3150 IF PI=FALSE THEN PRINT FD$;:GOTO 3170
3160 PRINT "AB";CHR$(99);CHR$(100);:RETURN
3170 IF EN=TRUE THEN PRINT " ";RETURN
3180 IF EN=FALSE THEN PRINT BL$;:RETURN
3190 IF EN=TRUE THEN PRINT " ";RETURN
3200 PRINT SP$;"X";CHR$(120);:RETURN
3210 PRINT SB$;"Y";CHR$(121);" ";:RETURN
3220 PRINT NS$;
3230 RETURN

Special character chart program

5 REM COMMODORE 64 <> DELTASET
10 OPEN4,4:CMD4
20 FOR J=160 TO 255 STEP 8
30 FOR I=J TO J+7
40 PRINT I;" =";CHR$(I);CHR$(9);:NEXT I:PRINT:NEXT J
50 NEXT J:PRINT:CLOSE4
60 END

Macro program

10 REM COMMODORE 64 <> DELTAMACRO
20 OPEN4,4:CMD4
30 PRINT CHR$(27);"+";
40 PRINT CHR$(18);
50 PRINT CHR$(27);"W";CHR$(0);
60 PRINT CHR$(27);"F";
70 PRINT CHR$(27);"H";
80 PRINT CHR$(27);"-";CHR$(0);
90 PRINT CHR$(27);"T";
95 PRINT CHR$(27);"5";
Bridge hand program

10 REM COMMODORE 64 () DELTA BRIDGE
15 OPEN4,4:CMD4
20 GOSUB 1000
30 GOSUB 2000
40 GOSUB 3000
50 GOSUB 4000
60 PRINT#4:CLOSE4
70 END
1000 REM INITIALIZE VARIABLES
1010 DIM HA(4),DE(52),CA$(13),SU$(3)
1020 CA$(1)=" 2":CA$(2)=" 3":CA$(3)=" 4"
1030 CA$(4)=" 5":CA$(5)=" 6":CA$(6)=" 7"
1040 CA$(7)=" 8":CA$(8)=" 9":CA$(9)=" 10"
1050 CA$(10)=" J":CA$(11)=" Q":CA$(12)=" K"
          CA$(13)=" A"
1060 SU$(0)="S":SU$(1)="H":SU$(2)="D":SU$(3)="C"
1070 RETURN
2000 REM INITIALIZE PRINTER
2010 PRINT CHR$(27)CHR$(27)CHR$(27)CHR$(27)CHR$(27)
       PRINT CHR$(27)CHR$(27)CHR$(27)CHR$(27)
2040 FOR I=1 TO 4
2050 PRINT CHR$(27)CHR$(27)CHR$(27)CHR$(27)
2060 NEXT J
2070 READ X:PRINT CHR$(X);CHR$(X)
2080 NEXT J
2090 NEXT I
2100 PRINT
2110 RETURN
2120 DATA 72,11,4,10,20,10,52,72,52,10,20,10,4
2130 DATA 83,11,16,8,20,8,86,41,86,8,20,8,16
2140 DATA 67,11,8,16,8,18,65,62,65,18,8,16,8
2150 DATA 68,11,8,0,28,0,62,65,62,0,28,0,8
3000 REM DEAL CARD
3010 FOR CA=1 TO 52
3020 X=INT(RND(1)*4+1)
3030 IF HA(X)=13 THEN 3020
3035 HA(X)=HA(X)+1
3040 DE(CA)=X
3050 NEXT CA
3060 RETURN
4000 REM PRINT FOUR HANDS
4010 PRINT CHR$(27);"!";CHR$(9);"NORTH"
4020 PRINT CHR$(27);"$";CHR$(1);CHR$(27);CHR$(70);
4030 HA=1
4040 FOR SU=0 TO 3
4050 PRINT CHR$(9);
4060 GOSUB 4300
4070 PRINT
4080 NEXT SU
4090 PRINT CHR$(27);"!";"WEST";CHR$(9);CHR$(9);
   "EAST"
4100 PRINT CHR$(27);"$";CHR$(1);CHR$(27);CHR$(70);
4110 FOR SU=0 TO 3
4120 HA=2
4130 GOSUB 4300
4140 PRINT CHR$(9)CHR$(9);
4150 HA=3
4160 GOSUB 4300
4170 PRINT
4180 NEXT SU
4190 PRINT CHR$(27);"!";CHR$(9);"SOUTH"
4200 PRINT CHR$(27);"$";CHR$(1);CHR$(27);CHR$(70);
4210 HA=4
4220 FOR SU=0 TO 3
4230 PRINT CHR$(9);
4240 GOSUB 4300
4250 PRINT
4260 NEXT SU
4270 PRINT CHR$(27);"$";CHR$(9);CHR$(27);CHR$(70);
4280 RETURN
4290 REM PRINT ONE LINE
4300 PRINT SU$(SU);
4310 FOR CA=13 TO 1 STEP -1
4320 IF DE(SU*13+CA)=HA THEN PRINT CA$(CA);
4330 NEXT CA
4340 RETURN

Numeral program

5 REM COMMODORE 64 <> DELTANUMERAL
10 REM PROGRAM TO DEFINE AND PRINT NUMERALS
20 REM EACH NUMERAL IS MADE UP OF 4 CHARACTERS (2
   WIDE * 2 HIGH )
25 OPEN4,4:CMD4
30  DD$ = CHR$(27) + CHR$(42) + CHR$(1)
40  DP$ = CHR$(27) + CHR$(88) + CHR$(1)
50  NDP$ = CHR$(27) + CHR$(88) + CHR$(0)
60  L7$ = CHR$(27) + CHR$(49) : L12$ = CHR$(27) +
       CHR$(50)
70  FOR N1 = 160 TO 200
80  PRINT DD$; CHR$(42) + CHR$(1) + CHR$(88) + CHR$(1) +
       CHR$(49) : L12$ = CHR$(27) + 200
90  PRINT CHR$(N1); N2
100  READ N2
110  PRINT CHR$(N2); N3
120  FOR S = 1 TO 11
130  READ MS
140  PRINT MS; MS;
150  NEXT S
160  NEXT N1
170  REM
180  AS = 160
190  FOR NUM = 0 TO 9
200  NT$(NUM) = CHR$(AS + 0) + CHR$(AS + 1)
210  NB$(NUM) = CHR$(AS + 2) + CHR$(AS + 3)
220  AS = AS + 4
230  NEXT NUM
240  BK$ = CHR$(200)
250  PRINT DP$; L7$;
260  FOR NUM = 0 TO 9
270  PRINT NT$(NUM); BK$;
280  NEXT NUM
290  PRINT
300  FOR NUM = 0 TO 9
310  PRINT NB$(NUM); BK$;
320  NEXT NUM
330  PRINT NP$; L12$
335  PRINT#4:CLOSE4
340  REM ZERO
350  DATA 11,0,96,16,104,16,44,30,14,0,2,1
360  DATA 11,2,1,2,1,6,8,38,88,32,88,32
370  DATA 11,3,12,19,12,51,0,96,96,96,0
380  DATA 11,0,32,0,48,0,28,3,12,3,4,3
390  REM ONE
400  DATA 11,0,0,0,0,0,4,0,0,4,0,4,126
410  DATA 9,12,11,4,12,11,4,12,2,0,0,0,0
420  DATA 11,64,0,64,0,64,0,64,32,80,47,80
430  DATA 9,47,80,47,64,0,64,0,64,0,0,0
440  REM TWO
450  DATA 11,0,0,0,0,0,12,16,14,9,0,6,0


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460 DATA 11,3,0,3,0,70,56,70,56,4,24,0
470 DATA 11,64,0,64,32,64,32,80,32,80,40,64
480 DATA 11,44,64,38,65,34,65,32,80,32,88,0
490 REM THREE
500 DATA 11,0,0,0,0,0,0,4,2,4,2,4
510 DATA 11,34,84,34,92,34,76,34,68,2,64,0
520 DATA 11,16,0,48,0,56,64,48,64,32,64,32
530 DATA 11,64,32,64,48,9,54,9,22,9,6,1
540 REM FOUR
550 DATA 11,0,0,0,0,0,0,4,2,4,2,4
560 DATA 11,34,84,34,92,34,76,34,68,2,64,0
570 DATA 11,0,8,4,16,5,10,5,8,4,72,4
580 DATA 11,88,38,89,38,89,6,73,4,8,6,0
590 REM FIVE
600 DATA 11,0,0,0,0,0,0,4,2,4,2,4
610 DATA 11,34,84,34,92,34,76,34,68,2,64,0
620 DATA 11,0,8,4,16,5,10,5,8,4,72,4
630 DATA 11,64,0,96,1,48,15,48,15,16,15,0
640 REM SIX
650 DATA 11,0,96,0,112,0,120,0,92,0,102,0
660 DATA 11,98,0,98,0,70,0,14,0,6
670 DATA 11,7,8,23,8,55,8,99,0,65,0,64
680 DATA 11,0,96,0,112,1,62,1,30,1,14,0
690 REM SEVEN
700 DATA 11,0,16,8,6,8,6,8,6,8,6,8
710 DATA 9,70,8,102,8,54,8,6,0,2,0,0
720 DATA 11,0,64,0,96,0,120,0,124,0,30,1
730 DATA 9,6,1,0,0,0,0,0,0,0,0,0
740 REM EIGHT
750 DATA 11,0,0,0,0,24,36,24,102,24,102,0
760 DATA 11,67,0,67,0,99,28,34,28,34,28,0
770 DATA 11,12,18,44,19,108,19,96,1,64,0,64
780 DATA 11,0,96,1,112,15,48,15,16,14,0,0
790 REM NINE
800 DATA 11,0,120,4,120,6,120,6,0,3,0
810 DATA 11,3,0,3,0,67,4,123,4,122,4,120
820 DATA 11,48,0,56,0,113,0,99,0,99,0,99
830 DATA 11,0,115,0,57,0,31,0,15,0,7,0
840 REM SPACE
850 DATA 11,0,0,0,0,0,0,0,0,0,0,0

Download utility program

4 ED$="EDIT P)RINTER Q)UIT
5 POKE 53281,0:POKE 53280,0
6 PRINT CHR$(5)
7 DD=1150
8 Y=0:X=0
10 DIM Z(8,12),MM(11),ML$(11),KK$(11,5)
15 AD=1984
20 PRINT CHR$(147):GOSUB 650
30 CS$=CHR$(0):SC$=CHR$(42):SS$=CHR$(15)
40 GET A$:IF A$="" THEN 40
50 IF A$="Q" THEN PRINT CHR$(147):END
60 IF A$="" THEN GOSUB 680:GOTO 40
70 IF A$="E" THEN GOSUB 700:GOSUB 260:GOTO 40
80 GOTO 40
130 IF Z(G,H)=0 THEN C$="":GOSUB 11000
140 IF Z(G,H)=1 THEN C$=CS$:GOSUB 11000
150 IF Z(G,H)=@ THEN C$=SS$:GOSUB 11000
160 IF Z(G,H)=0 THEN C$=CS$:GOSUB 11000
170 RETURN
260 REM EDIT LEVEL
265 H=1:G=1:X=0:Y=0
270 FOR I=1 TO 11:ML$(I)="":MM(I)=@:NEXT I
280 FOR I=1 TO 11:FOR J=1 TO 5:KK$(I,J)=":NEXT J:
290 GET A$:IF A$="" THEN 290
300 IF A$="L"THEN GOSUB 390:GOTO 370
310 IF A$="I" THEN GOSUB 410:GOTO 370
320 IF A$="U" THEN GOSUB 430:GOTO 370
330 IF A$="C" THEN GOSUB 450:GOTO 370
340 IF A$="E" THEN GOSUB 470:GOTO 370
350 IF A$="" THEN GOSUB 490:GOTO 370
360 IF A$="Q" THEN GOSUB 500:GOTO 380
370 GOTO 270
380 RETURN
390 GOSUB 120:Y=Y-3:H=H-1:IF Y<=0 then Y=0:H=1
400 GOSUB 150:RETURN
410 GOSUB 120:Y=Y+3:H=H+1:IF Y<=0 then Y=0:H=11
420 GOSUB 150:RETURN
430 GOSUB 120:X=X+80:G=G+1:IF X>480 THEN X=480:G=7
440 GOSUB 150:RETURN
450 GOSUB 120:X=X-80:G=G-1:IF X<0 then X=0:G=1
460 GOSUB 150:RETURN
470 IF Z(G,H-1)=1 OR Z(G,H+1)=1 THEN RETURN
480 Z(G,H)=1:C$=SS$:GOSUB 11000:RETURN
490 Z(G,H)=0:C$=CS$:GOSUB 11000:RETURN
500 REM GET OF EDIT MODE
510 CS$=ED:GOSUB 1000
520 IF Z(G,H)=1 THEN C$=SC$:GOSUB 11000:GOTO 540
530 IF Z(G,H)=0 THEN C$="":GOSUB 11000
540 REM PRINT COLUMN VALUES
550 FOR I=1 TO 11:FOR J=1 TO 7
560 MM(I)=MM(I)+Z(J,I)*2^(J-1):NEXT J:NEXT I
570 J=0:PRINT CHR$$(19):FOR I=1 TO 8 :PRINT CHR$$(17):
      NEXT I
574 PRINT "    ";
575 FOR I=1 TO 11:ML$(I)=STR$$(MM(I)):NEXT I
580 FOR I=1 TO 11:FOR J=1 TO LEN(ML$(I)):
      KK$(I,J)=MID$$(ML$(I),J,1):NEXT J
585 NEXT I
590 FOR I=1 TO 11:D1=1707:FOR J=1 TO LEN(ML$(I))
      POKE D1+1*3, ASC(KK$(I,J)):D1=D1+40:NEXT J
594 NEXT I
600 GOSUB 660:RETURN
660 B$=ED$:GOSUB 1000
670 FOR I=1 TO 7:FOR J=1 TO 11:Z(I,J)=0:NEXT J:NEXT
1:RETURN
680 REM PRINT MODE
690 PRINT CHR$$(19):FOR I=1 TO 22:PRINT CHR$$(17):
      NEXT I
695 INPUT "NORMAL OR PROPORTIONAL (N/P) ";AN$
700 IF AN$="N" THEN PR=0:GOTO 750
710 IF AN$="P" THEN GOTO 730
720 PRINT CHR$$(145);:GOTO 695
730 GOSUB 12000:PRINT CHR$$(145);
732 INPUT "PROPORTIONAL DATA (4-11) ";PR
740 IF PR<4 OR PR>11 THEN 730
750 GOSUB 12000:PRINT CHR$$(145);
755 INPUT "SHIFTED ENTER 1 ELSE ENTER 0 ";SH
760 IF SH<1 OR SH>1 THEN 750
770 GOSUB 12000:PRINT CHR$$(145);
775 INPUT "ASCII CODE (33-126) (160-254) ";AS
777 IF (AS<33 OR AS>126) AND (AS<160 OR AS>254)
      THEN 770
779 GOSUB 12000
780 IF SH=1 THEN SH=16
790 FOR I=1 TO 11:MM$=MM$+CHR$(MM(I)):NEXT I
800 N1=AS:N2=PR+SH
810 OPEN4,4:CMD4
820 PRINT CHR$$(27);"*";CHR$$(1);CHR$$(N1);CHR$$(N2);MM$
830 IF AN$="N" THEN PRINT CHR$$(27);"$";CHR$$(1):GOTO
850
840 PRINT CHR$$(27);"X";CHR$$(1)
Delta Plot program

10 REM COMMODORE 64 () DELTAPLT
50 PRINT CHR$(147)
60 FOR I=1 TO 5:PRINT " ":NEXT I
70 PRINT "THIS PROGRAM TAKES ABOUT ONE MINUTE"
80 PRINT "TO RUN, SO PLEASE TURN ON YOUR PRINTER"
90 PRINT "AND STAND BY.........................."
100 REM DELTA- PLOT
110 DIM BIT%(76,14)
120 REM SET PROGRAM CONSTANTS
130 MASK%(1) = 64 : MASK%(4) = 8
140 MASK%(2) = 32 : MASK%(5) = 4
150 MASK%(3) = 16 : MASK%(6) = 2
160 LX = 20 : LY = 20
170 XFAC = 72/LX : YFAC = 87/LY
200 REM PLOT CURVE
2010 RAD = 9
Pie chart program

50 PRINT CHR$(147); "PLEASE STAND BY"
100 REM PIECHART
110 DIM BIT%(190,36), A$(36), PCT%(25), TXT$(42), PTXT$(25)
120 ES$=CHR$(27):LF$=CHR$(10)
130 FF$=CHR$(12):VT$=CHR$(11)
140 EM$=ES$ + "E":CE$=ES$ + "F"
150 FOR I = 1 TO 168:SP$=SP$ + CHR$(16)
160 FOR I = 1 TO 168:SP$=SP$ + CHR$(16)
170 FOR I = 1 TO 168:SP$=SP$ + CHR$(16)
180 FOR I = 1 TO 168:SP$=SP$ + CHR$(16)
190 FOR I = 1 TO 168:SP$=SP$ + CHR$(16)
200 REM SET PROGRAM CONSTANTS
2100 REM PLOT CURVE
2200 REM SEND BIT IMAGE MAP TO PRINTER
3070 NEXT COL
3080 NEXT ROW
3100 OPEN 4, 4: CMD 4
3110 X = (40 - LEN(T$) / 2)
3120 FOR I = 1 TO X: PRINT " ": NEXT I
3130 PRINT EM$; T$; CE$; LF$
3140 PRINT VT$; VT$; VT$
3150 PRINT ES$; "A"; CHR$(3)
3160 PRINT TXT$(1); LF$; TXT$(2); LF$; TXT$(3); LF$
3170 FOR ROW = 0 TO 35
3180 PRINT ES$; "K"; CHR$(102); CHR$(1); SP$; A$(ROW)
3190 PRINT TXT$(ROW + 4)
3200 NEXT ROW
3210 PRINT TXT$(49); LF$
3220 PRINT TXT$(41); LF$
3230 PRINT TXT$(42); LF$
3240 PRINT "2"; FF$
3250 PRINT# 4: CLOSE 4
3255 PRINT CHR$(147)
3260 END
4000 REM DRAW A LINE FROM X1, Y1 TO X2, Y2
4010 XL = X2 - X1: YL = Y2 - Y1
4020 NX = ABS(XL * XFAC): NY = ABS(YL * YFAC)
4030 IF NX < NY THEN NX = NY
4040 NS% = INT(NX + 1)
4050 DX = XL / NS%: DY = YL / NS%
4060 FOR I = 1 TO NS%
4070 X1 = X1 + DX: Y1 = Y1 + DY
4080 GOSUB 5000
4090 NEXT I
4100 RETURN
5000 REM PLOT A POINT AT X1, Y1
5010 XX = X1 * XFAC: YY = Y1 * YFAC
5020 COL = INT(XX) + 1
5030 ROW = INT(YY / 6)
5040 XIT% = INT(YY - (6 * ROW)) + 1
5050 BIT%(COL, ROW) = BIT%(COL, ROW) OR MASK%(XIT%)
5060 RETURN
6000 REM
6010 MA% = (ANG + PA%) / 2
6020 R1 = MA% * 6.28 / 360
6030 X3 = INT(20 * SIN(R1)): Y3 = INT(22 * COS(R1))
6040 X4 = 22 + X3: Y4 = 40 + Y3
6050 IF MA% < 270 OR MA% > 90 THEN GOSUB 6100: GOTO 6070
6060 GOSUB 6200
6070 PA%=ANG
6080 RETURN
6100 MM$=TXT$(X4)
6102 LL$=LEFT$(MM$,Y4)
6104 PP=LEN(PTXT$(PI))
6106 RR$=RIGHT$(MM$,(80-(Y4+PP))
6108 TXT$(X4)=LL$ + PTXT$(PI) +RR$
6110 RETURN
6200 MM$=TXT$(X4)
6202 PP=LEN(PTXT$(PI))
6204 LL$=LEFT$(MM$,(Y4 - PP))
6206 RR$=RIGHT$(MM$, (80 - Y4))
6208 TXT$(X4) = LL$ + PTXT$(PI) +RR$
6210 RETURN
7000 REM
7005 I=1
7010 PRINT CHR$(147): PRINT:PRINT:PRINT:PRINT
7020 INPUT "ENTER TITLE FOR CHART ";T$
7030 AS%=0:AL%=100
7040 PRINT CHR$(147)
7050 PRINT "TOTAL SO FAR : ";AS%
7060 PRINT "TOTAL REMAINING : ";AL%
7070 INPUT "ENTER % FOR FIELD ";PCT%(I)
7080 IF PCT%(I)>AL% OR PCT%(I)=0 THEN PCT%(I)=AL%
7090 AL%=AL%-PCT%(I)
7100 AS%=AS%+PCT%(I)
7110 INPUT "ENTER DESCRIPTION OF FIELD : ";PTXT$(I)
7120 IF LEN(PTXT$(I))>15 THEN PRINT "FIELD TOO LONG
- 15 CHAR. MAX": GOTO 7110
7130 IF AL%=0 THEN GOTO 7200
7140 I=I+1
7150 GOTO 7040
7200 NP%=1
7210 IF NP%=1 THEN 7040
7220 PRINT CHR$(147)
7230 RETURN
Appendix H

DIP Switch Settings

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

DIP switch 2 is accessible from the rear of the printer, but to get to DIP switch 1 and DIP switch 3 you must remove the upper case. Chapter 10 tells you how to remove it.

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 1 and 2. DIP switch 3 controls the serial interface and is covered in Appendix P. The individual switches on DIP switch 1 are called 1-1 through 1-8; those on switch 2 are 2-1 through 2-4.
Table H-1

DIP Switch Settings

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>11&quot; page length</td>
<td>12&quot; page length</td>
</tr>
<tr>
<td>1-2</td>
<td>Normal print</td>
<td>Emphasized print</td>
</tr>
<tr>
<td>1-3</td>
<td>10 CPI (pica pitch)</td>
<td>17 CPI (condensed pitch)</td>
</tr>
<tr>
<td>1-4</td>
<td>Normal</td>
<td>Italic</td>
</tr>
<tr>
<td>1-5</td>
<td>1/6&quot; line feed</td>
<td>1/8&quot; line feed</td>
</tr>
<tr>
<td>1-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td></td>
<td>International character set selection</td>
</tr>
<tr>
<td>1-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Switch 2

<table>
<thead>
<tr>
<th>Switch</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Paper-out detector on</td>
</tr>
<tr>
<td>2-2</td>
<td>Serial interface</td>
</tr>
<tr>
<td>2-3</td>
<td>7-bit interface</td>
</tr>
<tr>
<td>2-4</td>
<td>Auto LF with CR</td>
</tr>
</tbody>
</table>

DIP switch 1 controls the default settings for printing functions. It is located inside the case at the left rear. Figure H-2 shows the location of this switch. You must open the case to change the settings of this switch.

DIP switch 2 controls the interface. It can be reached from the back of the printer without opening the case. Figure H-3 shows the location of switch 2.

Switch Functions

Switch 1

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

1-2 This switch selects either normal or emphasized print for the default. If this switch is ON then Delta will print normal type when the power is turned on. If this switch is OFF then Delta will print emphasized type when the power is turned on. This switch is set ON at the factory.
Figure H-2. DIP switch 1, located inside Delta's case, controls default printing functions.
Figure H-3. DIP switch 2, which controls the interface, is located on the back of the printer.

1-3 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.

1-4 Switch 1-4 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 italic. This switch is set ON at the factory.

1-5 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 Delta 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.

1-6 – 1-8 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**

<table>
<thead>
<tr>
<th>Switch</th>
<th>USA</th>
<th>England</th>
<th>Germany</th>
<th>Denmark</th>
<th>France</th>
<th>Sweden</th>
<th>Italy</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>1-7</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>1-8</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

2-1 This switch disables the paper-out sensor. If this switch is ON the printer will signal the computer when it runs out of 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.

2-2 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.

2-3 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.

2-4 When this switch is ON, Delta 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

<table>
<thead>
<tr>
<th>Decimal Character</th>
<th>Function</th>
<th>Decimal Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NUL End tab settings</td>
<td>47</td>
</tr>
<tr>
<td>7</td>
<td>BEL Bell</td>
<td>111</td>
</tr>
<tr>
<td>8</td>
<td>BS Backspace</td>
<td>49</td>
</tr>
<tr>
<td>9</td>
<td>HT Horizontal tab</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>LF Line feed</td>
<td>51</td>
</tr>
<tr>
<td>11</td>
<td>VT Vertical tab</td>
<td>52</td>
</tr>
<tr>
<td>12</td>
<td>FF Form feed</td>
<td>53</td>
</tr>
<tr>
<td>13</td>
<td>CR Carriage return</td>
<td>54</td>
</tr>
<tr>
<td>14</td>
<td>SO Expanded print on</td>
<td>55</td>
</tr>
<tr>
<td>15</td>
<td>SI Condensed print on</td>
<td>56</td>
</tr>
<tr>
<td>17</td>
<td>DC1 On line</td>
<td>57</td>
</tr>
<tr>
<td>18</td>
<td>DC2 Pica pitch</td>
<td>58</td>
</tr>
<tr>
<td>19</td>
<td>DC3 Off line</td>
<td>59</td>
</tr>
<tr>
<td>20</td>
<td>DC4 Expanded print off</td>
<td>60</td>
</tr>
<tr>
<td>27</td>
<td>ESC Escape</td>
<td>61</td>
</tr>
<tr>
<td>30</td>
<td>RS End macro</td>
<td>62</td>
</tr>
<tr>
<td>32</td>
<td>Space</td>
<td>63</td>
</tr>
<tr>
<td>33</td>
<td>! Apostrophe</td>
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</tr>
<tr>
<td>34</td>
<td>&quot;</td>
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<tr>
<td>37</td>
<td>% %</td>
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<tr>
<td>38</td>
<td>&amp; &amp;</td>
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<td>39</td>
<td>' ' Apostrophe</td>
<td>70</td>
</tr>
<tr>
<td>40</td>
<td>(</td>
<td>71</td>
</tr>
<tr>
<td>41</td>
<td>)</td>
<td>72</td>
</tr>
<tr>
<td>42</td>
<td>* *</td>
<td>73</td>
</tr>
<tr>
<td>43</td>
<td>+ +</td>
<td>74</td>
</tr>
<tr>
<td>44</td>
<td>. . Comma</td>
<td>75</td>
</tr>
<tr>
<td>45</td>
<td>- - Hyphen</td>
<td>76</td>
</tr>
<tr>
<td>46</td>
<td>. . Period</td>
<td>77</td>
</tr>
</tbody>
</table>

*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.
<table>
<thead>
<tr>
<th>Decimal Character</th>
<th>Decimal Character</th>
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<tbody>
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<td>78</td>
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<td>102</td>
<td>127 DEL Delete</td>
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</table>

*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

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<th>Decimal</th>
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</table>
## ASCII Codes

### Special Characters

<table>
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<th>Function</th>
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</tr>
<tr>
<td>144</td>
<td>DC1</td>
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<td>145</td>
<td>Pica pitch</td>
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<td>146</td>
<td>DC2</td>
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<td>End macro</td>
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### Additional Characters

<table>
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<th>Function</th>
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<tr>
<td>183</td>
<td>+</td>
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<td>184</td>
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### Block Graphics Characters

<table>
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<th>Space</th>
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<td>253</td>
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<tr>
<td>238</td>
<td></td>
<td>254</td>
</tr>
</tbody>
</table>

- **Decimal Character:** A numeric representation of each character.
- **Space:** Indicates the space character.
- **Block Graphics Characters:** A list of various block graphics characters.
Appendix J

Character Style Charts

Standard Characters

32  
33  
34  
35  
36  
37  
38  
39  
40  
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42  
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45  
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58  
59
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<tr>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td></td>
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<tr>
<td>100</td>
<td>101</td>
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</tr>
<tr>
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<td>111</td>
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</tr>
<tr>
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<td>118</td>
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<td></td>
</tr>
<tr>
<td>120</td>
<td>121</td>
<td>122</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>125</td>
<td>126</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Italic Characters

<table>
<thead>
<tr>
<th>32</th>
<th>33</th>
<th>34</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 32" /></td>
<td><img src="image" alt="Character 33" /></td>
<td><img src="image" alt="Character 34" /></td>
<td><img src="image" alt="Character 35" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>36</th>
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<th>38</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 36" /></td>
<td><img src="image" alt="Character 37" /></td>
<td><img src="image" alt="Character 38" /></td>
<td><img src="image" alt="Character 39" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>40</th>
<th>41</th>
<th>42</th>
<th>43</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 40" /></td>
<td><img src="image" alt="Character 41" /></td>
<td><img src="image" alt="Character 42" /></td>
<td><img src="image" alt="Character 43" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>44</th>
<th>45</th>
<th>46</th>
<th>47</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 44" /></td>
<td><img src="image" alt="Character 45" /></td>
<td><img src="image" alt="Character 46" /></td>
<td><img src="image" alt="Character 47" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>48</th>
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<th>50</th>
<th>51</th>
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<tbody>
<tr>
<td><img src="image" alt="Character 48" /></td>
<td><img src="image" alt="Character 49" /></td>
<td><img src="image" alt="Character 50" /></td>
<td><img src="image" alt="Character 51" /></td>
</tr>
</tbody>
</table>

<table>
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<th>52</th>
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<th>54</th>
<th>55</th>
</tr>
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<tbody>
<tr>
<td><img src="image" alt="Character 52" /></td>
<td><img src="image" alt="Character 53" /></td>
<td><img src="image" alt="Character 54" /></td>
<td><img src="image" alt="Character 55" /></td>
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</tbody>
</table>

<table>
<thead>
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<th>56</th>
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<th>58</th>
<th>59</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 56" /></td>
<td><img src="image" alt="Character 57" /></td>
<td><img src="image" alt="Character 58" /></td>
<td><img src="image" alt="Character 59" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>60</th>
<th>61</th>
<th>62</th>
<th>63</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Character 60" /></td>
<td><img src="image" alt="Character 61" /></td>
<td><img src="image" alt="Character 62" /></td>
<td><img src="image" alt="Character 63" /></td>
</tr>
<tr>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>100</td>
<td>101</td>
<td>102</td>
<td>103</td>
</tr>
<tr>
<td>104</td>
<td>105</td>
<td>106</td>
<td>107</td>
</tr>
<tr>
<td>108</td>
<td>109</td>
<td>110</td>
<td>111</td>
</tr>
<tr>
<td>112</td>
<td>113</td>
<td>114</td>
<td>115</td>
</tr>
<tr>
<td>116</td>
<td>117</td>
<td>118</td>
<td>119</td>
</tr>
<tr>
<td>120</td>
<td>121</td>
<td>122</td>
<td>123</td>
</tr>
<tr>
<td>124</td>
<td>125</td>
<td>126</td>
<td></td>
</tr>
</tbody>
</table>
International Characters

<table>
<thead>
<tr>
<th>35</th>
<th>£</th>
<th>£</th>
<th>£</th>
<th>£</th>
<th>£</th>
<th>£</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>á</td>
<td>ã</td>
<td>à</td>
<td>é</td>
<td>è</td>
<td>è</td>
<td>è</td>
</tr>
<tr>
<td>91</td>
<td>Ľ</td>
<td>Ľ</td>
<td>Ľ</td>
<td>Ľ</td>
<td>Ľ</td>
<td>Ľ</td>
<td>Ľ</td>
</tr>
<tr>
<td>92</td>
<td>ŕ</td>
<td>ř</td>
<td>ř</td>
<td>ř</td>
<td>ř</td>
<td>ř</td>
<td>ř</td>
</tr>
<tr>
<td>93</td>
<td>I</td>
<td>U</td>
<td>U</td>
<td>S</td>
<td>A</td>
<td>é</td>
<td>ĺ</td>
</tr>
<tr>
<td>94</td>
<td>ü</td>
<td>ù</td>
<td>ù</td>
<td>ü</td>
<td>ü</td>
<td>ü</td>
<td>ü</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>England</td>
<td>Germany</td>
<td>Denmark</td>
<td>France</td>
<td>Sweden</td>
<td>Italy</td>
</tr>
<tr>
<td>---</td>
<td>-----</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>123</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>124</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Special Characters

160 161 162 163
164 165 166 167
168 169 170 171
172 173 174 175
176 177 178 179
180 181 182 183
184 185 186 187
188 189 190 191
Block Graphics Characters

224

228

232

236

240

244

248

252
Appendix K

Function Code Reference

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

PURPOSE: Tells what the function code does.
CODE: Control code mnemonic
(decimal ASCII) ASCII decimal equivalent
(hex ASCII) 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 Delta. 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: \(\text{ESC}\) “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 1-4 on.

REFERENCE: Chapter 3

PURPOSE: Select the italic character set.

CODE: \(\text{ESC}\) “4”
(decimal ASCII) 27 52
(hex ASCII) 1B 34

REMARKS: This command selects the italic character set. You can select the italic character set as the power-on default by turning DIP switch 1-4 off.

REFERENCE: Chapter 3
PURPOSE: Select an international character set.

CODE: \(\text{ESC}\) "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:

<table>
<thead>
<tr>
<th>(n)</th>
<th>Character set</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>1</td>
<td>England</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
</tr>
<tr>
<td>3</td>
<td>Denmark</td>
</tr>
<tr>
<td>4</td>
<td>France</td>
</tr>
<tr>
<td>5</td>
<td>Sweden</td>
</tr>
<tr>
<td>6</td>
<td>Italy</td>
</tr>
<tr>
<td>7</td>
<td>Spain</td>
</tr>
</tbody>
</table>

You can select a particular international character set as a power-on default, by adjusting the settings of DIP switches 1-6, 1-7, and 1-8.

REFERENCE: Chapter 6

**Font pitch controls**

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

CODE: \(\text{ESC}\) "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 Delta-10 and 136 on the Delta-15. You can select pica type as the power-on default by turning DIP switch 1-3 on.

REFERENCE: Chapter 3
PURPOSE: Set the print pitch to elite (12 characters/inch).

CODE: \[\text{\langle ESC\rangle "B" 2}\]  
(decimal ASCII) 27 66 2  
(hex ASCII) 1B 42 02  

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

REFERENCE: Chapter 3

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

CODE: \[\text{\langle ESC\rangle "B" 3}\]  
(decimal ASCII) 27 66 3  
(hex ASCII) 1B 42 03  

REMARKS: This command causes all subsequent printing 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 Delta-10 and 233 on the Delta-15. You can select condensed type as the power-on default by turning DIP switch 1-3 off.

REFERENCE: Chapter 3

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

CODE: \[\text{\langle DC2\rangle}\]  
(decimal ASCII) 18  
(hex ASCII) 12  

REMARKS: This command is the same as \text{\langle ESC\rangle "B" 1}, but can be used in applications where a single-character command is required.

REFERENCE: Chapter 3.
PURPOSE: Set the print pitch to condensed (17 characters/inch).

CODE:  
(decimal ASCII)  15  
(hex ASCII)  0F  

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

REFERENCE: Chapter 3

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

CODE:  
(ESC)  27  15  
(ESC)  1B  0F  

REMARKS: Same as \langle SI\rangle, above.

PURPOSE: Set the printer to expanded print.

CODE:  
(ESC) "W"  27  87  1  
(ESC)  1B  57  01  

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Normal</th>
<th>Expanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>10 CPI</td>
<td>5 CPI</td>
</tr>
<tr>
<td>Elite</td>
<td>12 CPI</td>
<td>6 CPI</td>
</tr>
<tr>
<td>Condensed</td>
<td>17 CPI</td>
<td>8.5 CPI</td>
</tr>
</tbody>
</table>

REFERENCE: Chapter 3
PURPOSE: Set the printer to expanded print for the remainder of the current line.

CODE: (decimal ASCII) 14
(hex ASCII) 0E

REMARKS: This command causes the printer to print expanded characters until a carriage return is sent. The character widths are shown above in the description of the \( \text{ESC} \) “W” 1 command.

REFERENCE: Chapter 3

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

CODE: (decimal ASCII) 27
(hex ASCII) 1B

REMARKS: Same as \( \text{SO} \), above.

REFERENCE: Chapter 3

PURPOSE: Cancels expanded print.

CODE: (decimal ASCII) 27
(hex ASCII) 1B

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

REFERENCE: Chapter 3

PURPOSE: Cancels expanded print.

CODE: (decimal ASCII) 20
(hex ASCII) 14

REMARKS: This command is the same as \( \text{ESC} \) “W” 0, but can be used in applications where a single-character command is required.

REFERENCE: Chapter 3
**Special print modes**

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

**CODE:**
- (decimal ASCII) 27 71
- (hex ASCII) 1B 47

**REMARKS:** This command causes all subsequent characters to be printed in double-strike mode. Double-strike mode causes all characters to be printed once, the paper moved up 1/144 inch, and the characters reprinted. Shifting in and out of double-strike mode on the same line can cause the line to slant slightly.

**REFERENCE:** Chapter 3

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

**CODE:**
- (decimal ASCII) 27 72
- (hex ASCII) 1B 48

**REMARKS:** This command cancels double-strike printing and returns the printer to normal printing.

**REFERENCE:** Chapter 3

**PURPOSE:** Select emphasized printing.

**CODE:**
- (decimal ASCII) 27 69
- (hex ASCII) 1B 45

**REMARKS:** This command causes all subsequent 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. Emphasized print can, however, be used with double-strike mode to obtain "correspondence quality" printing. You can select emphasized printing as the power-on default by turning DIP switch 1-2 off.

**REFERENCE:** Chapter 3
cancel emphasized printing.

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27</td>
<td>1B</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>46</td>
</tr>
</tbody>
</table>

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 1-2 on.

Reference: Chapter 3

select underlining.

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27</td>
<td>1B</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>2D</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>01</td>
</tr>
</tbody>
</table>

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

Reference: Chapter 3

cancel underlining.

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27</td>
<td>1B</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>2D</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>00</td>
</tr>
</tbody>
</table>

Remarks: This command cancels underlining and returns the printer to normal printing.

Reference: Chapter 3
Select superscripts.

```plaintext
PURPOSE: Select superscripts.
CODE:   \langle ESC\rangle "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 unidirectional 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 or enlarged print.
REFERENCE: Chapter 3
```

Select subscripts.

```plaintext
PURPOSE: Select subscripts.
CODE:   \langle ESC\rangle "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 3
```

Cancel superscripts and subscripts.

```plaintext
PURPOSE: Cancel superscripts and subscripts.
CODE:   \langle ESC\rangle "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 3
```
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, the print head, in effect, moves down the page.

Line feed controls

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

**CODE:**
- (decimal ASCII) 10
- (hex ASCII) 0A

**REMARKS:** The actual distance advanced by the line feed is set either through the setting of DIP switch 1-5 or through various codes which can be sent (see below). When DIP switch 2-4 is “on” a line feed is automatically generated whenever the printer receives a carriage return.

**REFERENCE:** Chapter 4

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

**CODE:**
- (decimal ASCII) 27 48
- (hex ASCII) 1B 30

**REMARKS:** This command sets the distance the paper advances 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 1-5 off.

**REFERENCE:** Chapter 4
PURPOSE: Change the line spacing to 7/72 inch.

CODE: \(\text{ESC}\) "1"
(decimal ASCII) 27 49
(hex ASCII) 1B 31

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

REFERENCE: Chapter 4

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

CODE: \(\text{ESC}\) "2"
(decimal ASCII) 27 50
(hex ASCII) 1B 32

REMARKS: This command sets the actual distance the paper advances 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 1-5 on.

REFERENCE: Chapter 4

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

CODE: \(\text{ESC}\) "A" n
(decimal ASCII) 27 65 n
(hex ASCII) 1B 41 n

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

REFERENCE: Chapter 4
PURPOSE: **Change the line spacing to n/144 inch.**

CODE: \[ \text{(decimal ASCII)} \quad 27 \\
\text{(hex ASCII)} \quad 1B \]

REMARKS: This command sets the actual distance traveled by the paper to be n/144 inch. The value of n must be between 0 and 255.

REFERENCE: Chapter 4

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

CODE: \[ \text{〈ESC〉 "J" } n \]

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

REFERENCE: Chapter 4

**Form feed controls**

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

CODE: \[ \text{〈FF〉} \]

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

REFERENCE: Chapter 4
Set page length to \( n \) lines.

**Purpose:**
Set page length to \( n \) lines.

**Code:**

\[
\text{\langle ESC\rangle} \quad \text{"C"} \quad n
\]

(Decimal ASCII)

\[
27 \quad 67 \quad n
\]

(Hex ASCII)

\[
1B \quad 43 \quad n
\]

**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 4

Set page length to \( n \) inches.

**Purpose:**
Set page length to \( n \) inches.

**Code:**

\[
\text{\langle ESC\rangle} \quad \text{"C"} \quad 0 \quad n
\]

(Decimal ASCII)

\[
27 \quad 67 \quad 0 \quad n
\]

(Hex ASCII)

\[
1B \quad 43 \quad 00 \quad n
\]

**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 1-1.

**Reference:**
Chapter 4

Set the top margin.

**Purpose:**
Set the top margin.

**Code:**

\[
\text{\langle ESC\rangle} \quad \text{"R"} \quad n
\]

(Decimal ASCII)

\[
27 \quad 82 \quad n
\]

(Hex ASCII)

\[
1B \quad 52 \quad n
\]

**Remarks:**
This command sets the margin at the top of the page to \( n \) 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 4
PURPOSE: Set the bottom margin.

CODE: \(\text{\textbackslash ESC} \text{"N" } n\)  
(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 4

PURPOSE: Cancel top and bottom margins.

CODE: \(\text{\textbackslash ESC} \text{"O"}\)  
(decimal ASCII) 27 79  
(hex ASCII) 1B 4F  

REMARKS: This command cancels both the top margin set by \(\text{\textbackslash ESC} \text{"R" } n\) and the bottom margin set by \(\text{\textbackslash ESC} \text{"N" } n\).

REFERENCE: Chapter 4

**Vertical tabs**

PURPOSE: Advance paper to the next vertical tab position.

CODE: \(\text{\textbackslash VT}\)  
(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 5
PURPOSE:  Set vertical tab positions.

CODE:  
(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 5

PURPOSE:  Advance the paper n lines.

CODE:  
<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 4
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 2-4 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 4

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 Delta-10 the maximum print position for pica pitch is 80, for elite is 96, and for condensed pitch is 136. For Delta-15 the maximum print position for pica pitch is 136, for elite is 163, and for condensed pitch is 233.

REFERENCE: Chapter 5
PURPOSE: Set the right print margin.

CODE:  
(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.

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

CODE:  
(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 5

PURPOSE: Set horizontal tab positions.

CODE:  
(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 5
PURPOSE: Skip n print positions.
CODE: \(\text{\textlangle ESC\rangle \ "b" \ n}\) (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 5

PURPOSE: Move the print head back one print position (backspace).
CODE: \(\text{\textlangle BS\rangle}\) (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 6
Download Character Commands

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

**CODE:**

```plaintext
(ESC) "*"  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 7

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

**CODE:**

```plaintext
(ESC) "*"  0
27 42 0
1B 2A 00
```

**REMARKS:** This command takes all of the characters in the standard ASCII character (others don't work) 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 7
PURPOSE: Select download character set with proportional spacing.

CODE:
(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 7

PURPOSE: Cancel download character set with proportional spacing.

CODE:
(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 7

PURPOSE: Select download character set with normal spacing.

CODE:
(DECIMAL ASCII) 27 36 1
(HEX ASCII) 27 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 7
PURPOSE: Cancel download character set with normal spacing.

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

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

REFERENCE: Chapter 7

Commands to Control Graphics

PURPOSE: Print normal-density graphics.

CODE: (ESC) "K" n1 n2 m1 m2 m3...
      27 75 n1 n2 m1 m2 m3...
      1B 4B n1 n2 m1 m2 m3...

REMARKS: This command selects 60 dots-per-inch, 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. There must be the correct number of graphic characters following n2. The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 8
PURPOSE: **Print double-density graphics**

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27 76 n1 n2 m1 m2 m3...</td>
<td>1B 4C n1 n2 m1 m2 m3...</td>
</tr>
</tbody>
</table>

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. There must be the correct number of graphic characters following \( n2 \). The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 8

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

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27 121 n1 n2 m1 m2 m3...</td>
<td>1B 79 n1 n2 m1 m2 m3...</td>
</tr>
</tbody>
</table>

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. There must be the correct number of graphic characters following \( n2 \). The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 8

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

<table>
<thead>
<tr>
<th>CODE:</th>
<th>(decimal ASCII)</th>
<th>(hex ASCII)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27 122 n1 n2 m1 m2 m3...</td>
<td>1B 7A n1 n2 m1 m2 m3...</td>
</tr>
</tbody>
</table>

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. There must be the correct number of graphic characters following \( n2 \). The ASCII value of these characters determine which pins are fired for each character.

REFERENCE: Chapter 8
Macro Instruction Commands

PURPOSE: Define macro instruction.

CODE: 
(Decimal ASCII) 27 43 ...
(Hex ASCII) 1B 2B ...

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 6

PURPOSE: Execute macro instruction.

CODE: 
(Decimal ASCII) 27 33
(Hex ASCII) 27 21

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

REFERENCE: Chapter 6

Other Commands

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

CODE: 
(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 6
PURPOSE: Set the value of the eighth data bit to logical 0.

CODE:  
(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 6

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

CODE:  
(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 only a 7-bit interface to resume normal functions after accessing those characters whose ASCII code is greater than 127.

REFERENCE: Chapter 6

PURPOSE: Delete the last character sent.

CODE:  
(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 6
**PURPOSE:** 
*Set printer off line.*

**CODE:**  
(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 \(\text{DC1}\), 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 6

**PURPOSE:** 
*Set printer on line.*

**CODE:**  
(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 6

**PURPOSE:** 
*Sound printer bell.*

**CODE:**  
(Decimal ASCII) 7  
(Hex ASCII) 07

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

**REFERENCE:** Chapter 6
PURPOSE: **Disable the printer bell.**

CODE:  
(Decimal ASCII) 27 89 0
(Hex ASCII) 1B 59 00

REMARKS: This command causes the printer to ignore the \(<\text{BEL}\>\) character.

REFERENCE: Chapter 6

PURPOSE: **Enable the printer bell.**

CODE:  
(Decimal ASCII) 27 89 1
(Hex ASCII) 1B 59 01

REMARKS: This command causes the printer to respond to the \(<\text{BEL}\>\) character normally by sounding the printer bell.

REFERENCE: Chapter 6

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

CODE:  
(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. This command is useful when printing on single sheets of paper because it allows printing to the bottom of the page.

REFERENCE: Chapter 6

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

CODE:  
(Decimal ASCII) 27 57
(Hex ASCII) 1B 39

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

REFERENCE: Chapter 6
PURPOSE: Select uni-directional printing.

CODE:  
(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 6

PURPOSE: Cancel uni-directional printing.

CODE:  
(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 6

PURPOSE: Initialize printer.

CODE:  
(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 is preserved with this command.

REFERENCE: Chapter 6
Appendix L

Command Summary in Numeric Order

<table>
<thead>
<tr>
<th>Control code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHR$(0)</td>
<td>End tab settings</td>
</tr>
<tr>
<td>CHR$(7)</td>
<td>Sound bell</td>
</tr>
<tr>
<td>CHR$(8)</td>
<td>Backspace</td>
</tr>
<tr>
<td>CHR$(9)</td>
<td>Horizontal tab</td>
</tr>
<tr>
<td>CHR$(10)</td>
<td>Line feed</td>
</tr>
<tr>
<td>CHR$(11)</td>
<td>Vertical tab</td>
</tr>
<tr>
<td>CHR$(12)</td>
<td>Form feed</td>
</tr>
<tr>
<td>CHR$(13)</td>
<td>Carriage return</td>
</tr>
<tr>
<td>CHR$(14)</td>
<td>Expanded print</td>
</tr>
<tr>
<td>CHR$(15)</td>
<td>Condensed print</td>
</tr>
<tr>
<td>CHR$(17)</td>
<td>On line</td>
</tr>
<tr>
<td>CHR$(18)</td>
<td>Pica type</td>
</tr>
<tr>
<td>CHR$(19)</td>
<td>Off line</td>
</tr>
<tr>
<td>CHR$(20)</td>
<td>Cancel enlarged print</td>
</tr>
<tr>
<td>CHR$(27)</td>
<td>Escape (indicated as &lt;ESC&gt; below)</td>
</tr>
<tr>
<td>CHR$(30)</td>
<td>End macro instruction definition</td>
</tr>
<tr>
<td>CHR$(127)</td>
<td>Delete last character</td>
</tr>
<tr>
<td>&lt;ESC&gt; CHR$(14)</td>
<td>Expanded print</td>
</tr>
<tr>
<td>&lt;ESC&gt; CHR$(15)</td>
<td>Condensed print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;!&quot;</td>
<td>Use macro</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;#&quot;</td>
<td>Accept eighth bit as is</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;$&quot; CHR$(0)</td>
<td>Cancel normal download characters</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;$&quot; CHR$(1)</td>
<td>Use normal download characters</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;*&quot; CHR$(0)</td>
<td>Copy ROM characters to download RAM</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;*&quot; CHR$(1) n1 n2 m1 m2 ... m11</td>
<td>Define download character</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;+&quot; ... CHR$(30)</td>
<td>Define macro</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; CHR$(0)</td>
<td>Stop underlining</td>
</tr>
<tr>
<td>Control code</td>
<td>Function</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; CHR$(1)</td>
<td>Start underlining</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;0&quot;</td>
<td>1/8 inch line feed</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;1&quot;</td>
<td>7/72 inch line feed</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;2&quot;</td>
<td>1/6 inch line feed</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;3&quot; n</td>
<td>n/144 inch line feed</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;4&quot;</td>
<td>Italic print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;5&quot;</td>
<td>Cancel italic print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;7&quot; n</td>
<td>Select international character set</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;8&quot;</td>
<td>Ignore paper-out signal</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;9&quot;</td>
<td>Enable paper-out signal</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot;</td>
<td>Set eighth bit to 0</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;&gt;&quot;</td>
<td>Set eighth bit to 1</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;@&quot;</td>
<td>Reset the printer</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;A&quot; n</td>
<td>n/72 inch line feed</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;B&quot; CHR$(1)</td>
<td>Pica print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;B&quot; CHR$(2)</td>
<td>Elite print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;B&quot; CHR$(3)</td>
<td>Condensed print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;C&quot; n</td>
<td>Set page length to n lines</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;C&quot; CHR$(0) n</td>
<td>Set page length to n inches</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;D&quot; . . . CHR$(0)</td>
<td>Set horizontal tabs</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;E&quot;</td>
<td>Emphasized print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;F&quot;</td>
<td>Cancel emphasized print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;G&quot;</td>
<td>Double-strike print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;H&quot;</td>
<td>Cancel double-strike print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;]&quot; n</td>
<td>Single line feed of n/144 inches</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;K&quot; n1 n2</td>
<td>Single density graphics</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;L&quot; n1 n2</td>
<td>Double density graphics</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;M&quot; n</td>
<td>Set left margin at column n</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;N&quot; n</td>
<td>Set bottom margin at n lines</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;O&quot;</td>
<td>Cancel top and bottom margins</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;P&quot; . . . CHR$(0)</td>
<td>Set vertical tabs</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;Q&quot; n</td>
<td>Set right margin at column n</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;R&quot; n</td>
<td>Set top margin at line n</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;S&quot; CHR$(0)</td>
<td>Superscript on</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;S&quot; CHR$(1)</td>
<td>Subscript on</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;T&quot;</td>
<td>Cancel super and subscripts</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;U&quot; CHR$(0)</td>
<td>Bidirectional print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;U&quot; CHR$(1)</td>
<td>Unidirectional print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;W&quot; CHR$(0)</td>
<td>Cancel enlarged print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;W&quot; CHR$(1)</td>
<td>Enlarged print</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;X&quot; CHR$(0)</td>
<td>Cancel proportional download characters</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;X&quot; CHR$(1)</td>
<td>Use proportional download characters</td>
</tr>
<tr>
<td>Control code</td>
<td>Function</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>(ESC) &quot;Y&quot; CHR$(0)</td>
<td>Disable bell</td>
</tr>
<tr>
<td>(ESC) &quot;Y&quot; CHR$(1)</td>
<td>Enable bell</td>
</tr>
<tr>
<td>(ESC) &quot;a&quot; n</td>
<td>Advance n line feeds</td>
</tr>
<tr>
<td>(ESC) &quot;b&quot; n</td>
<td>Tab over n columns</td>
</tr>
<tr>
<td>(ESC) &quot;y&quot; n1 n2</td>
<td>Double speed, double density graphics</td>
</tr>
<tr>
<td>(ESC) &quot;z&quot; n1 n2</td>
<td>Quadruple density graphics</td>
</tr>
</tbody>
</table>
### Appendix M

**ASCII Code Conversion Chart**

#### Standard ASCII Codes

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Binary</th>
<th>Control character</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00</td>
<td>0000 0000</td>
<td>Ctrl-@</td>
<td>NUL</td>
</tr>
<tr>
<td>1</td>
<td>01</td>
<td>0000 0001</td>
<td>Ctrl-A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>02</td>
<td>0000 0010</td>
<td>Ctrl-B</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>03</td>
<td>0000 0011</td>
<td>Ctrl-C</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>04</td>
<td>0000 0100</td>
<td>Ctrl-D</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>05</td>
<td>0000 0101</td>
<td>Ctrl-E</td>
<td></td>
</tr>
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Appendix N

Technical Specifications

Printing

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**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
- Bit rate: 110, 300, 600, 1200, 2400, 4800, 9600 baud
- Word length: 1 start bit, 7 or 8 data bits, Odd, even or no parity, 1 or 2 stop bits
- Handshaking: Serial busy, 1 byte mode, Serial busy, 1 block mode, ACK mode, XON/XOFF mode
Appendix O

The Parallel Interface

Delta 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 STROBE pulses
- **Handshaking:** ACK and BUSY signals
- **Logic level:** Compatible with TTL level

Delta’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 O-1.

Functions of the Connector Signals

Communications between the computer and the Delta 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 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 Delta has successfully received the byte of data from the computer it sets pin 10 low for approximately 9 microse-
conds. This signal acknowledges the receipt of the data and so is called the ACK signal.

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Circuit Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA 1 - DATA 8</td>
<td>74LS Compatible</td>
</tr>
<tr>
<td>(To Printer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.7kΩ</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>STROBE</td>
<td>74LS Compatible</td>
</tr>
<tr>
<td>(To Printer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.7kΩ</td>
</tr>
<tr>
<td></td>
<td>100Ω</td>
</tr>
<tr>
<td></td>
<td>470pF</td>
</tr>
<tr>
<td>BUSY, ACK</td>
<td>74LS Compatible</td>
</tr>
<tr>
<td>(From Printer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.7kΩ</td>
</tr>
</tbody>
</table>

**Figure O-1.** Delta interface timing diagram.

**Figure O-2.** Typical interface circuit.
Table O-1

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

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

Serial Interface Specifications

Delta provides a very flexible RS232C serial interface. It can communicate at rates from 110 to 9600 baud and supports four different kinds of handshaking. The operating specifications of the interface are as follows:

Data transfer rate: 110-9600 baud
Word length: 1 start bit
7 or 8 data bits
Odd, even or no parity
1 or 2 stop bits
Signal levels: Mark or OFF, −3 to −15 volts
Space or ON, +3 to +15 volts
Handshaking: Serial busy, 1 byte mode
Serial busy, 1 block mode
ACK mode
XON/XOFF mode

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

Configuring the Serial Interface

DIP switch 3 controls the configuration of the serial interface. Figure P-1 shows the location of DIP switch 3. You must remove Delta’s upper case to reach this switch. See Chapter 10 for instructions on how to do this. Table P-2 describes the functions of the individual switches in DIP switch 3.

Delta’s Serial Protocols

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

**Table P-1**

*Serial Interface Pin Functions*

<table>
<thead>
<tr>
<th>Signal Pin No.</th>
<th>Signal Name</th>
<th>Direction</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>—</td>
<td>Printer’s chassis ground.</td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>OUT</td>
<td>This pin carries data from the printer.</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
<td>IN</td>
<td>This pin carries data to the printer.</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>OUT</td>
<td>This is ON when the printer is ready to receive data.</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data.</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data. Delta does not check this pin.</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>—</td>
<td>Signal ground</td>
</tr>
<tr>
<td>8</td>
<td>DCD</td>
<td>IN</td>
<td>This pin is ON when the computer is ready to send data.</td>
</tr>
<tr>
<td>9-10</td>
<td>N/C</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>RCH</td>
<td>OUT</td>
<td>This is the signal line for the serial busy protocols. This pin goes OFF when Delta’s buffer fills, and ON when Delta is ready to receive data. In the busy protocols this line carries the same signal as pin 20.</td>
</tr>
<tr>
<td>12</td>
<td>N/C</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>—</td>
<td>Signal ground</td>
</tr>
<tr>
<td>14-19</td>
<td>N/C</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>OUT</td>
<td>Delta turns this pin ON when it is ready to receive data.</td>
</tr>
<tr>
<td>21-25</td>
<td>N/C</td>
<td>Unused</td>
<td></td>
</tr>
</tbody>
</table>

**Table P-2**

*DIP Switch 3*

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>7 data bits</td>
<td>8 data bits</td>
</tr>
<tr>
<td>3-2</td>
<td>Parity checked</td>
<td>No parity</td>
</tr>
<tr>
<td>3-3</td>
<td>Handshaking protocols—see below</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>Odd parity</td>
<td>Even parity</td>
</tr>
<tr>
<td>3-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-7</td>
<td>Data transfer rate—see below</td>
<td></td>
</tr>
<tr>
<td>3-8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure P-1. DIP switch 3 is located inside the case.
**Table P-3**

*Handshaking protocols*

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Switch 3-3</th>
<th>Switch 3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial busy, 1 byte mode</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial busy, 1 block mode</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>ACK mode</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>XON/XOFF</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Table P-4**

*Data transfer rates*

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>Switch 3-6</th>
<th>Switch 3-7</th>
<th>Switch 3-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>110</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>300</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>600</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>1200</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2400</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>4800</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>9600</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Serial busy protocols**

In the serial busy protocols, Delta 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 Delta 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 Delta’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 Delta’s buffer approaches capacity Delta will send a DC3 (ASCII 19) on TXD (pin 2) to tell the computer that it must stop sending data. When Delta is able to receive more data it sends a DC1 (ASCII 17) on TXD. The computer can then send more data until Delta sends another DC3.
ACK protocol

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

Figure P-2. Typical data byte on the serial interface.
Serial busy protocol (1 byte) mode

RXD
Pin 3

DTR
Pin 20

RXD
Pin 11

Serial busy protocol (1 block) mode

RXD
Pin 3

DTR
Pin 20

RXD
Pin 11

XON/XOFF protocol

RXD
Pin 3

DTR
Pin 20

TXD
Pin 2

ACK protocol

RXD
Pin 3

DTR
Pin 20

TXD
Pin 2

Figure P-3. Serial protocol timing charts.
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### DIP Switch Settings

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP Switch 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>11” page length</td>
<td>12” page length</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>Normal print</td>
<td>Emphasized print</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>10 CPI (pica pitch)</td>
<td>17 CPI (condensed pitch)</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Normal</td>
<td>Italic</td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>1/6” line feed</td>
<td>1/8” line feed</td>
<td></td>
</tr>
<tr>
<td>1-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td>International character set selection—see below</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| DIP Switch 2 |
| 2-1 | Paper-out detector on | Ignore paper-out |
| 2-2 | Serial interface | Parallel interface |
| 2-3 | 7-bit interface | 8-bit interface |
| 2-4 | Auto LF with CR | LF must be from host |

| DIP Switch 3 |
| 3-1 | 7 data bits | 8 data bits |
| 3-2 | Parity checked | No parity |
| 3-3 | Handshaking protocols—see below |
| 3-4 | Odd parity | Even parity |
| 3-5 |
| 3-6 |
| 3-7 | Data transfer rate—see below |
| 3-8 |

### International character sets

<table>
<thead>
<tr>
<th>Switch</th>
<th>USA</th>
<th>England</th>
<th>Germany</th>
<th>Denmark</th>
<th>France</th>
<th>Sweden</th>
<th>Italy</th>
<th>Spain</th>
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</thead>
<tbody>
<tr>
<td>1-6</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>1-7</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>1-8</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

### Handshaking protocols

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Switch 3-3</th>
<th>Switch 3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial busy, 1 byte mode</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Serial busy, 1 block mode</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>ACK mode</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>XON/XOFF</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

### Data transfer rates

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>Switch 3-6</th>
<th>Switch 3-7</th>
<th>Switch 3-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>110</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>300</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>600</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>1200</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>2400</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>4800</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>9600</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

Use the “setting” column to record the way the switches are set in your printer.
# Command Quick Reference

## Commands to control print style

- `<ESC>“5”` Cancel italic print
- `<ESC>“4”` Italic print
- `<ESC>“7”` Select international character set

### Font pitch controls

- `<ESC>“B”` CHR$(1) Pica pitch
- `<ESC>“B”` CHR$(2) Elite pitch
- `<ESC>“B”` CHR$(3) Condensed pitch
- CHR$(18) Pica pitch
- CHR$(15) Condensed pitch
- `<ESC>` CHR$(15) Condensed pitch
- `<ESC>“W”` CHR$(1) Expanded print
- CHR$(14) Expanded print
- `<ESC>` CHR$(14) Expanded print
- `<ESC>“W”` CHR$(0) Cancel expanded print
- CHR$(20) Cancel expanded print

### Special print modes

- `<ESC>“G”` Double-strike print
- `<ESC>“H”` Cancel double-strike print
- `<ESC>“E”` Emphasized print
- `<ESC>“F”` Cancel emphasized print
- `<ESC>“-”` CHR$(1) Start underlining
- `<ESC>` CHR$(0) Stop underlining
- `<ESC>“S”` CHR$(0) Superscript on
- `<ESC>` CHR$(1) Subscript on
- `<ESC>“T”` Cancel super and subscripts

## Commands to control vertical position of the print head

- CHR$(10) Line feed
- `<ESC>“0”` Set line feed to 1/8 inch
- `<ESC>“1”` Set line feed to 7/72 inch
- `<ESC>“2”` Set line feed to 1/6 inch
- `<ESC>“A”` n Set line feed to n/72 inch
- `<ESC>“3”` n Set line feed to n/144 inch
- `<ESC>“J”` n Single line feed of n/144 inches

### Form feed controls

- CHR$(12) Form feed
- `<ESC>“C”` n Set page length to n lines
- `<ESC>“C”` CHR$(0) n Set page length to n inches
- `<ESC>“R”` n Set top margin at line n
- `<ESC>“N”` n Set bottom margin at n lines
- `<ESC>“O”` Cancel top and bottom margins
**Vertical tabs**

CHR$(11)  
(ESC) "P" . . . CHR$(0)  
(ESC) "a" n  

**Commands to control horizontal position of the print head**

CHR$(13)  
(ESC) "M" n  
(ESC) "Q" n  
CHR$(9)  
(ESC) "D" . . . CHR$(0)  
(ESC) "b" n  
CHR$(8)  

**Download character commands**

(ESC) "*" CHR$(1) n1 n2 m1 m2 . . . m11  
(ESC) "*" CHR$(0)  
(ESC) "X" CHR$(1)  
(ESC) "X" CHR$(0)  
(ESC) "$" CHR$(1)  
(ESC) "$" CHR$(0)  

**Commands to control graphics**

(ESC) "K" n1 n2  
(ESC) "L" n1 n2  
(ESC) "y" n1 n2  
(ESC) "z" n1 n2  

**Macro instruction commands**

(ESC) "+" . . . CHR$(30)  
(ESC) "!"  

**Other function codes**

(ESC) "="  
(ESC) "#"  
CHR$(127)  
CHR$(19)  
CHR$(17)  
CHR$(7)  
(ESC) "Y" CHR$(0)  
(ESC) "Y" CHR$(1)  
(ESC) "g"  
(ESC) "g"  
(ESC) "U" CHR$(1)  
(ESC) "U" CHR$(0)  
(ESC) "@"  

---