

II DIGITAL RESEARCH

Post Office Box 579, Pacific Grove, California 93950, (408) 373-3403

DDT UTILITIES

CP/M VERSION _____

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DIGITAL RESEARCH

P. O. BOX 579

PACIFIC GROVE, CA. 93950

SER. # _____

```

2>
3>
4>
5>
6>
7>
8> 0100
9> 0005 =
10> 0200 =
11>
12> 0100 010000
13> 0103 C5
14> 0104 210700
15>
16> 0107 79
17> 0108 B7
18> 0109 7E
19> 010A CA0E01
20> 010D 3D
21> 010E 90
22> 010F 57
23> 0110 1E00
24> 0112 D5
25>
26> 0113 210002
27> 0116 78
28> 0117 B1
29> 0118 CA2301
30> 0118 08
31> 011C 7E
32> 011D 12
33> 011E 13
34> 011F 23
35> 0120 C31601
36>
37>
38>
39> 0123 D1
40> 0124 C1
41> 0125 E5
42> 0126 62
43>
44> 0127 78
45> 0128 B1
46> 0129 CA4501
47>
48>
49> 012C 08
50> 012D 78
51> 012E E607
52> 0130 C23001
53>
54> 0133 E3
55> 0134 7E
56> 0135 23
57> 0136 E3
58> 0137 6F
59> 0138 7D
60> 0139 17

DDT UTILITY RELOCATOR PROGRAM. INCLUDED WITH THE UTILITY
TO MOVE IT UP NEXT TO THE LOWEST MODULE BENEATH THE DDT
PROGRAM. ALSO CHANGES THE BRANCH INSTRUCTION AT LOCATION
5H TO ADDRESS THE NEWLY INSERTED MODULE, AND GIVES IT CONTROL
AT THE PRIMARY ENTRY POINT.

ORG 100H
EQU 0005H
MODULE EQU 200H ;MODULE ADDRESS

LXI B,0 ;ADDRESS FIELD FILLED-IN WHEN MODULE BUILT
PUSH B ;USING DDT'S STACK
LXI H,BDOS+2;ADDRESS FIELD OF JUMP TO BDOS (TOP MEMORY)
CHECK LEAST SIGNIFICANT BYTE OF SIZE FIELD
MOV A,C
ORA A ;ZERO FLAG SET IF = 00H
MOV A,M ;A HAS HIGH ORDER ADDRESS OF MEMORY TOP
JZ NODEC
DCR A ;PAGE DIRECTLY BELOW BDOS
SUB B ;A HAS HIGH ORDER ADDRESS OF RELOC AREA
MOV D,A
MVI E,0 ;D,E ADDRESSES BASE OF RELOC AREA
PUSH D ;SAVE FOR RELOCATION BELOW

LXI H,MODULE;READY FOR THE MOVE
MOV A,B ;BC=0?
ORA C
JZ RELOC
DCX B ;COUNT MODULE SIZE DOWN TO ZERO
MOV A,M ;GET NEXT ABSOLUTE LOCATION
STAX D ;PLACE IT INTO THE RELOC AREA
INX D
INX H
JMP MOVE

;STORAGE MOVED, READY FOR RELOCATION
HL ADDRESSES BEGINNING OF THE BIT MAP FOR RELOCATION
POP D ;RECALL BASE OF RELOCATION AREA
POP B ;RECALL MODULE LENGTH
PUSH H ;SAVE BIT MAP BASE IN STACK
MOV H,D ;RELOCATION BIAS IS IN D

MOV A,B ;BC=0?
ORA C
JZ ENDREL

NOT END OF THE RELOCATION, MAY BE INTO NEXT BYTE OF BIT MAP
DCX B ;COUNT LENGTH DOWN
MOV A,E
ANI 111B ;0 CAUSES FETCH OF NEXT BYTE
JNZ REL1
FETCH BIT MAP FROM STACKED ADDRESS
XTHL
MOV A,M ;NEXT 8 BITS OF MAP
INX H
XTHL ;BASE ADDRESS GOES BACK TO STACK
MOV L,A ;L HOLDS THE MAP AS WE PROCESS 8 LOCATIONS
MOV A,L
RAL ;CY SET TO 1 IF RELOCATION NECESSARY

```

UTILMO1

013A 6F
013B D24101

013E 1A
013F 84
0140 12
0141 13
0142 C32701

0145 D1
0146 2E00

0148 220600
0149 2E03
014D E9
014E

MOV L,A ;BACK TO L FOR NEXT TIME AROUND
JNC REL2 ;SKIP RELOCATION IF CY=0

CURRENT ADDRESS REQUIRES RELOCATION
LDAX D
ADD H ;APPLY BIAS IN H
STAX D
INX D ;TO NEXT ADDRESS
JMP REL0 ;FOR ANOTHER BYTE TO RELOCATE

ENDREL; END OF RELOCATION
POP D ;CLEAR STACKED ADDRESS
MVI L,0
ENTRY ADDRESS IS AT H.L + 3
THE MODULE CONTAINS A JUMP AROUND TO NEXT MODULE
CHANGE ADDRESS FIELD AT 5H TO ADDRESS BEGINNING OF MODULE
SHLD BDOS+1 ;CHANGE ENTRY ADDRESS
MVI L,3 ;MODULE ADDRESS + 3
PCHL ;GONE...
END

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P. O. BOX 579
PACIFIC GROVE, CA 93950
SERIAL # UTILITY MOVE PDS

HISTO

```

1>
2>
3> 0000 HISTO, ORG 000H
4>
5> COPYRIGHT (C) 1976
6> DIGITAL RESEARCH
7> BOX 579 PACIFIC GROVE
8> CALIFORNIA 93950
9>
10> HISTOGRAM OF PROGRAM EXECUTION FREQUENCY
11> DDT ENTRY POINT
12> 0039 = DDTBASE EQU 7*8+1 ;RESTART ENTRY POINT HAS BASE
13> 0000 C30004 JMP ENDMOD ;END OF THIS MODULE (TO BEGINNING OF NEXT)
14> 0003 C30F00 INIE: JMP INITIAL
15> 0006 C3F100 COLE: JMP COLLECT
16> 0009 C32F01 DISE: JMP DISPLAY
17> 000C 434F505952 DB ;COPYRIGHT (C) 1976 DIGITAL RESEARCH
18> DDT SUBROUTINES
19> GETBUFF, READ NEXT COMMAND BUFFER
20> LXI B,3
21> 0032 010300 JMP GODDT
22> 0035 C35900
23>
24> GNC, ;READ NEXT CHARACTER TO REGISTER A
25>
26> 0038 010600 LXI B,6
27> 003B C35900 JMP GODDT
28>
29> PCHAR, ;PRINT CHARACTER FROM REGISTER A
30>
31> 003E 010900 LXI B,9
32> 0041 C35900 JMP GODDT
33>
34> PBYTE, ;PRINT DECODED BYTE FROM REGISTER A
35>
36> 0044 010C00 LXI B,12
37> 0047 C35900 JMP GODDT
38>
39> PADDR, ;PRINT DECODED ADDRESS FROM D,E
40>
41> 004A 010F00 LXI B,15
42> 004D C35900 JMP GODDT
43>
44> SCANEXP,
45> SCAN COMMAND LINE FOR 1,2, OR 3 EXPRESSIONS
46> 0050 011200 LXI B,18
47> 0053 C35900 JMP GODDT
48>
49> GETVAL,
50> READ NEXT VALUE FROM SCANEXP CALL TO H,L
51> 0056 011500 LXI B,21
52>
53> GODDT, ;PERFORM THE DDT CALL
54> 0059 2A3900 LHL DDTBASE
55> 005C 09 DAD B
56> 005D E9 PCHL
57>
58>
59> 000D = CR EQU 0DH

```

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 SER. # HISTOGRAM GENERATOR

```

1> 000A = LF EQU 0AH
2> 0040 = HSIZE EQU 64 ;SIZE OF HISTOGRAM (MUST CORRESPOND TO SHR)
3>
4>
5>
6>
7> 005E 7B ;USEFUL SUBROUTINES
8> 005F 95 ;COMPUTE THE DIFFERENCE: DE = DE - HL
9> 0060 3F MOV A,E
10> 0061 7A SUB L
11> 0062 9C MOV E,A
12> 0063 57 MOV A,D
13> 0064 C9 SBB H
14>
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```

SHR6, ;DIVIDE H,L BY 64 (MUST CORRESPOND TO HSIZE)
 MOV A,L
 MOV L,H
 MVI H,0
 DAD H ;HIGH ORDER * 2
 DAD H ;HIGH ORDER * 4
 RLC ;MOVE HIGH TWO BITS OF LOW BYTE
 RLC ;TO POSITION IN A
 ANI 11B ;MASK TO REPLACE LOW BITS OF H,L
 ORA L
 MOV L,A
 RET

CRLF, ;SEND CRLF CHARACTERS
 MVI A,CR
 CALL PCHAR
 MVI A,LF
 CALL PCHAR
 RET

PRINT, ;PRINT MESSAGE IN D,E 'TIL FIRST SER.#
 LDAX D
 ORA A
 RZ
 ;MORE TO PRINT
 INX D
 PUSH D
 CALL PCHAR
 POP D
 JMP PRINT

INERR, LXI D,ERNMSG
 CALL PRINT

INITIAL, ;PRINCIPAL PROCESSORS
 LXI D,BOUNDS ;SEND STARTING MESSAGE
 CALL PRINT
 CALL GETBUFF ;GET BUFFER FULL FOR BOUNDS SCAN
 CALL SCANEXP ;SHOULD BE 2 PARAMETERS
 JC INERR ;CANNOT BE ,X,X
 CPI 2
 JNZ INERR ;1,3?
 CALL GETVAL ;FIRST PARAMTER TO H,L
 SHLD LB ;LOWER BOUND SAVED
 PUSH H ;COMPARED WITH UPPER BOUND LATER

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```

120> 00AA CD5600
121> 00AD 23
122> 00AE 227902
123> 00B1 D1
124> 00B2 EB
125> 00B3 CD5E00
126> 00B6 DA8900
127>
128> 00B9 EB
129> 00BA CD6500
130> 00BD 22F002
131> 00C0 217602
132> 00C3 0E00
133> 00C5 3600
134> 00C7 23
135> 00C8 00
136> 00C9 C2C500
137>
138> 00CC 114602
139> 00CF CD7D00
140> 00D2 110300
141> 00D5 CD4A00
142> 00D8 115502
143> 00DB CD7D00
144> 00DE 110600
145> 00E1 CD4A00
146> 00E4 116202
147> 00E7 CD7D00
148> 00EA 110900
149> 00ED CD4A00
150> 00F0 C9
151>
152>
153>
154>
155>
156>
157> 00F1 D5
158> 00F2 2A7902
159> 00F5 EB
160> 00F6 CD5E00
161> 00F9 D1
162> 00FA DA2C01
163> 00FD 2A7702
164> 0100 CD5E00
165> 0103 DA2C01
166>
167>
168> 0106 0E00
169> 0108 2AF002
170>
171> 0108 CD5E00
172> 010E DA1501
173> 0111 0C
174> 0112 C3B001
175>
176>
177>
178> 0115 0600
179> 0117 217802

```

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CALL GETVAL      ;UPPER BOUND
INX H
SHLD UB
POP D
;LOWER IN D,E UPPER IN H,L
XCHG
CALL DIFF        ;UB>LB?
JC INERR
;DIFFERENCE IN D,E - COMPUTE INCREMENT
XCHG
CALL SHR6        ;DIVIDE BY 64
SHLD INC
LXI H,HVEC      ;CLEAR THE HISTGRAM VECTOR
MVI C,HSIZE*2
FILL0, MVI M,0
INX H
DCR C
JNZ FILL0
VECTOR FILLED, GO BACK TO THE DEBUGGER
LXI D,INMSG
CALL PRINT
LXI D,INIE
CALL PADDR      ;INITIAL = XXXX
LXI D,COLMSG
CALL PRINT
LXI D,COLE
CALL PADDR      ;COLLECT = XXXX
LXI D,DISHSG
CALL PRINT
LXI D,DISE
CALL PADDR      ;DISPLAY = XXXX
RET

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;COLLECT.
;CALLED FROM DEBUGGER WITH REGISTER C HOLDING THE OPERATOR
;CATEGORY (NOT USED HERE), AND D,E HOLDING THE PC
PUSH D          ;SAVE THE PC
LHLD UB         ;WITHIN THE RANGE LB - UB?
XCHG
CALL DIFF       ;X = UB - PC
POP D
JC RET0        ;SKIP IF BELOW LB
LHLD LB
CALL DIFF       ;X = PC - LB
JC RET0
;D,E HAS INDEX TO HIST VECTOR
MVI C,0        ;READY TO COUNT INDEX TO PROPER ELEMENT IN H
LHLD INC       ;AMOUNT IN EACH CATEGORY
FINDCELL, CALL DIFF ;X = X - INC
JC FOUND
INR C          ;TO NEXT HVEC ELEMENT
JMP FINDCELL
;REG C HAS INDEX TO HVEC
FOUND, MVI B,0 ;BECOMES DOUBLE PRECISION
LXI H,HVEC

```

```

180> 011A 09
181> 011B 09
182> 011C 5E
183> 011D 23
184> 011E 56
185> 011F 13
186> 0120 72
187> 0121 2B
188> 0122 73
189> 0123 13
190> 0124 7A
191> 0125 B3
192> 0126 C22C01
193>
194>
195> 0127 3E01
196> 0128 C9
197>
198>
199> 012C 3E00
200> 012E C9
201>
202>
203>
204>
205>
206>
207> 012F 217802
208> 0132 0E40
209> 0134 110000
210> 0137 D5
211> 0138 5E
212> 0139 23
213> 013A 56
214> 013B 23
215> 013C E3
216> 013D D5
217> 013E CD5E00
218> 0141 D1
219> 0142 EB
220> 0143 DA4701
221> 0146 EB
222> 0147 00
223> 0148 E1
224> 0149 C23701
225>
226>
227> 014C EB
228> 014D E5
229> 014E CD6500
230>
231> 0151 7C
232> 0152 B5
233> 0153 C25701
234> 0156 23
235> 0157 22F002
236> 015A 110802
237> 015D CD7D00
238> 0160 D1
239> 0161 CD4A00

```

```

DAD B
DAD B ;HVEC(X)
MOV E,M ;OLD VALUE OF HVEC(X)
INX H
MOV D,M ;TO D,E, READY FOR INCREMENT
INX D ;COUNT UP BY ONE, CHECK FOR 0FFFFH
MOV M,D
DCX H
MOV M,E ;REPLACED IN MEMORY
INX D ;0FFFFH GOES TO 0000H
MOV A,D
ORA E
JNZ RET0 ;NORMAL RETURN IF NOT 0FFFFH
;ONE CATEGORY FILLED, STOP EXECUTION
MVI A,1
RET
;RETURN 0 TO CONTINUE COLLECTION
MVI A,0
RET
;DISPLAY.
;DISPLAY THE HISTOGRAM COLLECTED SO FAR
;FIND LARGEST VALUE TO SCAL DIAGRAM
LXI H,HVEC
MVI C,HSIZE
D,0 ;MAX SO FAR
LARG0, PUSH D ;SAVE LARGEST
MOV E,M
INX H
MOV D,M ;D,E HOLDS TEST ELEMENT
INX H ;READY FOR NEXT ELEMENT
XTHL ;LARGEST TO H,L ADDRESS TO STACK
PUSH D ;SAVE TEST
CALL DIFF ;X = TEST - LARGEST
POP D ;RESTORE TEST VALUE
XCHG ;LARGEST IN D,E - TEST IN H,L
JC LARG1 ;CARRY IF LARGEST > TEST
XCHG ;TEST GOES TO D,E
LARG1, DCR C ;COUNT LENGTH DOWN
POP H ;RECALL HVEC ADDRESS
JNZ LARG0 ;FOR ANOTHER TEST
;MAX IS IN D,E
XCHG ;TO H,L
PUSH H ;SAVE LARGEST FOR PRINTING BELOW
CALL SHR6 ;DIVIDE BY 64 FOR SCALING
;CHECK FOR ZERO
MOV A,H
ORA L
JNZ NONZER
INX H ;SET SCALE TO 1
NONZER, SHLD SCALE
LXI D,LARMSG
CALL PRINT
POP D ;RECALL LARGEST VALUE
CALL PADDR

```

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240> 0164 AF      XRA      A      ;CLEAR ZERCHT
241> 0165 327602  STA      ZERCHT
242>
243>
244> 0160 2A7702  ; NOW STEP THROUGH THE HIST VECTOR AND PRINT '*' FOR EACH LINE
245> 0160 EB      LHL D      LB
246> 016C 017802  XCHG      ;LOWER BOUND TO D,E
247> 016F D5      LXI      B,HVEC ;BASE OF HIST VECTOR
248> 0170 2A7902  PUSH     D      ;SAVE CURRENT LINE ADDRESS
249> 0173 CD5E00  LHL D      UB      ;TEST FOR OVER THE TOP
250> 0176 D1      CALL    DIFF
251> 0177 D2BD01  POP      D
252> JNC     DISP1 ;NO CARRY IF CURRENT >= UB
253> CHECK FOR MULTIPLE BLANK LINES AND PRINT .... INSTEAD
254> MOV     H,B    ;HIGH ORDER HVEC INDEX
255> MOV     L,C    ;LOW ORDER HVEC INDEX
256> MOV     A,M    ;LOW ORDER HVEC VALUE
257> INX     H
258> ORA     M      ;VALUE = 0?
259> LXI     H,ZERCHT
260> JNZ     ZCHK1  ;VALUE IS NOT ZERO, PRINT LINE
261> VALUE IS ZERO, ALREADY PRINTED?
262> MOV     A,M    ;GET ZERCHT
263> ORA     A
264> JNZ     ZCHK0  ;JUMP IF ALREADY PRINTED LINE
265> NOT PRINTED YET, SET ZERCHT TO TRUE AND PRINT MSG
266> MVI     M,OFFH
267> PUSH    B
268> PUSH    D
269> LXI     D,PERMSG
270> CALL    PRINT
271> POP     D
272> POP     B
273> ZCHK0, ;INCREMENT LINE ADDRESS
274> LHL D      INC
275> DAD     D
276> XCHG
277> JMP     DISP0
278>
279> ZCHK1, ;LINE IS NOT ZERO, FLAG IT AND CONTINUE
280> MVI     M,0    ;ZERCHT SET FALSE
281> PUSH    B
282> PUSH    D
283> PUSH    D
284> CALL    CRLF
285> POP     D
286> ;LINE ADDRESS TO DE
287> CALL    PADDR
288> POP     D
289> ;RECALL LINE ADDRESS
290> LHL D      INC
291> DAD     D
292> XTHL
293> ;LINE ADDRESS STACKED, INDEX TO HVEC IN HL
294> MOV     E,M
295> INX     H
296> MOV     D,M
297> INX     H
298> PUSH    H
299> CALL    STARS ;PRINTS STARS FOR THIS LINE
300> POP     B
301> ;RECALL HVEC BASE
302> POP     D
303> ;RECALL CURRENT LINE
304> JMP     DISP0

```

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 SER. # _____

```

01BD CD7200
01C0 C9
01C1 7B
01C2 B2
01C3 C8
01C4 D5
01C5 3E20
01C7 CD3E00
01CA D1
01CB 2AFB02
01CE CD5E00
01D1 D8
01D2 D5
01D3 3E2A
01D5 CD3E00
01D8 D1
01D9 C3CB01
01DC 0D0A455252ERMSG,
01F2 0D0A545950BBOUNDS,
0200 0D0A484953LARMMSG,
0217 0D0A414444
0248 0D0A494E49IHIMSG,
0255 0D0A434F4CCOLMSG,
0262 0D0A444953DISMSG,
026F 0D0A2E2E2EPEPRMSG,
0276 ZERCHT,
0277 LB,
0279 UB,
027B HVEC,
02FB SCALE,
02FD INC,
02FF 00
0400 =
0300

```

```

DISP1, ;END OF DISPLAY
CALL    CRLF
RET      ;RETURN TO DDT

;
STARS, ;PRINT STARS ACROSS LINE BASED ON SCALE VALUE
MOV     A,E
ORA     D
RZ      ;RETURN IF ZERO STARS
PUSH    D
MVI     A,' '
CALL    PCHAR

;
STAR0, ;LOOP PRINTING STARS
LHL D      SCALE ;SCALING FACTOR
CALL    DIFF ;X = SIZE - SCALE
RC
PUSH    D ;SAVE REMAINING LENGTH
MVI     A,' '
CALL    PCHAR
POP     D
JMP     STAR0

```

DATA AREAS

```

DB CR,LF,'ERROR - FORM IS X,Y',0
DB CR,LF,'TYPE HISTOGRAM BOUNDS ',0
DB CR,LF,'HISTOGRAM,'
DB CR,LF,'ADDR RELATIVE FREQUENCY, LARGEST VALUE'
DB CR,LF,'INITIAL = ',0
DB CR,LF,'COLLECT = ',0
DB CR,LF,'DISPLAY = ',0
DB CR,LF,'...',0
1
2 ;LOWER BOUND
2 ;UPPER BOUND
HSIZE*2 ;HISTOGRAM VECTOR
2 ;SCALE FACTOR
2 ;INCREMENT BETWEEN LINES
NOP
EQU ;(H*100H) AND 0FF00H ;BEGINNING OF NEXT MODULE
END HISTO

```

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 SER. # ~~1976-000000~~

```

1>
2>
3> 0100      ORG      100H
4> FFFF =    TRUE    EQU      0FFFFH
5> 0000 =    FALSE   EQU      NOT TRUE
6> 0000 =    TEST    EQU      FALSE
7>
8>
9>
10>
11>
12>
13>
14>
15>
16> 0100 C30004
17> 0103 C35C01
18> 0106 C3A601
19> 0109 C3B801
20>
21> 010C 434F505952
22>
23> 0039 =    DDTBASE EQU 7*8+1
24> 000D =    CR      EQU 0DH
25> 000A =    LF      EQU 0AH
26>
27>
28> 0133 010900
29> 0136 C33C01
30>
31>
32> 0139 010F00
33> 013C 2A3900
34> 013F 09
35> 0140 E9
36>
37>
38> 0141 1A
39> 0142 87
40> 0143 C8
41>
42> 0144 13
43> 0145 D5
44> 0146 CD3301
45> 0149 D1
46> 014A C34101
47>
48>
49> 014D C5
50> 014E D5
51> 014F 3E0D
52> 0151 CD3301
53> 0154 3E0A
54> 0156 CD3301
55> 0159 D1
56> 015A C1
57> 015B C9
58>
59>
60>

```

TRACE INSTRUCTIONS IN. DDT

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BOX 579, PACIFIC GROVE, CA.
93950

ENTRY VECTOR

DB 'COPYRIGHT (C) 1976, DIGITAL RESEARCH'

DDTBASE EQU 7*8+1 ADDRESS OF DDT ENTRY VECTOR

CR EQU 0DH

LF EQU 0AH

PCHAR, PRINT CHARACTER FROM REGISTER A

PADDR, PRINT ADDRESS FROM D.E

CODDT, LHL DDTBASE GET ENTRY TO DDT FROM RST 7 LOCATION

DAD B

PCHL

PRINT, PRINT MESSAGE IN. D.E 'TIL FIRST ZERO

LDAX D

ORA A

RZ

MORE TO PRINT

INX D

PUSH D

CALL PCHAR

POP D

JMP PRINT

CRLF, PRINT CARRIAGE RETURN. LINE FEED

PUSH B

PUSH D

MVI A, CR

CALL PCHAR

MVI A, LF

CALL PCHAR

POP D

POP B

RET

INITIAL, PRINT ENTRY POINT ADDRESSES

TRACE

CPI: VERSION

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SER. # TRACE PROGRAM

```

61> 015C 112102
62> 015F CD4101
63> 0162 110301
64> 0165 CD3901
65> 0168 112E02
66> 016B CD4101
67> 016E 110601
68> 0171 CD3901
69> 0174 113002
70> 0177 CD4101
71> 017A 110901
72> 017D CD3901
73>
74>
75> 0180 3A3A00
76> 0183 FE04
77> 0185 C29001
78>
79> 0188 114002
80> 018B 3E01
81> 018D C39401
82>
83> 0190 AF
84> 0191 117102
85>
86> 0194 329E02
87> 0197 CD4101
88> 019A 219902
89> 019D 3600
90> 019F 210003
91> 01A2 229A02
92> 01A5 C9
93>
94>
95>
96> 01A6 219902
97> 01A9 7E
98> 01AA B7
99> 01AB FAF01
100> 01AE 34
101> 01AF 2A9A02
102> 01B2 73
103> 01B3 2C
104> 01B4 72
105> 01B5 2C
106> 01B6 229A02
107> 01B9 AF
108> 01BA C9
109>
110>
111>
112> 01BB 219E02
113> 01BE 7E
114> 01BF B1
115> 01C0 4F
116> 01C1 C5
117> 01C2 118C02
118> 01C5 CD4101
119> 01C8 C1
120> 01C9 219902

```

```

LXI D, INMSG
CALL PRINT
LXI D, INIE
CALL PADDR
LXI D, COLMSG
CALL PRINT
LXI D, COLE
CALL PADDR
LXI D, DISMSG
CALL PRINT
LXI D, DISE
CALL PADDR

```

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DETERMINE IF THE DISASSEMBLER IS PRESENT
LDA DDTBASE+1 HIGH ORDER ADDRESS OF DDT TO REC-A
CPI ENDMOD SHR 8
JNZZ INIT1
DISASSEMBLER HAS BEEN. OVERLAYED
LXI D, OVERMSG
MVI A, 1 MARK AS ADDRESSES ONLY
JMP INIT2
INIT1, MARK AS FULL TRACE
XRA A
LXI D, UNDMSG
INIT2, STA DISFLG SET TO 1 IF ADDRESSES ONLY
CALL PRINT
LXI H, COUNT
MVI M, 0 ZERO THE INSTRUCTION. COUNT
LXI H, ABUFF ADDRESS BUFFER
SHLD NEXT NEXT TO FILL AT BEGINNING OF BUFFER
RET BACK TO DDT
COLLECT, ENTER WITH INSTRUCTION. ADDRESS IN. D.E
LXI H, COUNT
MOVA A, M INSTRUCTION. COUNT
ORA A
JM FULLC STOP AT 128 COUNTS
INR M NOT AT 128 YET
FULLC, LHL NEXT NEXT POSITION. TO FILL
MOVA M, E WRAP-AROUND ON. PAGE
INR L
MOVA M, D
INR L
SHLD NEXT
XRA A
RET RETURN. TO DDT WITH ZERO FLAG
DISPLAY, ENTER WITH C=1 IF ONLY ADDRESS TRACE IS REQUESTED
LXI H, DISFLG
MOVA A, M
ORA C DISFLG = 1 IF DISASSEMBLER NOT PRESENT
MOVA C, A
PUSH B
LXI D, TRMSG TRACE MESSAGE
CALL PRINT
POP B
LXI H, COUNT

```

```

121> 01CC 46      MOV#   B,M      ;QUEUE SIZE IN. B
122> 01CD AF      XRA     A        ;CLEAR COLUMN. COUNT
123> 01CE 329F02  STA     COLUMN
124> 01D1 79      MOV#   A,C
125> 01D2 87      OR#     A        ;ADDRESS MODE?
126> 01D3 C2DC01  JNZ     DISPO
127>             ;
128>             ;SAVE OLD PC FROM DISASSEMBLER
129> 01D6 2A0C04  LHL     PC
130> 01D9 229C02  SHLD    TPC
131> 01DC 2A9A02  LHL     NEXT
132>             ;
133>             ;DISP1. ;DISPLAY COLLECTED ADDRESSES OR INSTRUCTIONS
134> 01DF 78      MOV#   A,B      ;QUEUE SIZE
135> 01E0 87      OR#     A
136> 01E1 CA1702  JZ      ENDISP
137> 01E4 95      DCR     B        ;COUNT SIZE DOWN
138> 01E5 C5      PUSH    B        ;SAVE COUNT AND MODE
139> 01E6 2D      DCR     L        ;ADDRESS LAST HIGH ORDER ADDRESS
140> 01E7 56      MOV#   D,M
141> 01E8 2D      DCR     L        ;ADDRESS LAST LOW ORDER ADDRESS
142> 01E9 5E      MOV#   E,M
143> 01EA E5      PUSH    H        ;SAVE NEXT TO GET
144> 01EB EB      XCHG
145>             ;CHECK MODE OF DISPLAY
146> 01EC 79      MOV#   A,C
147> 01ED B7      OR#     A
148> 01EE CA0702  JZ#     FDISP      ;FULL DISPLAY?
149>             ;
150>             ;PARTIAL ADDRESS DISPLAY
151> 01F1 EB      XCHG      ;READY FOR ADDRESS PRINTING
152> 01F2 219F02  LXI     H,COLUMN
153> 01F5 7E      MOV#   A,M
154> 01F6 34      INR     M
155> 01F7 E607  ANI     111B      ;COUNTS 0-7
156> 01F9 CC4D01  CZ      CRLF      ;START NEW LINE
157> 01FC CD3901  CALL    PADDDR
158> 01FF 3E20  MVI     A,' '
159> 0201 CD3301  CALL    PCHAR
160> 0204 C31202  JMP     EDISP
161>             ;
162> 0207 220C04  FDISP.  SHLD    PC      ;READY FOR DECODE
163> 020A 3E02  MVI     A,2
164> 020C 321004  STA     PAGM      ;TO DISPLAY ONE LINE
165> 020F CD0604  CALL    DISENT      ;DISPLAYED
166> 0212 E1      EDISP.  POP     H      ;RECOVER NEXT TO DECODE
167> 0213 C1      POP     B      ;RECOVER COUNT
168> 0214 C3DF01  JMP     DISP1
169>             ;
170>             ;END OF DISPLAY
171> 0217 79      MOV#   A,C
172> 0218 B7      OR#     A
173> 0219 C8      RZ#      ;RETURN. WITHOUT RESTORING PC
174> 021A 2A9C02  LHL     TPC
175> 021D 220C04  SHLD    PC      ;DISASSEMBLER'S PC RESTORED
176> 0220 C9      RET
177>             ;
178>             ;MESSAGES
179> 0221 0D0A494E49INMSG. DB CR,LF,'INITIAL = ',0
180> 0222 0D0A434F4CCOLMSG. DB CR,LF,'COLLECT = ',0
181> 023B 0D0A444953DISMSG. DB CR,LF,'DISPLAY = ',0

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181>             ;OVERMSG.
182> 0240 0D0A444953 DB CR,LF,'DISASSEMBLER OVERLAYED. ADDRESSES ONLY'.0
183> 0271 0D0A524541UNDMSG. DB CR,LF,'READY FOR SYMBOLIC TRACE'.0
184> 028C 0D0A545241TRMSG. DB CR,LF,'TRACEBACK.'.0
185>             ;
186>             ;DATA AREAS
187> 0299 00      COUNT. DB 0
188> 029A 0003    NEXT. DW ABUFF
189> 029C        TPC. DS 2
190> 029E        DISFLG. DS 1 ;1 IF ADDRESSES ONLY
191> 029F        COLUMN. DS 1 ;COLUMN. COUNT IF ADDRESSES ONLY
192> 0300        ORG      (< + 100H) AND 0FF00H
193> 0300        ABUFF. DS 255
194> 03FF 00      DB 0
195> 0400 =
196>             ;ENDMOD EQU $
197>             ;IF TEST 0D900H
198>             ;ENDIF
199>             ;IF NOT TEST
200> 0400 =       DISEM EQU ENDMOD
201>             ;ENDIF
202>             ;
203> 040C =       PC EQU DISEM+0CH
204> 0410 =       PAGM EQU DISEM+10H
205> 0406 =       DISENT EQU DISEM+06H
206> 0400 =       END

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