

```

; CP/M DEBUGGER DISASSEMBLER/ASSEMBLER MODULE
TITLE 'CP/M DEBUGGER (ASMOD) 1/78'

```

```

;
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; BOX 579 PACIFIC GROVE, CA
; 93950
;

```

```

0000 = FALSE EQU 0 ;VALUE OF "FALSE"
FFFF = TRUE EQU NOT FALSE ;VALUE OF "TRUE"
0000 = DEBUG EQU FALSE ;TRUE IF CHECK-OUT TIME
FFFF = RELOC EQU TRUE ;TRUE IF GENERATING RELOC IMAGE
;

```

```

; IF DEBUG
; ORG 1000H ;IN LOW MEMORY FOR DEBUG
-ELSE
; IF RELOC
0000 ORG 0000H ;READY FOR RELOCATION
; ELSE
; ORG 0D000H ;DEBUG IN 64K
; ENDEF
; ENDEF

```

```

;
0005 = JLOC1 EQU 0005H ;BDOS JUMP LOCATION
;
;

```

```

; ENTRY POINTS FOR DEBUGGING MONITOR

```

```

0680 = DEMON EQU $+680H
0683 = BEGIN EQU DEMON+03H ;BEGINNING OF DEBUGGING MONITOR
0689 = GETBUFF EQU DEMON+9H ;READ BUFFER
068C = GNC EQU DEMON+0CH
068F = PCHAR EQU DEMON+0FH ;PRINT CHARACTER IN REG A
0692 = PBYTE EQU DEMON+12H ;PRINT BYTE
0695 = PADDX EQU DEMON+15H ;PRINT ADDRESS IN REG D,E
0698 = SCANEXP EQU DEMON+18H ;SCAN 0,1, OR 2 EXPRESSIONS
069E = BREAK EQU DEMON+1EH ;CHECK FOR BREAK AT CONSOLE
06A1 = PRLABEL EQU DEMON+21H ;PRINT SYMBOLIC LABEL
;
;

```

```

068C = CI EQU GNC ;SYNONYM FOR GNC
;

```

```

000D = CR EQU 0DH
000A = LF EQU 0AH
0009 = TAB EQU 09H
;

```

```

; MODLOC: ;MODULE LOCATION

```

```

0000 C38306 JMP BEGIN ;ADDRESS FIELD IS ALTERED AT "BEGIN"
0003 000000 DB 0,0,0 ;FILLER (USED IN SYMBOL TABLE)
0006 C34F03 JMP DISENT
0009 C32405 JMP ASMEN ;ENTRY POINT FOR ASSEMBLER
000C PC: DS 2 ;CURRENT FAKED PC DURING DISASSEMBLY
000E MPC: DS 2 ;MAX VALUE FOR PC (STOP ADDRESS)
0010 PAGM: DS 1 ;PAGE MODE IF NON ZERO
0011 TPC: DS 2 ;TEMPORARY PC FOR ASSEMBLER RESTORE ON ERROR
0013 OLDSP: DS 2 ;ENTRY SP VALUE
;

```

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```

;
CO:      ;PRINT CHARACTER IN REGISTER C
0015 F5  PUSH    PSW
0016 79  MOV     A,C          ;PCHAR EXPECTS VALUE IN C
0017 CD8F06 CALL    PCHAR        ;TO PRINT THE CHARACTER
001A F1  POP     PSW
001B C9  RET

;
;
DELIM:   ;CHECK FOR DELIMITER
001C FE20 CPI     ' '
001E C8  RZ
001F FE09 CPI     TAB
0021 C8  RZ
0022 FE2C CPI     ', '
0024 C8  RZ
0025 FE0D CPI     CR
0027 C8  RZ
0028 FE7F CPI     7FH
002A CA2405 JZ     ASMEN      ;RESTART CURRENT LINE
002D C9  RET

;
CRLF:    ;RETURN AND LINE FEED
002E 0E0D MVI     C,CR
0030 CD1500 CALL    CO
0033 0E0A MVI     C,LF
0035 CD1500 CALL    CO
0038 C9  RET

;
SCAN:    ;FILL OPCODE WITH CHARACTERS
;
0039 CD8C06 SC1:    CALL    CI
SCAN0:    ;ENTER HERE IF CHARACTER SCANNED
003C FE0D CPI     CR
003E CA1805 JZ     ERR
0041 CD1C00 CALL    DELIM
0044 CA3900 JZ     SC1

;
;
CLEAR BUFFER
0047 0E04 MVI     C,4
0049 217A06 LXI     H,OPCODE
004C 3620 SC0:    MVI     M,' '
004E 23  INX     H
004F 0D  DCR     C
0050 C24C00 JNZ     SC0

;
;
GARBAGE REMOVED AT BEGINNING OF SCAN
0053 0E05 MVI     C,5
0055 217A06 LXI     H,OPCODE
0058 77  SC2:    MOV     M,A      ;STORE CHARACTER
0059 CD8C06 CALL    CI
005C CD1C00 CALL    DELIM
005F CA6A00 JZ     SC3
0062 23  INX     H
0063 0D  DCR     C
0064 CA1805 JZ     ERR      ;TOO LONG

```

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0067 C35800

JMP SC2

```

;
SC3: ;END OF CURRENT SCAN, COMPARE FOR EMPTY
      LDA OPCODE
      CPI ' '
      RET

```

006A 3A7A06

006D FE20

006F C9

```

;
HEX: ;CONVERT ACCUMULATOR TO HEXADECIMAL

```

0070 D630

SUI '0'

0072 FE0A

CPI 10

0074 D8

RC ;'0' - '9'

0075 C6F9

ADI ('0'-'A'+10) AND OFFH

0077 FE10

CPI 16

0079 D8

RC

007A C31805

JMP ERR

```

;
GADDR: ;GET ADDRESS VALUE TO B (HIGH ORDER) AND C (LOW) WITH CC.Y OF C I

```

007D CD9806

CALL SCANEXP ;READ 1 EXPRESSION

0080 3D

DCR A ;GOES TO ZERO

0081 C21805

JNZ ERR ;? IF NOT A SINGLE EXPRESSION

0084 EB

XCHG ;ADDRESS OF EXPRESSION TO HL

0085 4E

MOV C,M ;LOW BYTE

0086 23

INX H

0087 46

MOV B,M ;HIGH BYTE

0088 79

MOV A,C ;COPY OF LOW BYTE TO A

0089 05

DCR B

008A 04

INR B ;SETS ZERO FLAG IF B IS ZERO

008B C9

RET

```

;
GBYTE: ;GET BYTE VALUE TO ACCUMULATOR AND C, CHECK FOR HIGH ORDER ZERO

```

008C CD7D00

CALL GADDR

008F C21805

JNZ ERR

0092 C9

RET

```

*****
***** ASSEMBLER MODULE STARTS HERE *****
*****

```

```

;
ADJ: ;MOVE REGISTER INDICATOR TO MIDDLE FIELD OF CODE

```

0093 17

RAL

0094 17

RAL

0095 17

RAL

0096 E638

ANI 111000B

0098 C9

RET

```

;
ADJ4: ;MOVE TO LEFT BY 4 AND MASK

```

0099 17

RAL

009A 17

RAL

009B 17

RAL

009C 17

RAL

009D E630

ANI 110000B

009F C9

RET

```

;
SEAR2: ;SAME AS SEAR, EXCEPT 2 CHARACTER MATCH
;
      H,L ADDRESS TABLE TO MATCH ON

```

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```

00A0 EB          XCHG
00A1 2A7A06      LHL      OPCODE ;2ND BYTE IN D, 1ST BYTE 1 E
00A4 EB          XCHG      ;H,L ADDRESS TABLE
00A5 7B          SEAO: MOV   A,E ;GET 1ST BYTE
00A6 BE          CMP       M ;MATCH?
00A7 C2AF00      JNZ      SEA1 ;TO ADDRESS NEXT ELT
00AA 23          INX       H ;NEXT TO MATCH
00AB 7A          MOV       A,D ;2ND CHAR
00AC BE          CMP       M
00AD C8          RZ          ;MATCH AT CURRENT ENTRY
00AE 2B          DCX       H
00AF 2B          SEA1: DCX   H
00B0 2B          DCX       H ;ADDRESSES NEXT ELEMENT
00B1 0D          DCR       C
00B2 C2A500      JNZ      SEAO ;FOR ANOTHER COMPARE
;
; NO MATCH IN TABLE, RETURN WITH NON-ZERO VALUE
00B5 0D          DCR       C
00B6 C9          RET
;
;
; SEAR: ;SEARCH FOR MATCH IN OPCODE TABLE, LENGTH OF TABLE IN REG-C
; D,E CONTAINS ADDRESS OF BINARY EQUIVALENT OF OPCODE
; H,L ADDRESS FOUR CHARACTER OPCODE TO MATCH
; OPCODE CONTAINS FOUR BYTE OPCODE TYPED AT CONSOLE
; RETURNS WITH ZERO VALUE IF OPCOE FOUND, WITH D,E
; ADDRESSING PROPER BYTE, NON-ZERO IF NOT FOUND.
00B7 0604      MVI       B,4 ;4 CHARACTER MATCH
;
;
00B9 D5          PUSH      D ;SAVE THE CURRENT BYTE VALUE LOCATION
00BA 117A06      LXI       D,OPCODE ;ADDRESS CHARACTERS TYPED
00BD 1A          SE1: LDAX   D ;POINT TO FIRST BYTE TO MATCH
00BE BE          CMP       M ;SAME CHARACTER AS TABLE?
00BF C2CA00      JNZ      SE2 ;NO, SKIP TO NXT TABLE ENTRY
00C2 23          INX       H ;YES, LOOK AT NEXT CHARACTER
00C3 13          INX       D ;MOVE TO NEXT CHARACTER TYPED
00C4 05          DCR       B ;DECREMENT CHARACTER COUNT
00C5 C2BD00      JNZ      SE1 ;MORE TO MATCH?
;
; COMPLETE MATCH, RETURN WITH D,E ADDRESSING BYTE VALUE
00C8 D1          POP       D
00C9 C9          RET
;
; MISMATCH, FINISH COUNT
00CA 23          SE2: INX       H
00CB 05          DCR       B
00CC C2CA00      JNZ      SE2
;
; H,L AT END OF FOUR BYTE AREA, MOVE BACK 8
00CF 11F8FF      LXI       D,-8
00D2 19          DAD       D ;H,L READY FOR NXT MATCH
;
;
00D3 D1          POP       D ;RESTORE BYTE POINTER
00D4 13          INX       D ;MOVE TO NEXT IN CASE MATCH OK
00D5 0D          DCR       C ;MORE OPCODES TO MATCH?
00D6 C2B700      JNZ      SEAR ;LOOK FOR MORE

```

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```

;
; NO MATCH FOUND IN TABLE, SET NON-ZERO VALUE AND RETURN
00D9 OD      DCR      C
00DA C9      RET

```

```

;
; GETREG: ;SCAN FOR SIMPLE REGISTER REFERENCE

```

```

00DB C5      PUSH     B
00DC CD3900  CALL     SCAN
00DF CA1805  JZ       ERR
00E2 0E08    MVI      C,8      ;8 REGISTERS
00E4 216006  LXI      H,SREG   ;SIMPLE REGISTERS
00E7 CDA000  CALL     SEAR2     ;LOOK FOR 2 CHAR MATCH
00EA C21805  JNZ      ERR
00ED 0D      DCR      C
00EE 79      MOV      A,C
00EF C1      POP      B
00F0 C9      RET

```

```

;
; GETD: ;GET DOUBLE PRECISION REGISTER

```

```

00F1 C5      PUSH     B
00F2 CD3900  CALL     SCAN
00F5 CA1805  JZ       ERR
00F8 0E05    MVI      C,5
00FA 217206  LXI      H,DREG
00FD CDB700  CALL     SEAR
0100 C21805  JNZ      ERR
0103 0D      DCR      C
0104 79      MOV      A,C
0105 C1      POP      B
0106 C9      RET

```

```

;
; GETDR: ;GET DOUBLE REGISTER (BDHSP)

```

```

0107 CDF100  CALL     GETD
010A FE04    CPI      4      ;PSW?
010C CA1805  JZ       ERR
010F C9      RET

```

```

;
; GETPR: ;GET PUSH/POP REGISTER (BDH OR PSW)

```

```

0110 CDF100  CALL     GETD
0113 FE03    CPI      3
0115 CA1805  JZ       ERR
0118 FE04    CPI      4
011A C0      RNZ
011B 3D      DCR      A      ;PSW MUST BE ADJUSTED
011C C9      RET

```

```

;
; GCON: ;GET CONDITION CODE
; BUFFER IS SCANNED, MOVE LEFT BEFORE COMPARE

```

```

011D 217A06  LXI      H,OPCODE
0120 117B06  LXI      D,OPCODE+1
0123 0E02    MVI      C,2      ;MOVE TWO CHARACTERS
0125 1A      MOP:    LDAX     D      ;LOAD CHARACTER TO MOVE
0126 77      MOV      M,A      ;MOVE LEFT
0127 23      INX      H      ;NEXT DESTINATION
0128 13      INX      D      ;NEXT SOURCE

```

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```

0129 OD          DCR      C
012A C22501      JNZ      MOP
;
;
012D 1A          LDAX     D
012E FE20        CPI      ' '
0130 C21805      JNZ      ERR
0133 77          MOV      M,A
;
;
0134 215006      LXI      H,CREG
0137 0E08        MVI      C,8
0139 CDA000      CALL     SEAR2
013C C21805      JNZ      ERR
013F 0D          DCR      C
0140 79          MOV      A,C
0141 CD9300      CALL     ADJ      ;MOVE TO BITS 3,4,5 OF BYTE (LSB = 0)
0144 C9          RET
;
;GCONA: ;GET CONDITION CODE TO REGISTER A, DOUBLE ADDRESS TO B,C
0145 CD1D01      CALL     GCON      ;CONDITION CODE TO A
0148 F5          PUSH     PSW
0149 CD7D00      CALL     GADDR      ;VALUE TO B,C
014C F1          POP      PSW
;
;INCLUDE HIGH ORDER 11'S FOR J AND C OPCODES
014D F6C0        ORI      11000000B
014F C9          RET
;
;SETMD: ;SET MEMORY AT LOCATION PC TO VALUE ADDRESSED BY D
0150 1A          LDAX     D      ;VALUE TO ACCUM
;
;SETM: ;SET MEMORY AT LOCATION PC TO VALUE IN ACCUM, INC PC
0151 2A1100      LHL      TPC
0154 77          MOV      M,A      ;STORE AT PC
0155 23          INX      H      ;PC=PC+1
0156 221100      SHLD     TPC
0159 C9          RET
;
;
;
;GETOP: ;PROCESS NEXT OPCODE
015A CD8C06      CALL     CI
015D FE0D        CPI      CR
015F CA4005      JZ       GOBACK ;RETURN IF SIMPLE INPUT
0162 FE2E        CPI      '.' ;ALTERNATE RETURN IS .
0164 CA4005      JZ       GOBACK
0167 CD3C00      CALL     SCANO
016A CA1805      JZ       ERR
;
;CHKO: ;CHECK FOR OPCODES WITH NO OPERANDS
016D 0E11        MVI      C,17 ;LENGTH OF GROUP-0
016F 21A605      LXI      H,ETAB1 ;END OF GROUP-0
0172 114505      LXI      D,TABLE ;FIRST BYTE VALUE
0175 CDB700      CALL     SEAR ;LOOK FOR MATCH
0178 C27E01      JNZ      CHK1 ;NO MATCH, CHECK FOR GROUP-1
;

```

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```

; MATCHED OPCODE, D,E ADDRESS BYTE VALUE
017B C35001 JMP SETMD ;SET MEMORY AT PC AND INC PC
;
; CHECK GROUP-1 VALUES
017E 0E0A CHK1: MVI C,10 ;LENGTH OF GROUP-1
0180 21CE05 LXI H,ETAB2
0183 CDB700 CALL SEAR ;D,E REMAIN SET
0186 C29201 JNZ CHK2 ;NO MATCH, CHECK NEXT GROUP
;
; MATCH FOUND, SET BYTE AND GET BYTE OPERAND
0189 CD5001 CALL SETMD
018C CD8C00 CALL GBYTE ;GETS BYTE VALUE TO ACCUMULATOR
018F C35101 JMP SETM ;PUTS BYTE VALUE TO MEMORY AT PC
;
; CHECK GROUP-2 OPCODES, REQUIRE DOUBLE BYTE OPERAND
0192 0E06 CHK2: MVI C,6
0194 21E605 LXI H,ETAB3
0197 CDB700 CALL SEAR
019A C2AA01 JNZ CHK3 ;NO MATCH
;
; FOUND MATCH, GET OPCODE BIT PATTERN AND STORE
019D CD5001 CALL SETMD
OP2: ;ENTER HERE FOR DOUBLE BYTE OPERANDS
01A0 CD7D00 CALL GADDR ;VALUE IN B,A
01A3 CD5101 CALL SETM
01A6 78 MOV A,B
01A7 C35101 JMP SETM
;
CHK3: ;CHECK FOR MOV INSTRUCTION
01AA 0E01 MVI C,1
01AC 21EA05 LXI H,PMOV
01AF CDB700 CALL SEAR
01B2 C2C601 JNZ CHK4
;
; MOV INSTRUCTION GET DESTINATION OPERAND
01B5 CDD800 CALL GETREG ;VALUE TO ACCUMULATOR
01B8 CD9300 CALL ADJ
01BB 47 MOV B,A ;SAVE IN B
01BC 0E40 MVI C,01000000B ;BIT PATTERN FOR MOV
;
OP1: ;GET NEXT OPERAND FOR MOV, FIRST OPERAND FOR ACCUM/REG OPERATOR
01BE CDD800 CALL GETREG
01C1 B1 ORA C ;SETS HIGH ORDER TWO BITS
01C2 B0 ORA B ;SETS DESTINATION/OPERATOR
01C3 C35101 JMP SETM
;
CHK4: ;CHECK FOR GROUP-5 (ACCUM/REG OPERATOR)
01C6 0E08 MVI C,8
01C8 210A06 LXI H,ETAB5
01CB CDB700 CALL SEAR
01CE C2DC01 JNZ CHK5
;
; ACCUM/REG INSTRUCTION, C COUNTS OPERATORS AS SEARCH PROCEEDS
01D1 0D DCR C
01D2 79 MOV A,C
01D3 CD9300 CALL ADJ

```

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```

01D6 47      MOV      B,A
;            OPERATOR NUMBER (SHIFTED) SAVED FOR LATER MASK
01D7 0E80    MVI      C,10000000B      ;ACCUM/REG OPERATOR INDICATOR
01D9 C3BE01  JMP      OP1      ;GETS OPERAND AND SAVES BYTE IN MEMORY
;
CHK5:        ;MAY BE INR/DCR
01DC 0E02    MVI      C,2
01DE 211206  LXI      H,PDCR
01E1 CDB700  CALL     SEAR
01E4 C2F401  JNZ      CHK6
;
;            C=2 IF DCR, =1 IF INR
01E7 0C      INR      C      ;+1
01E8 0C      INR      C      ;+2
01E9 0C      INR      C      ;+3
01EA CDD800  CALL     GETREG ;VALUE TO ACCUM
01ED CD9300  CALL     ADJ
01F0 B1      ORA      C      ;FILL PROPER INSTRUCTION INDICATOR
01F1 C35101  JMP      SETM
;
CHK6:        ;MAY BE A MVI INSTRUCTION
01F4 0E01    MVI      C,1
01F6 211606  LXI      H,PMVI
01F9 CDB700  CALL     SEAR
01FC C21002  JNZ      CHK7
;
;            MVI INSTRUCTION, GET REGISTER
01FF CDD800  CALL     GETREG ;VALUE GOES TO ACCUMULATOR
0202 CD9300  CALL     ADJ
0205 F606    ORI      110B
0207 CD5101  CALL     SETM
020A CD8C00  CALL     GBYTE
020D C35101  JMP      SETM
;
CHK7:        ;CHECK FOR GROUP-7
0210 0E06    MVI      C,6
0212 212E06  LXI      H,ETAB7
0215 CDB700  CALL     SEAR
0218 C23602  JNZ      CHK8
;
;            LXI,STAX,INX,DAD,LDA, OR DCX
021B 79      MOV      A,C      ;A=1...6
021C FE04    CPI      4
021E DA2302  JC       INO
;
;            MUST BE DAD,LDA, OR DCX
0221 C605    ADI      5      ;CHANGES ACCUM TO 9,10, OR 11
INO:        ;ACCUMULATOR CONTAINS CODE, SAVE IT
0223 47      MOV      B,A
0224 CD0701  CALL     GETDR  ;DOUBLE REGISTER VALUE TO ACCUM
0227 CD9900  CALL     ADJ4   ;ADJUST VALUE TO MIDDLE FIELD
022A B0      ORA      B      ;FILLS REMAINING BITS
022B CD5101  CALL     SETM
;
;            MAY BE LXI
022E E6CF    ANI      11001111B
0230 FE01    CPI      1

```

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```

0232 CO          RNZ      ;NOT LXI
0233 C3A001      JMP      OP2      ;PICK UP OPERAND

;
;
;
CHK8:      ;RST?
0236 0E01      MVI      C,1
0238 213206     LXI      H,PRST
023B CDB700     CALL     SEAR
023E C25102     JNZ      CHK9

;
;
RST, GET OPERAND
0241 CD8C00     CALL     GBYTE
0244 FE08       CPI      8
0246 D21805     JNC      ERR
0249 CD9300     CALL     ADJ
024C F6C7       ORI      11000111B
024E C35101     JMP      SETM

;
CHK9:      ;POP/PUSH?
0251 0E02      MVI      C,2
0253 213E06     LXI      H,PPOP+4
0256 CDB700     CALL     SEAR
0259 C27102     JNZ      CHK10

;
;
C=2 IF PUSH, 1 IF POP
025C 0D         DCR      C
025D C26502     JNZ      PP0

;
;
POP, SET BIT PATTERN
0260 0EC1      MVI      C,11000001B
0262 C36702     JMP      PP1

;
PP0:      ;PUSH
0265 0EC5      MVI      C,11000101B
0267 CD1001     PP1:    CALL     GETPR      ;DOUBLE PUSH/POP REGISTER TO PROPER FIELD
026A CD9900     CALL     ADJ4      ;MOVE TO FIELD
026D B1         ORA      C
026E C35101     JMP      SETM

;
CHK10:     ;J/C/R?
0271 3A7A06     LDA      OPCODE
0274 FE4A       CPI      'J'
0276 C28102     JNZ      CHK11
0279 CD4501     CALL     GCONA

;
CONDITION CODE TO FIELD IN ACCUM, ADDRESS TO B,C
027C F602       ORI      010B
027E C38B02     JMP      FADDR      ;FILL ADDRESS

;
CHK11:     CPI      'C'
0281 FE43       JNZ      CHK12
0283 C29602     CALL     GCONA
0286 CD4501     ORI      100B
0289 F604

;
FADDR:     CALL     SETM
028B CD5101     MOV      A,C
028E 79

```

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```

028F CD5101      CALL    SETM
0292 78          MOV     A,B
0293 C35101      JMP     SETM

```

```

;
CHK12: 0296 FE52      CPI     'R'
0298 C21805      JNZ     ERR
029B CD1D01      CALL    GCON
029E F6C0        ORI     11000000B
02A0 C35101      JMP     SETM

```

```

*****
***** END OF ASSEMBLER MODULE, START DISASSEMBLER *****
*****

```

```

;
02A3 2A0E00      RDBYTE: LHL    MPC
02A6 D5          PUSH    D      ;SAVE DE
02A7 EB          XCHG      ;MAX PC TO D,E
02A8 2A0C00      LHL     PC      ;CURRENT PC
;               SUBTRACT PC FROM MPC, STOP IF CARRY GENERATED
02AB 7B          MOV     A,E
02AC 95          SUB     L
02AD 7A          MOV     A,D
02AE 9C          SBB     H
02AF D2B702      JNC     RDO

```

```

;
02B2 2A1300      ; PC EXCEEDS MPC, RETURN
02B5 F9          LHL     OLDSPL
02B6 C9          SPHL      ;RESTORE ORIGINAL STACK POINTER
RET

```

```

;
02B7 D1          RDO:    POP     D      ;RESTORE D,E
02B8 7E          MOV     A,M
02B9 23          INX     H
02BA 220C00      SHLD    PC
02BD C9          RET

```

```

02BE 3C          RGP1:   INR     A
02BF E607        ANI     07
02C1 FE06        CPI     06
02C3 DAC802      JC      RGP1
02C6 C603        ADI     03
02C8 FE05        CPI     05
02CA DACF02      JC      RGP2
02CD C602        ADI     02
02CF C641        RGP2:   ADI     41H
02D1 4F          MOV     C,A
02D2 C31500      JMP     CO

```

```

02D5 47          DECODE: MOV     B,A
02D6 E6F0        ANI     0F0H
02D8 0F          RRC
02D9 0F          RRC
02DA 0F          RRC
02DB 0F          RRC
02DC C690        ADI     90H
02DE 27          DAA

```

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02DF CE40	ACI	40H
02E1 27	DAA	
02E2 4F	MOV	C,A
02E3 CD1500	CALL	CO
02E6 78	MOV	A,B
02E7 E60F	ANI	0FH
02E9 C690	ADI	90H
02EB 27	DAA	
02EC CE40	ACI	40H
02EE 27	DAA	
02EF 4F	MOV	C,A
02F0 C31500	JMP	CO

02F3 0604	PRINT: MVI	B,4
02F5 4E	P1: MOV	C,M
02F6 CD1500	CALL	CO
02F9 23	INX	H
02FA 05	DCR	B
02FB C2F502	JNZ	P1
02FE 0E20	MVI	C,' '
0300 C31500	JMP	CO

;
;
EXTRACT THE REGISTER FIELD FROM THE OPCODE

0303 7A	XTRACT: MOV	A,D
0304 E638	ANI	0011\$1000B
0306 0F	RRC	
0307 0F	RRC	
0308 0F	RRC	
0309 C9	RET	

;
;
PRINT CONDITION CODE

030A CD0303	CCPRNT: CALL	XTRACT
030D 87	ADD	A
030E 4F	MOV	C,A
030F 214206	LXI	H,CCODE
0312 09	DAD	B
0313 4E	MOV	C,M
0314 CD1500	CALL	CO
0317 23	INX	H
0318 4E	MOV	C,M
0319 CD1500	CALL	CO
031C 0E20	MVI	C,' '
031E CD1500	CALL	CO
0321 C31500	JMP	CO

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;
PRINT REGISTER REFERENCE

0324 CD0303	RPPRNT: CALL	XTRACT
0327 E606	ANI	06
0329 FE06	CPI	06
032B C2BE02	JNZ	RGPRNT
032E 0E53	MVI	C,'S'
0330 CD1500	CALL	CO
0333 0E50	MVI	C,'P'
0335 C31500	JMP	CO

;
;

```

0338 CD2E00      PRPC:  ;PRINT CRLF FOLLOWED BY PC VALUE
                  CALL   CRLF
;                (ENTER HERE FROM DISASSEMBLER)
033B 2A0C00      PRPC0: LHL  PC
033E 7C          MOV    A,H
033F CDD502      CALL   DECODE
0342 7D          MOV    A,L
0343 CDD502      CALL   DECODE
0346 0E20        MVI    C,' '
0348 CD1500      CALL   CO
034B CD1500      CALL   CO
034E C9          RET

;
DISENT: ;ENTER HERE FROM DEBUGGER
034F 210000      LXI    H,0
0352 39          DAD    SP
0353 221300      SHLD   OLDSP ;SP SAVED FOR LATER RETURN

;
;                CHECK FOR PAGE MODE DISPLAY
0356 3A1000      LDA    PAGM ;GET PAGE MODE (NUMBER OF LINES TO PRINT)
0359 B7          ORA    A ;SET FLAGS
035A CA7103      JZ     DISASM ;NOT PAGE MODE

;
;                SET MPC TO OFFFHH
035D 21FFFF      LXI    H,OFFFHH
0360 220E00      SHLD   MPC

;                255 IMPLIES TRACE MODE
0363 3C          INR    A
0364 C27103      JNZ    DISASM ;NOT TRACE MODE IF BR

;                TRACE MODE, SET TO 1 AND IGNORE ADDRESS FIELD
0367 3C          INR    A ;1 IN ACC
0368 321000      STA    PAGM
036B 2A0C00      LHL    PC ;RECOVER PC
036E C39703      JMP    DIS1

;
;
DISASM:
;                CHECK FOR BREAK AT CONSOLE
0371 CD9E06      CALL   BREAK
0374 C24005      JNZ    GOBACK

;
;                CHECK TO SEE IF ENOUGH LINES PRINTED IN PAGE MODE
0377 211000      LXI    H,PAGM
037A 7E          MOV    A,M
037B B7          ORA    A ;ZERO?
037C CA8303      JZ     DISO ;JMP IF NOT PAGE MODE

;
;                PAGE MODE, DECREMENT AND CHECK FOR ZERO
037F 35          DCR    M
0380 CA4005      JZ     GOBACK

;
DISO:  LHL    PC ;CURRENT PC
0386 CDA106      CALL   PRLABEL ;OPTIONAL LABEL
0389 CD2E00      CALL   CRLF ;NEW LINE
038C 0E20        MVI    C,' '
038E CD1500      CALL   CO

```

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```

0391 CD1500      CALL    CO      ;TWO LEADING BLANKS
0394 CD3B03      CALL    PRPCO    ;PRINT THE VALUE
0397 CDA302      DIS1:  CALL    RDBYTE
;               ; SAVE THE OPCODE IN THE D REGISTER
039A 57          ;       MOV     D,A
;               ; SEARCH THE FIRST 17 ITEMS FOR SIMPLE OPCODES
;               ; EI (FB) THROUGH NOP (00). NOTE THAT THE SEARCH PROCEEDS
;               ; THROUGH "TABLE" STARTING AT THE BEGINNING, BUT THE OPCODES
;               ; ARE ACTUALLY STORED IN SYMBOLIC FORM IN REVERSE ORDER.
;
039B 214505      LXI     H, TABLE
039E 011100      LXI     B, 17     ;FIRST 17 SIMPLE OPCODES
03A1 BE          GROUP1: CMP     M     ;TABLE VALUE = OPCODE?
03A2 CAFD04      JZ      TYPE1     ;SKIP TO PRINT IF SO
03A5 23          INX     H         ;MOVE TO THE NEXT TABLE ELEMENT
03A6 0D          DCR     C         ;COUNT THE SIMPLE OPCODES DOWN
03A7 C2A103      JNZ     GROUP1    ;TRY FOR ANOTHER
;
;       NOT A SIMPLE OPERATION CODE, CHECK FOR IMMEDIATE OP
;       ADI, ACI, OUT, SUI, IN, SBI, ANI, XRI, ORI, CPI
;       MVI     C, 10
03AA 0E0A          GROUP2: CMP     M
03AC BE          JZ      TYPE2
03AD CAE904      INX     H
03B0 23          DCR     C
03B1 0D          JNZ     GROUP2
;
;       NOT AN IMMEDIATE OPERATION, CHECK FOR
;       SHLD LHL STA LDA JMP OR CALL
;       MVI     C, 6
03B5 0E06          GROUP3: CMP     M
03B7 BE          JZ      TYPE3
03B8 CACE04      INX     H
03BB 23          DCR     C
03BC 0D          JNZ     GROUP3
03BD C2B703
;
;       NOT TYPE3 OPERATION CODE, CHECK FOR MOV
;       BY MASKING THE HIGH ORDER TWO FIBITS -
;       XX00 0000 IS PRODUCED IN THE ACCUMULATOR
;       ANI     0COH
03C0 E6C0          MOV IS GIVEN BY 01 DDD SSS (DDD IS DEST, SSS IS SOURCE)
;       CPI     40H
03C2 FE40          JZ      MOVOP
03C4 CAB404
;
;       NOT A MOV INSTRUCTION, CHECK FOR ACCUMLATOR-REGISTER OPS
;       BIT PATTERN 10 CCC RRR     CORRESPONDS TO
;       ADD (0), ADC (1), SUB (2), SBB (3), ANA (4),
;       XRA (5), ORA (6), CMP (7)
;       CPI     80H
03C7 FE80          JZ      ACCREG
03C9 CAA504
;
;       NOT ACCUM-REGISTER, RESTORE OPCODE FOR FURTHER CHECKS
;       MOV     A,D
03CC 7A
;
;       LOOK FOR INR, DCR, AND MVI OPERATIONS
;       INR = 00 RRR 100, DCR = 00 RRR 101, MVI = 00 RRR 110

```

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```

; OR, INR = 00 RRR 4, DCR = 00 RRR 5, MVI = 00 RRR 6
03CD E6C7 ANI 11C $0111B
03CF D604 SUI 04
; INR GOES TO ZERO
03D1 CA9604 JZ INRREG
; NOT INR, MAY BE DCR
03D4 3D DCR A
03D5 CA9004 JZ DCRREG
03D8 3D DCR A
; NOT DCR, MAY BE MVI
03D9 CA7C04 JZ MVI REG
; NOT INR, DCR, OR MVI INSTRUCTION
;
; RESTORE THE OPCODE
03DC 7A MOV A,D
; LOOK FOR LXI STAX INX DAD LDAX DCX OPCODES
; LXI = 00 RR 0001,
; STAX= 00 RR 0010,
; INX = 00 RR 0011,
; DAD = 00 RR 1001,
; LDAX= 00 RR 1010
; DCX = 00 RR 1011
03DD E6C0 ANI 0COH
03DF CA4A04 JZ LXILST ;TO PROCESS FURTHER
;
; NOT ONE OF THE ABOVE, CHECK FURTHER
; MUST BE OF THE FORM - 11 XXX XXX
03E2 7A MOV A,D
03E3 E607 ANI 0000$0111B ;TO EXTRACT THE RIGHTMOST BITS
; RETURN CONDITIONALS TAKE THE FORM 11 XXX 000
03E5 CA3F04 JZ RETCON ;RETURN CONDITIONALLY
; JUMP CONDITIONALS TAKE THE FORM 11 XXX 010 = 2
03E8 D602 SUI 02
03EA CA3404 JZ JMPCON
; CALL CONDITIONALS TAKE THE FORM 11 XXX 100 = 4 - 2 = 2
03ED D602 SUI 02
03EF CA2904 JZ CALLCON
; RST'S TAKE THE FORM 11 XXX 111 = 7 - 4 = 3
03F2 D603 SUI 03
03F4 CA1A04 JZ RSTOP
;
; NONE OF THE ABOVE, PUSHES AND POP'S REMAIN
03F7 7A MOV A,D ;RESTORE OPCODE
; FIRST CAPTURE REMAINING OPCODES CB, D9, DD, ED, FD
03F8 E608 ANI 0000$1000B ;THIS BIT RESET FOR POP,PUSH
03FA C20B05 JNZ N8080 ;NOT 8080 OPCODE IF SET
03FD 7A MOV A,D ;RESTORE IT
; PUSH = 11 XX0 101 = 5, POP = 11 XX0 001 = 1
03FE E607 ANI 07
; USE THE RESULTING VALUE TO INDEX TO REGISTER TABLE
0400 4F MOV C,A
0401 3D DCR A ;POP GOES TO 00
0402 213906 LXI H,PPOP-1
0405 09 DAD B
0406 CDF302 CALL PRINT
; GET THE RELEVANT REGISTER

```

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```

0409 CD0303      CALL    XTRACT
                  ;      CHECK FOR PSW OPERATION CODE
040C FE06        CPI      06
040E C29F04      JNZ      D6
0411 213606      LXI      H,PPSW
0414 CDF302      CALL     PRINT
0417 C37103      JMP      DISASM
                  ;
                  ;      PRINT RST XXX INSTRUCTION
041A 213206      RSTOP:   LXI      H,PRST
041D CDF302      CALL     PRINT
0420 CD0303      CALL     XTRACT
0423 CDD502      CALL     DECODE
0426 C37103      JMP      DISASM
                  ;
                  ;      CALL CONDITIONAL 'C'
CALLCON:
0429 0E43        MVI      C,'C'
042B CD1500      CALL     CO
042E CD0A03      CALL     CCPRNT
0431 C3D904      JMP      PREXT      ;TO PRINT THE ADDRESS
                  ;
                  ;      JUMP CONDITIONAL 'J'
JMPCON:
0434 0E4A        MVI      C,'J'
0436 CD1500      CALL     CO
0439 CD0A03      CALL     CCPRNT
043C C3D904      JMP      PREXT      ;TO PRINT THE ADDRESS
                  ;
                  ;      RETURN CONDITIONAL 'R'
RETCON:
043F 0E52        MVI      C,'R'
0441 CD1500      CALL     CO
0444 CD0A03      CALL     CCPRNT
0447 C37103      JMP      DISASM
                  ;
                  ;
                  ;      PROCESS ONE OF LXI STAX INX DAD LDAX DCX
044A 211A06      LXILST:  LXI      H,PLXI
                  ;      CAPTURE 08, 10, 18, 20, 28, 30, AND 38
044D 7A          MOV      A,D      ;GET OPCODE
044E E607        ANI      111B     ;RIGHTMOST BITS ZERO?
0450 CA0B05      JZ       N8080     ;NOT 8080 IF SO
                  ;      RECALL OPCODE TO DETERMINE WHICH ONE
0453 7A          MOV      A,D
                  ;      FIND THE PARTICULAR OPCODE
0454 E60F        ANI      OFH
                  ;      LXI HAS LEAST SIGNIFICANT FOUR BITS = 0001
0456 3D          DCR      A
0457 CA6E04      JZ       LXIREG
                  ;      STAX 0010 BECOMES 0001 = 1
                  ;      INX 0011 BECOMES 0010 = 2
                  ;      DAD 1001 BECOMES 1000 = 8
                  ;      LDAX 1010 BECOMES 1001 = 9
                  ;      DCX 1011 BECOMES 1010 = 10
045A FE03        CPI      03

```

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```

045C DA6104      JC      D4
;               MUST BE DAD, LDAX OR DCX
045F D605        SUI      05
;               DAD 8 BECOMES 3
;               LDAX9 BECOMES 4
;               DCX10 BECOMES 5
;               ACCUMULATOR NORMALIZED
0461 87          D4:     ADD      A
0462 87          ADD      A
;               VALUE IN ACCUM MULTIPLIED BY FOUR
0463 10          MOV      C,A
0464 09          DAD      B
0465 CDF302      CALL     PRINT
;               STAX, INX, DAD, LDAX, OR DC X PRINTED, PRINT REGISTER
0468 CD2403      CALL     RPPRNT
046B C37103      JMP      DISASM
;
;               PRINT REGISTER ADDRESSED BY HL (E.G., IN LXI)
046E CDF302      LXIREG:  CALL    PRINT
0471 CD2403      CALL     RPPRNT
0474 0E2C        MVI      C,','
0476 CD1500      CALL     CO
0479 C3D904      JMP      PREXT ;TO PRINT THE EXTENDED INSTRUCTION
;
;
047C 211606      MVIREG: LXI      H,PMVI
047F CDF302      CALL     PRINT
0482 CD0303      CALL     XTRACT
0485 CDBE02      CALL     RGPRNT
0488 0E2C        MVI      C,','
048A CD1500      CALL     CO
048D C3F404      JMP      DATA8
;
;
0490 211206      DCRREG: LXI      H,PDCE
0493 C39904      JMP      D5
;
;
0496 210E06      INRREG: LXI      H,PINR
;
;
;               PRINT THE INSTRUCTION GIVEN BY HL, FOLLOWED BY REGISTER
0499 CDF302      D5:     CALL     PRINT
049C CD0303      CALL     XTRACT
049F CDBE02      D6:     CALL     RGPRNT
04A2 C37103      JMP      DISASM
;
;
;               FOUND ACCUM REGISTER OPERATION - MIDDLE BITS GIVE PCODE
04A5 7A          ACCREG: MOV      A,D
04A6 E638        ANI      38H      ;SELECT OPCODE BITS
04A8 0F          RRC          ;OPCODE * 4 FOR LENGTH FOUR STRING
04A9 4F          MOV      C,A
04AA 21EE05      LXI      H,PADD ;ADDRESS THE ACCUM-REGISTER LIST
04AD 09          DAD      B
04AE CDF302      CALL     PRINT
04B1 C3C504      JMP      D9
;
;
;               MOV OPERATION FOUND
04B4 21EA05      MOVOP:  LXI      H,PMOV

```

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```

04B7 CDF302      CALL    PRINT
04BA CD0303      CALL    XTRACT
04BD CDBE02      CALL    RGPRNT
04C0 0E2C        MVI     C,' ' ;REGISTER DELIMITER
04C2 CD1500      CALL    CO
04C5 7A          D9:    MOV    A,D
04C6 E607        ANI     07
04C8 CDBE02      CALL    RGPRNT
04CB C37103      JMP     DISASM

```

```

;
;
; TYPE GROUP3: CALL JMP LDA STA LHLD
TYPE3:

```

```

04CE 79          MOV     A,C      ;*4 FOR LENGTH 4
04CF 87          ADD     A
04D0 87          ADD     A
04D1 4F          -MOV    C,A
04D2 21CE05      LXI     H,TAB3-4
04D5 09          DAD     B
04D6 CDF302      -CALL   PRINT

```

```

;
;
; ARRIVE HERE TO PRINT THE ADDRESS FIELD

```

```

04D9 CDA302      PREXT:  CALL   RDBYTE ;LOW ADDRESS TO A
04DC F5          PUSH    PSW        ;SAVE IT
04DD CDA302      CALL   RDBYTE
04E0 57          MOV     D,A        ;SET HIGH ADDRESS
04E1 F1          POP     PSW        ;RECALL LOW ADDRESS
04E2 5F          MOV     E,A        ;DE IS THE ADDRESS TO PRINT
04E3 CD9506      CALL   PADDX
04E6 C37103      JMP     DISASM

```

```

;
;
; TYPE THE IMMEDIATE OPCODES (INCLUDING IN/OUT)

```

```

04E9 79          TYPE2:  MOV     A,C      ;TYPE IMMEDIATE OPERATION CODE
04EA 87          ADD     A              ;*2
04EB 87          ADD     A              ;*4 FOR LENGTH FOUR CHAR STRING
04EC 4F          MOV     C,A          ;BC = INDEX * 4 FOR OPCODE
04ED 21A605      LXI     H,TAB2-4
04F0 09          DAD     B
04F1 CDF302      CALL   PRINT

```

```

;
;
; ARRIVE HERE TO PRINT THE IMMEDIATE VALUE

```

```

04F4 CDA302      DATA8:  CALL   RDBYTE
04F7 CD9206      CALL   PBYTE ;BYTE VALUE PRINTED
04FA C37103      JMP     DISASM

```

```

;
;
; FOUND OPCODE IN TABLE, POSITION GIVEN
; BY COUNT IN BC (NOTE THAT C IS COUNTED DOWN, WHILE
; INDEX WAS MOVING UP THE TABLE DURING THE SEARCH)

```

```

04FD 79          TYPE1:  MOV     A,C      ;TYPE SIMPLE OPCODES FROM GROUP 1
04FE 87          ADD     A              ;POSITION * 2
04FF 87          ADD     A              ;POSITION * 4 (FOUR CHAR CODES)
0500 4F          MOV     C,A          ;BC IS INDEX * 4 OF OPCODE
0501 216205      LXI     H,TAB1-4
0504 09          DAD     B              ;HL NOW HOLDS ADDRESS OF CODE TO PRINT
0505 CDF302      CALL   PRINT
0508 C37103      JMP     DISASM

```

SHLD

CP/M v.2.2

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```

N8080: ;NOT AN 8080 OPERATION CODE
050B 217606 LXI H,DBOP
050E CDF302 CALL PRINT ;PRINT THE '??='
0511 7A MOV A,D ;GET THE OPCODE
0512 CD9206 CALL PBYTE ;AND PRINT IT
0515 C37103 JMP DISASM

```

```

;
ERR: ;ENTER HERE FOR ERROR REPORTING
0518 CD2E00 CALL CRLF
051B 0E3F MVI C,'?'
051D CD1500 CALL CO

```

```

;
0520 2A1300 LHL D OLDSP
0523 F9 SPHL
PC REMAINS UNCHANGED

```

```

;
;
;
ASMEN: ;ENTER HERE FROM DEBUGGER
0524 210000 LXI H,0
0527 39 DAD SP
0528 221300 SHLD OLDSP

```

```

;
ASMO: CALL PRPC ;PRINT PC VALUE
052B CD3803 SHLD TPC ;SAVE PC VALUE
052E 221100 CALL GETBUFF ;FILL INPUT BUFFER
0531 CD8906 CALL GETOP ;GET OPERATION
0534 CD5A01 ; UPDATE PC, MUST BE CORRECT INPUT
; LHL D TPC
0537 2A1100 SHLD PC
053A 220C00 SHLD PC
053D C32B05 JMP ASMO

```

```

;
GOBACK: LHL D OLDSP
0540 2A1300 SPHL
0543 F9 RET
0544 C9

```

```

;
; THE FIRST 17 ITEMS CORRESPOND TO SIMPLE OPCODES
; (NOP BACKWARD THROUGH EI)
0545 00070F17 TABLE: DB 000H,007H,00FH,017H ;NOP RLC RRC RAL
0549 1F272F37 DB 01FH,027H,02FH,037H ;RAR DAA CMA STC
054D 3F76C9E3 DB 03FH,076H,0C9H,0E3H ;CMC HLT RET XTHL
0551 E9EBF3F9 DB 0E9H,0EBH,0F3H,0F9H ;PCHL XCHG DI SPHL
0555 FB DB 0FBH ;EI

```

```

;
; THE NEXT 10 ITEMS CORRESPOND TO THE IMMEDIATE OPCODES
0556 C6CED3 DB 0C6H,0CEH,0D3H ;ADI ACI OUT
0559 D6DBDEE6 DB 0D6H,0DBH,0DEH,0E6H ;SUI IN SBI ANI
055D EEF6FE DB 0EEH,0F6H,0FEH ;XRI ORI

```

```

0560 22 DB 022H ;SHLD
0561 2A323AC3 DB 02AH,032H,03AH,0C3H
0565 CD DB 0CDH
0566 4549202053TAB1: DB 'EI ','SPHL','DI ','XCHG'

```

```

0576 5043484C58 DB 'PCHL','XTHL','RET ','HLT'

```

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```

0586 434D432053      DB      'CMC ', 'STC ', 'CMA ', 'DAA '

0596 5241522052      DB      'RAR ', 'RAL ', 'RRC ', 'RLC '

05A6 4E4F5020  ETAB1:  DB      'NOP '
05AA 435049204FTAB2:  DB      'CPI ', 'ORI ', 'XRI ', 'ANI '

05BA 5342492049      DB      'SBI ', 'IN  ', 'SUI ', 'OUT '

05CA 41434920      DB      'ACI '
05CE 41444920  ETAB2:  DB      'ADI '
;
05D2 43414C4C4ATAB3:  DB      'CALL', 'JMP ', 'LDA ', 'STA '

05E2 4C484C44      DB      'LHLD'
05E6 53484C44  ETAB3:  DB      'SHLD'
;

05EA 4D4F5620  PMOV:   DB      'MOV '
05EE 4144442041PADD:  DB      'ADD ', 'ADC ', 'SUB ', 'SBB '

05FE 414E412058      DB      'ANA ', 'XRA ', 'ORA '
060A 434D5020  ETAB5:  DB      'CMP '

060E 494E5220  PINR:   DB      'INR '
0612 44435220  PDCR:   DB      'DCR '
0616 4D564920  PMVI:   DB      'MVI '
061A 4C58492053PLXI:  DB      'LXI ', 'STAX', 'INX ', 'DAD '

062A 4C4444158      DB      'LDAX'
062E 44435820  ETAB7:  DB      'DCX '
;

0632 52535420  PRST:   DB      'RST '
0636 50535720  PPSW:   DB      'PSW '
063A 504F502050PPOP:  DB      'POP ', 'PUSH'

0642 4E5A5A204ECCODE: DB      'NZ ', 'Z ', 'NC', 'C '

064A 504F504550      DB      'PO ', 'PE ', 'P '
0650 4D20      CREG:   DB      'M '

0652 4220432044      DB      'B ', 'C ', 'D ', 'E '
065A 48204C204D      DB      'H ', 'L ', 'M '
0660 4120      SREG:   DB      'A '
;
0662 4220202044      DB      'B ', 'D ', 'H ', 'SP '

```

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CP/M MACRO ASSEM 2.0 #020 CP/M DEBUGGER (ASMOD) 1/78

0672 50535720	DREG:	DB	'PSW '
	:		
0676 3F3F3D20	DBOP:	DB	'??= '
067A	OPCODE:	DS	4
067E		END	

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04A5 ACCREG	0093 ADJ	0099 ADJ4	052B ASM0	0524 ASMEN
0683 BEGIN	069E BREAK	0429 CALLCON	0642 CCODE	030A CCPRNT
016D CHK0	017E CHK1	0271 CHK10	0281 CHK11	0296 CHK12
0192 CHK2	01AA CHK3	01C6 CHK4	01DC CHK5	01F4 CHK6
0210 CHK7	0236 CHK8	0251 CHK9	068C CI	0015 CO
000D CR	0650 CREG	002E CRLF	0461 D4	0499 D5
049F D6	04C5 D9	04F4 DATA8	0676 DBOP	0490 DCRREG
0000 DEBUG	02D5 DECODE	001C DELIM	0680 DEMON	0383 DIS0
0397 DIS1	0371 DISASM	034F DISENT	0672 DREG	0518 ERR
05A6 ETAB1	05CE ETAB2	05E6 ETAB3	060A ETAB5	062E ETAB7
028B FADDR	0000 FAL 3	007D GADDR	008C GBYTE	011D GCON
0145 GCONA	0689 GETBUFF	00F1 GETD	0107 GETDR	015A GETOP
0110 GETPR	00DB GETREG	068C GNC	0540 GOBACK	03A1 GROUP1
03AC GROUP2	03B7 GROUP3	0070 HEX	0223 IN0	0496 INRREG
0005 JLOC1	0434 JMPCON	000A LF	044A LXILST	046E LXIREG
0000 MODLOC	0125 MOP	04B4 MOVOP	000E MPC	047C MVIREG
050B N8080	0013 OLD	01BE OP1	01A0 OP2	067A OPCODE
02F5 P1	05EE PADD	0695 PADDX	0010 PAGM	0692 PBYTE
068F PCHAR	000C PC	0612 PDCR	060E PINR	061A PLXI
05EA PMOV	0616 PMVI	0265 PPO	0267 PP1	063A PPOP
0636 PPSW	04D9 PREXT	02F3 PRINT	06A1 PRLABEL	0338 PRPC
033B PRPC0	0632 PRST	02B7 RDO	02A3 RDBYTE	FFFF RELOC
043F RETCON	02C8 RGP1	02CF RGP2	02BE RGPRNT	0324 RPPRNT
041A RSTOP	004C SCO	0039 SC1	0058 SC2	006A SC3
003C SCANO	0698 SCANEXP	0039 SCAN	00BD SE1	00CA SE2
00A5 SEA0	00AF SEA1	00A0 SEAR2	00B7 SEAR	0150 SETMD
0151 SETM	0660 SREG	0009 TAB	0566 TAB1	05AA TAB2
05D2 TAB3	0545 TABLE	0011 TPC	FFFF TRUE	04FD TYPE1
04E9 TYPE2	04CE TYPE3	0303 XTRACT		

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