```
LOC  OBJ                  LINE     SOURCE

                             1 +1  $TITLE (HARDWARE INITIALIZATION AND SYSTEM STARTUP)
                             2 +1  $include(:f1:propa.lit)
                      =1     3     ;
                      =1     4     ;    Intel Corporation Proprietary Information. This listing is
                      =1     5     ;    supplied under the terms of a license agreement with Intel
                      =1     6     ;    Corporation and may not be copied nor disclosed except in
                      =1     7     ;    accordance with the terms of the agreement.
                      =1     8     ;
                             9 +1  $INCLUDE (:F1:PORTS.INC)
                      =1    10
                      =1    11     ;       CONTOL PORTS
                      =1    12
  0000                =1    13     SET_TXSRT        EQU     000H
  0001                =1    14     RESET_TXSRT      EQU     001H
  0002                =1    15     SET_RXAV1        EQU     002H
  0003                =1    16     SET_RXAV2        EQU     003H
  0004                =1    17     SET_RXAV3        EQU     004H
  0005                =1    18     RESET_ERROR      EQU     005H
  0006                =1    19     RESET_CHANNEL_COUNTER   EQU     006H
  00A0                =1    20     SET_SYS          EQU     0A0H
  00B0                =1    21     SET_LCC          EQU     0B0H
                      =1    22
                      =1    23
                      =1    24     ;       PIT VALUES
                      =1    25
  00D3                =1    26     PITCMD           EQU     0D3H          ;PIT COMMAND PORT
  00D2                =1    27     PIT_BCK          EQU     0D2H          ;PIT BACKOFF TIMER
  00D1                =1    28     PIT_RTC          EQU     0D1H          ;PIT REAL-TIME CLOCK PORT
  00D0                =1    29     PIT_ALC          EQU     0D0H          ;PIT ALARM-CLOCK PORT
                      =1    30
  00C0                =1    31     LATCH_RTC        EQU     00H           ;LATCH REAL-TIME CLOCK VALUE
  0040                =1    32     LATCH_ALC        EQU     40H           ;LATCH ALARM-CLOCK VALUE
                      =1    33
                      =1    34
                      =1    35     ;       DMA VALUES
                      =1    36
  00C8                =1    37     DMACMD           EQU     0C8H          ;DMA COMMAND AND STATUS PORT
  00C9                =1    38     DMAREQ           EQU     0C9H          ;DMA REQUEST PORT
  00CA                =1    39     DMAMSKB          EQU     0CAH          ;DMA MASK BIT PORT
  00CB                =1    40     DMAMODE          EQU     0CBH          ;DMA MODE PORT
  00CC                =1    41     DMABPTR          EQU     0CCH          ;DMA BYTE POINTER PORT
  00CD                =1    42     DMACLR           EQU     0CDH          ;? (TMP & CLEAR??)
  00CF                =1    43     DMAMASK          EQU     0CFH          ;DMA MASK PORT
                      =1    44
  00C0                =1    45     CH0ADDR          EQU     0C0H          ;CHANNEL 0 ADDRESS PORT
  00C1                =1    46     CH0WC            EQU     0C1H          ;CHANNEL 0 WORD COUNT PORT
  00C2                =1    47     CH1ADDR          EQU     0C2H          ;CHANNEL 1 ADDRESS PORT
  00C3                =1    48     CH1WC            EQU     0C3H          ;CHANNEL 1 WORD COUNT PORT
  00C4                =1    49     CH2ADDR          EQU     0C4H          ;CHANNEL 2 ADDRESS PORT
  00C5                =1    50     CH2WC            EQU     0C5H          ;CHANNEL 2 WORD COUNT PORT
```

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LOC  OBJ                  LINE     SOURCE

  00C6                =1    51     CH3ADDR         EQU     0C6H            ;CHANNEL 3 ADDRESS PORT
  00C7                =1    52     CH3WC           EQU     0C7H            ;CHANNEL 3 WORD COUNT PORT
                      =1    53
                      =1    54
                      =1    55     ;       PIO VALUES
                      =1    56
  00E3                =1    57     PIOCMD          EQU     0E3H            ;PIO COMMAND PORT (CHECK: F3?)
  00E0                =1    58     PIOA            EQU     0E0H            ;PIO PORT A
  00E1                =1    59     PIOB            EQU     0E1H            ;PIO PORT B
  00E2                =1    60     PIOC            EQU     0E2H            ;PIO PORT C
                      =1    61
  00F3                =1    62     PIOCLR          EQU     11110011B       ;CLEAR SERDES
  002A                =1    63     PIOSEN          EQU     00101010B       ;SERIAL ENABLE
                      =1    64     ;       PIOLOOP         EQU     XXXXXXXXB       ;LOOPBACK COMMAND
  00E0                =1    65     PIOREAD         EQU     11100000B       ;READ ADDRESS COMMAND
                      =1    66
                      =1    67
                      =1    68     ;       PIC VALUES
                      =1    69
  00F0                =1    70     PICCMD          EQU     0F0H            ;PIC COMMAND PORT
  00F0                =1    71     PICDATA         EQU     0F0H            ;PIC DATA PORT
  00F1                =1    72     PICMASK         EQU     0F1H            ;PIC MASK PORT
                      =1    73
  0020                =1    74     ECI_PIC         EQU     20H             ;PIC END-OF-INTERRUPT COMMAND
  0060                =1    75     SEOI_PIC        EQU     60H             ;PIC SELECTIVE EOI COMMAND
  000C                =1    76     POLL_PIC        EQU     0CH             ;POLL PIC COMMAND
  000A                =1    77     READ_IRR        EQU     0AH             ;PIC READ-IRR COMMAND
  0020                =1    78     RTC_INT         EQU     20H             ;MASK FOR REAL-TIME CLOCK INTERRUPT
  0066                =1    79     RTC_INT_SEOI    EQU     60H+6           ;COMMAND TO EOI RTC INTERRUPT
                      =1    80
  00C1                =1    81     CH1_DONE        EQU     01H             ;RX CHANNEL 1 DONE
  00C2                =1    82     CH2_DONE        EQU     02H             ;RX CHANNEL 2 DONE
  00C4                =1    83     CH3_DONE        EQU     04H             ;RX CHANNEL 3 DONE
                            84
                            85             NAME    INIT
                            86
                            87     DGROUP  GROUP   DATA
----                        88     DATA    SEGMENT BYTE PUBLIC 'DATA'
                            89
0000 (80                    90             DB      80  DUP (?)
     ??
     )
  0050                      91     MIP_STACK EQU   $
                            92
                            93             EXTRN   CTRESULT:BYTE
----                        94     DATA    ENDS
                            95     CGROUP  GROUP   CODE
----                        96     CODE    SEGMENT byte  PUBLIC 'CODE'
                            97             ASSUME  DS:DGROUP,CS:CGROUP
                            98             EXTRN   CQCREATELIST:NEAR
                            99             EXTRN   CQDLLSTART:NEAR
                           100             EXTRN   CQCAINTROUTINE:NEAR
                           101             EXTRN   CQSTART:NEAR
                           102             EXTRN   CQSCHEDULE:NEAR
                           103             EXTRN   STARTINGLIST:BYTE
```

```
LOC  OBJ                  LINE     SOURCE

                           104             EXTRN   SETLED:NEAR
                           105
                           106
                           107
                           108     ;
                           109     ; THIS ROUTINE STARTS THE CMX FIRMWARE.
                           110     ;
                           111             PUBLIC  CQCBINIT
0000                       112     CQCBINIT:
0000 FA                    113             CLI
                           114     ;
                           115     ;  SET UP STACK FOR INITIALIZATION
                           116     ;
0001 B8F0F9                117             MOV     AX,0F9F0H
0004 8ED0                  118             MOV     SS,AX
0006 BC7000                119             MOV     SP,70H
0009 2E8E1E5C00     R      120             MOV     DS,WORD PTR CGROUP:DGRP
                           121
                           122     ;       INITIALIZE INTERRUPT VECTORS
                           123
000E 33C0                  124             XOR     AX,AX
0010 8EC0                  125             MOV     ES,AX
0012 8BF8                  126             MOV     DI,AX           ; FIRST INIT THE MISC VECTORS
0014 B90800                127             MOV     CX,8
0017 B8DD00         R      128             MOV     AX,OFFSET CGROUP:NULL_ISR
001A 268905                129     IL1:    MOV     ES:[DI],AX      ; PUT OFFSET AWAY
001D 26C74502----   R      130             MOV     ES:[DI+2],CGROUP
0023 83C704                131             ADD     DI,4
0026 49                    132             DEC     CX
0027 75F1                  133             JNZ     IL1
0029 B91000                134             MOV     CX,2*8          ;NUMBER OF WORDS TO MOVE
002C BEDE0090       R      135             MOV     SI,OFFSET CGROUP:VECTORS
0030 F3                    136             REP     MOVS ES:WORD PTR [DI], CS:[SI]  ;MOVE VECTORS TO LOW MEMORY
0031 2EA5
                           137
                           138     ;       INITIALIZE HARDWARE
                           139
0033 E81C00                140             CALL    CQHDWINIT
                           141
                           142     ;       START UP COMM SYSTEM
                           143
0036 0E                    144             PUSH    CS
0037 B80000         E      145             MOV     AX,OFFSET CGROUP:STARTINGLIST
003A 50                    146             PUSH    AX
003B E80000         E      147             CALL    CQCREATELIST
003E E80000         E      148             CALL    CQDLLSTART
0041 8D3E0000       E      149             LEA     DI,DGROUP:CTRESULT      ;
0045 803D00                150             CMP     BYTE PTR [DI],0         ; IF NO PROBLEM WITH CONF TEST,
0048 7502                  151             JNE     INIT1                   ; THEN SAVE DLL STARTING RESULTS
004A 8805                  152             MOV     BYTE PTR [DI],AL
004C E80000         E      153     INIT1:  CALL    CQSTART
004F F4                    154             HLT
                           155
0050 ----           R      156     DGRP    DW      DGROUP
                           157
```

```
LOC  OBJ                    LINE     SOURCE

                             158 +1  $eject
```

```
LOC  OBJ                  LINE     SOURCE

                          159      ;
                          160      ; HARDWARE INITIALIZATION ROUTINE
                          161
                          162              PUBLIC  CQHDWINIT
C052                      163      CQHDWINIT:
                          164      ;       RESET THINGS
                          165
0052 B000                 166 +2                   MOV     AL,0
0054 E6B0                 167 +2           OUT       0B0H,AL                ; MAKE SURE ADDRESS IN ON BOARD
0056 E690                 168              OUT     090H,AL          ; MAKE SURE MB INTERRUPT IS OFF
0058 E601                 169              OUT     RESET_TXSRT,AL
                          170
                          171      ;       INITIALIZE PIO (PARALLEL IO)
                          172
005A B098                 173 +2                   MOV     AL,80H+10H+8H
005C E6E3                 174 +2           OUT             PIOCMD,AL  ;MODES: A:IN,0  B:OUT,0  CL:OUT CH:IN
005E B0F3                 175 +2                   MOV     AL,PIOCLR
0060 E6E1                 176 +2           OUT             PIOB,AL ;INITIALIZE OUTPUT PORT TO CLEAR SERDES
0062 E80000         E     177              CALL    SETLED          ; TURN OFF ALL DIAGNOSTIC FUNCTIONS
                          178
                          179      ;       INITIALIZE PIT (PROGRAMMABLE INTERVAL TIMER)
                          180
0065 B030                 181 +2                   MOV     AL,30H
0067 E6D3                 182 +2           OUT             PITCMD,AL       ;SET TIMER 0 TO MODE 0
0069 B074                 183 +2                   MOV     AL,74H
006B E6D3                 184 +2           OUT             PITCMD,AL       ;SET TIMER 1 TO MODE 2
006D B0B0                 185 +2                   MOV     AL,0B0H
006F E6D3                 186 +2           OUT       PITCMD,AL      ;SET TIMER 2 TO MODE 0
0071 B000                 187 +2                   MOV     AL,00H
0073 E6D1                 188 +2           OUT             PIT_RTC,AL      ;SET CLOCK TO 8000H
0075 B080                 189 +2                   MOV     AL,80H
0077 E6D1                 190 +2           OUT             PIT_RTC,AL
                          191
                          192      ;       INITIALIZE DMA
                          193
0079 E6CD                 194              OUT     DMACLR,AL       ;CLEAR DMA CHIP
007B B0A0                 195 +2                   MOV     AL,10100008
007D E6C8                 196 +2           OUT             DMACMD,AL ;DACK:HIGH, DREQ:LOW, EXTENDED WRITE, ENABLED
007F B088                 197 +2                   MOV     AL,0+88H
0081 E6CB                 198 +2           OUT      DMAMODE,AL     ;CH0: BLOCK MODE, READ TRANSFER
0083 B015                 199 +2                   MOV     AL,1+14H
0085 E6CB                 200 +2           OUT             DMAMODE,AL      ;CH1: DEMAND MODE, AUTO INIT, WRITE TRANSFER
0087 B016                 201 +2                   MOV     AL,2+14H
0089 E6CB                 202 +2           OUT             DMAMODE,AL      ;CH2: SAME
008B B017                 203 +2                   MOV     AL,3+14H
008D E6CB                 204 +2           OUT             DMAMODE,AL      ;CH3: SAME
008F B00F                 205 +2                   MOV     AL,0FH
0091 E6CF                 206 +2           OUT             DMAMASK,AL      ;DISABLE ALL CHANNELS
                          207
                          208      ;       INITIALIZE PIC (PORGRAMMABLE INTERRUPT CONTROLLER)
                          209
0093 B013                 210 +2                   MOV     AL,13H
0095 E6F0                 211 +2           OUT             PICCMD,AL       ;ICW1
0097 B008                 212 +2                   MOV     AL,08H
0099 E6F1                 213 +2           OUT             PICMASK,AL      ;ICW2
```

```
LOC  OBJ                  LINE      SOURCE

009B B001                  214 +2                 MOV     AL,01H
009D E6F1                  215 +2           OUT           PICMASK,AL      ;ICW4
009F B000                  216 +2                 MOV     AL,(NOT 11111111B)
00A1 E6F1                  217 +2           OUT           PICMASK,AL ;SET MASK
00A3 C3                    218              RET
                           219
                           220 +1   $EJECT
```

set MCS-86 mode

allow all interrupts

```
LOC  OBJ                  LINE     SOURCE

                           221     ;       IDLE PROCESS
                           222
                           223
                           224             PUBLIC  IDLE
00A4 FA                    225     IDLE:   CLI                     ;WANT INDIVISIBILITY HERE
00A5 E80000          E     226             CALL    CQSCHEDULE
00A8 FB                    227             STI                     ;INTERRUPTS ENABLED ONLY DURING HALT
00A9 F4                    228             HLT
00AA EBF8                  229             JMP     IDLE
                           230
                           231
                           232     ;       INTERRUPT SERVICE ROUTINES AND VECTORS
00AC                       233     CAISR:
00AC 06                    234             PUSH    ES
00AD 1E                    235             PUSH    DS
00AE 2E8E1E5C00      R     236             MOV     DS,DGRP
00B3 50                    237             PUSH    AX
00B4 51                    238             PUSH    CX
00B5 52                    239             PUSH    DX
00B6 53                    240             PUSH    BX
00B7 56                    241             PUSH    SI
00B8 57                    242             PUSH    DI
00B9 B020                  243 +2                  MOV     AL,EOI_PIC
00BB E6F0                  244 +2          OUT             PICCMD,AL
                           245     ;
                           246     ; SAVE CURRENT STACK SO WE CAN TURN INTERRUPTS ON AGAIN
                           247     ;
00BD 8BC4                  248             MOV     AX,SP
00BF BC4E00          R     249             MOV     SP,OFFSET DGROUP:MIP_STACK-2
00C2 50                    250             PUSH    AX
                           251     ;
                           252     ; NOW MASK OFF INTERRUPT SO WON'T GET LOWER PRIORITY INTERRUPTS
                           253     ;
00C3 E4F1                  254             IN      AL,PICMASK
00C5 0CF0                  255             OR      AL,11110000B    ; MASK OFF CA AND LOWER INTERRUPTS
00C7 E6F1                  256             OUT     PICMASK,AL
00C9 FB                    257             STI
00CA E80000          E     258             CALL    CQCAINTROUTINE
                           259     ;
                           260     ; NOW RESTORE THINGS
                           261     ;
00CD FA                    262             CLI
00CE E4F1                  263             IN      AL,PICMASK
00D0 240F                  264             AND     AL,00001111B    ; ALLOW CA AND LOWER INTERRUPTS
00D2 E6F1                  265             OUT     PICMASK,AL
00D4 5C                    266             POP     SP
                           267
00D5 5F                    268             POP     DI
00D6 5E                    269             POP     SI
00D7 5B                    270             POP     BX
00D8 5A                    271             POP     DX
00D9 59                    272             POP     CX
00DA 58                    273             POP     AX
00DB 1F                    274             POP     DS
00DC 07                    275             POP     ES


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```

```
LOC  OBJ                  LINE     SOURCE

0DDD                       276     NULL_ISR:
0DDD CF                    277             IRET
                           278
                           279             EXTRN   RXISR:FAR
                           280             EXTRN   XMITISR:FAR,BACKOFFISR:FAR
                           281             EXTRN   TIMERINT:FAR,CLOCKINT:FAR
                           282
CODE                       283     VECTORS:
0DDE 0000----         E    284     INT8    DD      CGROUP:RXISR
0DE2 0000----         E    285     INT9    DD      CGROUP:RXISR
0DE6 0000----         E    286     INT10   DD      CGROUP:RXISR
0DEA C000----         E    287     INI11   DD      CGROUP:XMITISR
0DEE AC00----         R    288     INT12   DD      CGROUP:CAISR
0DF2 0000----         E    289     INT13   DD      CGROUP:TIMERINT
0DF6 0000----         E    290     INT14   DD      CGROUP:CLOCKINT
0DFA 0000----         E    291     INT15   DD      CGROUP:BACKOFFISR
                           292
                           293
----                       294     CODE    ENDS
                           295
                           296             END

ASSEMBLY COMPLETE, NO ERRORS FOUND
```