CST8216 Processor Architecture

68HCS12 Application Programming Interface (API) and Library Routines Booklet

(Last Update: 14 May 2023 D. Haley)

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General Use of Subroutines

This document contains a description of the various Hardware Configuration and Library Subroutines that make up the **API.s19** file, which must be loaded into the Simulator prior to its use.

Although the subroutine's source code is not included in this manual, each subroutine's use is described in detail for the user.

Where a subroutine destroys (overwrites) a value in either an 8-bit or 16-bit register, it is recommended that those registers should be pushed onto the Stack before calling the subroutine and subsequently pulled off the Stack afterwards if you wish to preserve the original register contents.

Subroutine Entry Points

The appropriate lines of code below should be included in your source code for use of the API and Library subroutines, as applicable, noting that no other code or data should be originated in the range of $2100 -- $2160.

```
Config_Sws_And_Leds        equ        $2100
Config_Hex_Displays        equ        $2117
Delay_Ms                   equ        $211F
Hex_Display                equ        $2139
Extract_MSB                equ        $2144
Extract_LSB                equ        $2149
```

The library file **API.s19** must be loaded into the simulator along with the compiled source code's **.s19** file.

Configure Switches and LEDs Subroutine

```
;------------------------------------
; Config_SWs_and_LEDs.asm           -
;     Purpose:                      -
;         Configure the Wytec Rev F -
;         board to use the LEDs mapped -
;         on port B and the SWITCHES -
;         mapped on port H          -
;                                   -
;     Source:                       -
;         - Wytec User's Manual for -
;           Rev F board Revision 1.05 -
;           page 21 .asm listing    -
;         - 28 Feb 2013 - D. Haley  -
;           rewrote as a            -
;           Library Subroutine      -
;                                   -
;     Use:                          -
;                                   -
;         jsr Config_SWs_and_LEDs   -
;                                   -
;     Postcondition:               -
;         - A destroyed             -
;------------------------------------
```

Configure HEX Displays Subroutine

```
;------------------------------------
; Config_HEX_Displays.asm            -
;     Purpose:                      -
;         - To configure the ports the -
;           Dragon12-Plus HCS12 Trainer -
;           Rev F. Board Ports to use -
;           the four HEX displays   -
;           on Port B               -
;                                   -
;      Use:                         -
;         - jsr Config_HEX_Displays -
;                                   -
;     Postcondition:               -
;         - A is destroyed          -
;------------------------------------
```

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Delay millisecond Subroutine

```
;---------------------------------------
; Delay_ms.asm                          -
;     Purpose:                          -
;         - A millisecond delay for the -
;           Dragon12-Plus HCS12 Trainer -
;           Rev F. Board running at     -
;           24 MHz with an 8 MHz Crystal-
;                                       -
;    Source:                            -
;         - Wytec User's Manual for     -
;           Rev F board Revision 1.05   -
;         - page 21 .asm listing        -
;         - D. Haley - rewrote to       -
;           include stack operations    -
;         - updated 28 Feb 2013 to      -
;           have Accumulator A hold the -
;           number of milliseconds to   -
;           delay, versus using a       -
;           global label                -
;                                       -
;     Precondition:                     -
;         - Stack initialized at $2000  -
;         - Accumulator A loaded with   -
;           number of milliseconds to   -
;           delay ( 1 ms to 255 ms )    -
;           e.g. Accumulator A <- #250  -
;           will cause a 250 ms delay   -
;                                       -
;     Use:                              -
;                                       -
;         - to call the delay routine   -
;           (example for a 250 ms delay -
;                                       -
;           ldaa #250                   -
;           jsr Delay_ms                -
;                                       -
;     Postcondition:                    -
;         - A destroyed                 -
;         - Y destroyed                 -
;---------------------------------------
```

HEX Display Subroutine

```
;HEX_Display.asm
; Author:              D. Haley
; Student Number:      Faculty
; Date:                31 Oct 2015
;
; Purpose:             A Subroutine to display a value on a Hex Display
;
; Preconditions:       HEX Displays configured for Output
;                      Value to Display is in Accumulator A
;                      Hex Display to use is in Accumulator B
; Use:
;                      jsr Hex_Display
;
; Postcondition:       X is destroyed
;                      A is destroyed
;
;                 Lookup table for LED segments
LEDSEG  db      $3f,$06,$5b,$4f,$66,$6d,$7d,$07,$7f,$6f,$77,$7C,$39,$5E,$79,$71
;                 0,   1,   2,   3,   4,   5,   6,   7,   8,   9,   A,   B,   C,   D,   E,   F
```

Extract MSB subroutine

```
; Extract_MSB.asm
; Author:              D. Haley
; Student Number:      Faculty
; Date:                15 Nov 2012, revised 19 Mar 2010
;
;
; Purpose:             Subroutine to extract MSB from an 8-bit Accumulator
;
; Preconditions:
;                      Accumulator A holds the value to extract
;
; Use:                 jsr Extract_MSB
;
; Postcondition:       The lower nibble of A contains the value that was
;                      originally in the upper nibble.
;
;                      The original upper nibble is destroyed
```

Extract LSB subroutine

```
; Extract_LSB.asm
; Author:              D. Haley
; Student Number:      Faculty
; Date:                15 Nov 2012, revised 19 Mar 2010
; Purpose:             Subroutine to extract LSB from an 8-bit Accumulator
;
; Preconditions:
;                      Accumulator A holds the value to extract
;
; Use:                 jsr Extract_LSB
;
;
; Postcondition:       The lower nibble of A contains the value that was
;                      originally in the lower nibble.
;
;                      The original upper nibble is destroyed
```

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