

Interfacing the X5043 Watchdog Timer to Hitachi H8/3000 Microcontrollers

The following code demonstrates how the Intersil X5043 SPI serial EEPROM and watchdog timer could be interfaced to the Hitachi H8/3000 microcontroller family when connected

as shown in Figure 1. The interface uses four of the port pins available on H8 family devices to implement the interface.

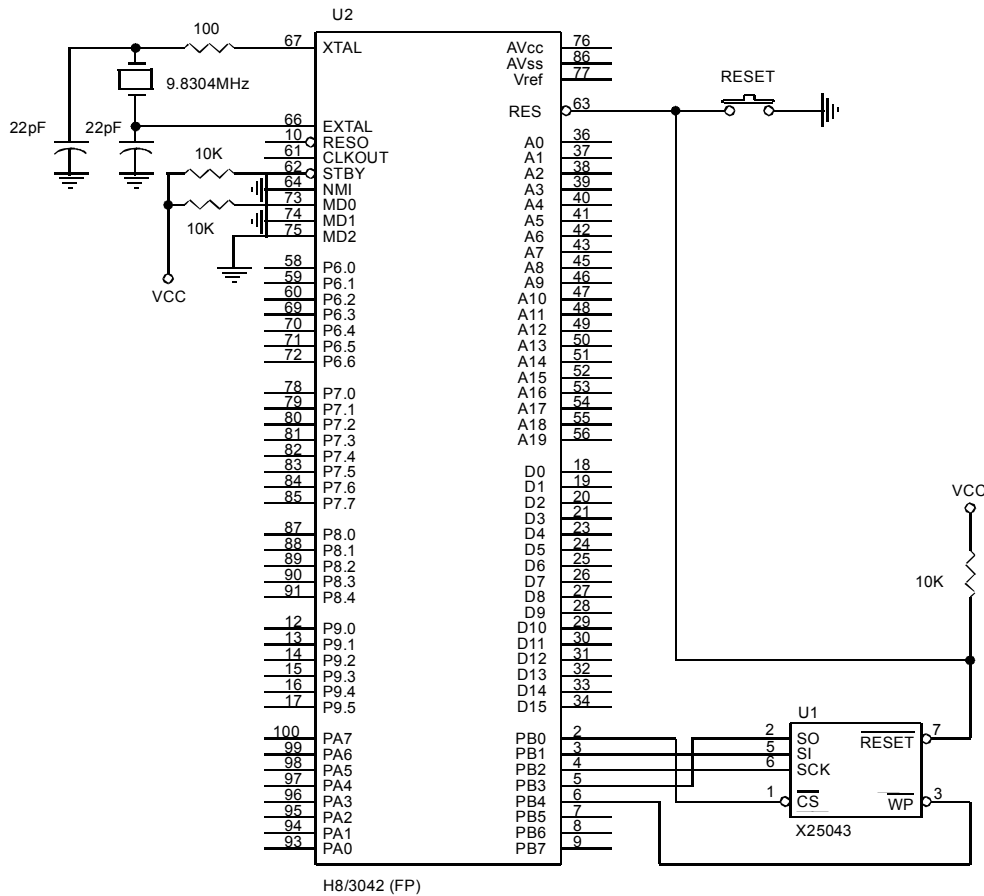


FIGURE 1. TYPICAL HARDWARE CONNECTION FOR INTERFACING AN X5043 TO THE H8/3042 MICROCONTROLLER

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        .h8300h
        .file "h8x25043.asm"

; h8x25043.asm

; Demonstration code for interfacing Xicor X5043 to Hitachi H8/3042

; Revision: 2.03 02/04/96

; Expects the H8/3042 hard-wired in Mode 1: 8-bit bus-width, Expanded address
; space (0x00000-0xFFFFF), Internal ROM disabled, Internal RAM enabled
; (0xFF710-0xFFF0F), 9.8304 MHz xtal

        .include "h8stddef.inc"          ; H8/3042 standard register definitions

; H8/3042 specific equates

        .equ  H8RAMTOP,    0xFFFF0F    ; Highest onboard RAM address (2048 bytes)
        .equ  H8RAMBOT,    0xFF710     ; Lowest onboard RAM address
        .equ  RXD0,        bit_2       ; Receive data pin of port/SCI
        .equ  INTMASK,     0b11000000  ; CCR Interrupt Mask (I and UI bits)

; Xicor X5043 device-specific equates

        .equ  CS,          bit_0        ; Port bit for Chip Select input (H8 out)
        .equ  SI,          bit_1        ; Port bit for Serial data Input (H8 out)
        .equ  SCK,         bit_2        ; Port bit for Serial Clock input (H8 out)
        .equ  SO,          bit_3        ; Port bit for Serial data Output (H8 in)
        .equ  WP,          bit_4        ; Port bit for Write Protect input (H8 out)

        .equ  XICOR,       PBDR         ; H8/3042 data port assignment (PB)
        .equ  XICORDDR,    PBDDR        ; H8/3042 data direction port assignment
        .equ  DDRSETUP,    0b11110111  ; Port Data Direction Register setup

        .equ  WREN,        0x06         ; WRite ENable latch instruction
        .equ  WRDI,        0x04         ; WRite DIisable latch instruction
        .equ  WRSR,        0x01         ; WRite Status Register instruction
        .equ  RDSR,        0x05         ; ReaD Status Register instruction
        .equ  WRITE,       0x02         ; WRITe memory instruction
        .equ  READ,        0x03         ; REaD memory instruction

        .equ  STATUSREG,   0x00         ; Status Register

        .equ  WIPBIT,      bit_0        ; Write In Progress status bit
        .equ  ADDRBIT,     bit_3        ; Read/Write instruction address MSB
        .equ  PAGESIZE,    4            ; Bytes per page
        .equ  NUMPAGES,    128          ; Number of pages in X25043
        .equ  NUMBYTES,    NUMPAGES*PAGESIZE ; Number of bytes in X25043
        .equ  MAXPOLLS,    100          ; Maximum number of poll attempts for WIP

; Main equates

        .equ  STACKTOP,    H8RAMTOP-4   ; Stack initializes here and builds down
        .equ  ALLONES,     0b11111111  ; All bits set
        .equ  BIGWRITE,    70           ; Test number of bytes to write
        .equ  RAMBFR0,     H8RAMBOT     ; Start of read/write buffer in on-board RAM
        .equ  RAMBFR1,     H8RAMBOT+PAGESIZE ; Second read/write buffer
        .equ  RAMBFR2,     RAMBFR1+BIGWRITE ; Third read/write buffer
        .equ  DATABYTE0,    0xF0         ; Test byte 0
        .equ  DATABYTE1,    0x0F         ; Test byte 1

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.equ  DATABYTE2,  0x55      ;          2/Power-up flag
.equ  DATABYTE3,  0xAA      ;          3/
.equ  PWRUPFLGS,  256*DATABYTE3+DATABYTE2 ; 0xAA55
.equ  XADDRB,     45        ; Test byte write/read address
.equ  XADDRP,     200       ; Test page write/read address
.equ  XADDRBP,    0x195     ; Test block protect read/write address
.equ  XADDRBW,    0x037     ; EEPROM BigWrite destination
.equ  H8RAMLOC0,  H8RAMBOT+1047 ; Power-up RAM test location 0
.equ  H8RAMLOC1,  H8RAMBOT+1597 ;          1

; Start of code
; .org 0x00000          ; H8/3042 Interrupt vector jump table
;                      ; Must reside at address 0x00000

.long 0x00000100      ; 0 RESET
.long _bogus_int      ; 1 reserved
.long _bogus_int      ; 2 reserved
.long _bogus_int      ; 3 reserved
.long _bogus_int      ; 4 reserved
.long _bogus_int      ; 5 reserved
.long _bogus_int      ; 6 reserved
.long _bogus_int      ; 7 external interrupt (NMI)
.long _bogus_int      ; 8 Trap Instruction (4 sources)
.long _bogus_int      ; 9 Trap Instruction (4 sources)
.long _bogus_int      ; 10 Trap Instruction (4 sources)
.long _bogus_int      ; 11 Trap Instruction (4 sources)
.long _bogus_int      ; 12 External Interrupt IRQ0
.long _bogus_int      ; 13 External Interrupt IRQ1
.long _bogus_int      ; 14 External Interrupt IRQ2
.long _bogus_int      ; 15 External Interrupt IRQ3
.long _bogus_int      ; 16 External Interrupt IRQ4
.long _bogus_int      ; 17 External Interrupt IRQ5
.long _bogus_int      ; 18 reserved
.long _bogus_int      ; 19 reserved
.long _bogus_int      ; 20 WOV1 Watchdog timer
.long _bogus_int      ; 21 CMI Refresh controller
.long _bogus_int      ; 22 reserved
.long _bogus_int      ; 23 reserved
.long _bogus_int      ; 24 IMIA0 GRA0 compare match/input capture
.long _bogus_int      ; 25 IMIB0 GRB0 compare match/input capture
.long _bogus_int      ; 26 OVI0 overflow 0
.long _bogus_int      ; 27 reserved
.long _bogus_int      ; 28 IMIA1 GRA1 compare match/input capture
.long _bogus_int      ; 29 IMIB1 GRB1 compare match/input capture
.long _bogus_int      ; 30 OVI1 overflow 1
.long _bogus_int      ; 31 reserved
.long _bogus_int      ; 32 IMIA2 GRA2 compare match/input capture
.long _bogus_int      ; 33 IMIB2 GRB2 compare match/input capture
.long _bogus_int      ; 34 OVI2 overflow 2
.long _bogus_int      ; 35 reserved
.long _bogus_int      ; 36 IMIA3 GRA3 compare match/input capture
.long _bogus_int      ; 37 IMIB3 GRB3 compare match/input capture
.long _bogus_int      ; 38 OVI3 overflow 3
.long _bogus_int      ; 39 reserved
.long _bogus_int      ; 40 IMIA4 GRA4 compare match/input capture
.long _bogus_int      ; 41 IMIB4 GRB4 compare match/input capture
.long _bogus_int      ; 42 OVI4 overflow 4
.long _bogus_int      ; 43 reserved
.long _bogus_int      ; 44 DEND0A DMAC group 0
.long _bogus_int      ; 45 DEND0B DMAC group 0
.long _bogus_int      ; 46 DEND1A DMAC group 0

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        .long _bogus_int      ; 47 DEND1B  DMAC group 0
        .long _bogus_int      ; 48 reserved
        .long _bogus_int      ; 49 reserved
        .long _bogus_int      ; 50 reserved
        .long _bogus_int      ; 51 reserved
        .long _bogus_int      ; 52 ERI0 receive error      SCI chan 0
        .long _bogus_int      ; 53 RXI0 receive data full  SCI chan 0
        .long _bogus_int      ; 54 TXI0 transmit data empty SCI chan 0
        .long _bogus_int      ; 55 TEI0 transmit end        SCI chan 0
        .long _bogus_int      ; 56 ERI1 receive error      SCI chan 1
        .long _bogus_int      ; 57 RXI1 receive data full  SCI chan 1
        .long _bogus_int      ; 58 TXI1 transmit data empty SCI chan 1
        .long _bogus_int      ; 59 TEI1 transmit end        SCI chan 1
        .long _bogus_int      ; 60 ADI  A/D end

_bogus_int:
    orc        #0b11000000, ccr    ; Disable interrupts (I and UI)
    rte

;    .org        0x000100

_powerup:
    orc        #INTMASK, ccr      ; Initialize
    mov.l      #STACKTOP, er7     ; Disable interrupts (I and UI)
    bsr        _init_xiport:16    ; Initialize the Stack pointer
    bset       #WP, @XICOR        ; Initialize the X25043 I/O port
    ; Write Protect line high to enable X25043
    ; writes
    bsr        _wren_cmnd:16      ; Enable writing to the X25043 to ...
    mov.b      #0b00110000, r0l    ; Setup to disable the WDT
    bsr        _wrsrc_cmnd:16     ; ... and do so!

_main:
    mov.l      #H8RAMLOC0, er1    ; Point to power-up flag location 0
    mov.b      @er1, r0l          ; ... and fetch the flag
    mov.l      #H8RAMLOC1, er2    ; ... the other flag, location 1
    mov.b      @er2, r0h          ; ... fetch it
    mov.w      #PWRUPFLGS, r3     ; Setup flag compare (and re-write)
    mov.b      r3l, @er1          ; Store first flag
    mov.b      r3h, @er2          ; ... and the second
    ; (we've powered-up or reset)
    cmp.w      r0, r3             ; Has the WDT brought us here?
    beq        _skip_wdt         ; Yes, skip the Watch Dog Timer exercise

;    Exercise the X5043 Watch Dog Timer one time

    bsr        _wren_cmnd:16      ; No, enable writing to the X5043
    mov.b      #0b00100000, r0l    ; Setup the WDT for 200ms
    bsr        _wrsrc_cmnd:16     ; ... and enable it
_wdt_delay:
    mov.w      #30788, r3         ; Setup loop count (100ms @9.8304MHz)
_wdtdly_loop:
    dec.w      #1, r3             ; Crank the counter
    bne        _wdtdly_loop       ; Done?
    bsr        _wdog_reset:16     ; Kick the dog (verifies WDT reset)
_wdt_wait:
    bra        _wdt_wait:16       ; Spin here until WDT kicks back to reset

;    Skip the Watch Dog Timer ... done once, now byte Read/Write exercise

_skip_wdt:

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xor.b      r01,r01          ; Setup null byte to clear power-up flags
mov.l      #H8RAMLOC0,er1   ; Point to power-up flag location 0
mov.b      r01,@er1        ; ... and clear the flag
mov.l      #H8RAMLOC1,er1   ; ... the other flag, location 1
mov.b      r01,@er1        ; ... and clear it (now reset recycles WDT)
bsr        _rdsr_cmnd:16    ; Read the X5043 status register
bsr        _wren_cmnd:16    ; Enable writing to the X5043
mov.b      #DATABYTE0,r01   ; Setup data for single byte write
mov.w      #XADDRB,r1       ; Setup X5043 target address
bsr        _byte_write:16   ; ... and write it
mov.w      #XADDRB,r1       ; Setup X5043 source address
bsr        _byte_read:16    ; ... and fetch it!
bsr        _wren_cmnd:16    ; Enable writing to the X5043
mov.b      #DATABYTE1,r01   ; Setup data for single byte write
mov.w      #XADDRB,r1       ; Setup X5043 target address
bsr        _byte_write:16   ; ... and write it
mov.w      #XADDRB,r1       ; Setup X5043 source address
bsr        _byte_read:16    ; ... and fetch it!

; Page Read/Write exercise

bsr        _wren_cmnd:16    ; Enable writing to the X5043
mov.w      #XADDRP,r1       ; Setup X5043 target page address
mov.l      #_dataset0,er2   ; Point to source data
bsr        _page_write:16   ; ... and write the page
mov.w      #XADDRP,r1       ; Again, setup X5043 source page address
mov.l      #RAMBFR0,er2     ; Point to destination buffer in onboard RAM
mov.w      #PAGESIZE,e1     ; Setup byte read count
bsr        _read_seq:16     ; ... and read the page

; Sequential Read/Write exercise

xor.w      r0,r0            ; Initialize byte sequence (0->BIGWRITE-1)
mov.l      #RAMBFR1,er2     ; ... and point to the destination
_bigwr_setup:
mov.b      r01,@er2         ; Store a byte in the RAM buffer
inc.l      #1,er1           ; Bump pointer to next RAM location
inc.w      #1,r0            ; Count bytes stored/generate next byte
cmp.w      #BIGWRITE,r0     ; Have we done 'em all?
blt        _bigwr_setup     ; No, continue

mov.w      #BIGWRITE,e1     ; Setup to read 'em back!
mov.w      #XADDRBW,r1      ;
mov.l      #RAMBFR1,er2     ; Setup X5043 'big write' (count is in e1)
bsr        _wren_cmnd:16    ; Enable writing to the X5043
bsr        _write_seq:16    ; ... and write 'em

mov.w      #BIGWRITE,e1     ; Setup to read 'em back!
mov.w      #XADDRBW,r1      ;
mov.l      #RAMBFR2,er2     ;
bsr        _read_seq:16     ;

; Block Protect exercise

bsr        _wren_cmnd:16    ; Enable writing to the X5043
mov.b      #0b00110100,r01  ; Setup Block Protect upper quarter (0x180+)
bsr        _wrsr_cmnd:16    ; ... and protect it
mov.w      #XADDRBP,r1      ; Setup X25043 source address (protected)
bsr        _byte_read:16    ; ... and fetch it!
not.b      r01              ; One's complement, for re-write verify
mov.b      r01,r11         ; Temporarily preserve it

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    bsr        _wren_cmnd:16    ; Enable writing to the X5043
    mov.b     r11,r01          ; Recover data for single byte write
    mov.w     #XADDRBP,r1      ; Setup X5043 target address (protected)
    bsr        _byte_write:16   ; ... and write it
    mov.w     #XADDRBP,r1      ; Setup X5043 source address
    bsr        _byte_read:16    ; ... and fetch it!

_end_loop:
    bra        _end_loop        ; Terminal infinite loop

; X25043 Interface Subroutines

; Name:      _init_xiport
; Function:   Initializes the H8 I/O port bit directions
; Calls:     None
; Expects:   Nothing
; Returns:   Nothing
; Registers: r01
; Remarks:   Must be called once initially to setup the I/O port

_init_xiport:
    mov.b     #DDRSETUP,r01
    mov.b     r01,@XICORDDR
    bset      #CS,@XICOR        ; Chip Select disable X5043
    bclr      #SI,@XICOR        ; Drop Serial Input to X5043
    bclr      #SCK,@XICOR       ; Drop the clock SCK
    bclr      #WP,@XICOR        ; Write Protect line low, disable writes
    rts

; Name:      _wren_cmnd
; Function:   Sends the command to enable writing to the Xicor X5043 EEPROM
; Calls:     _send_byte
; Expects:   Nothing
; Returns:   Nothing
; Registers: r01
; Remarks:

_wren_cmnd:
    bclr      #SCK,@XICOR       ; SCK low
    bclr      #CS,@XICOR        ; CS low
    mov.b     #WREN,r01         ; Setup Write Enable instruction
    bsr        _send_byte:16
    bclr      #SCK,@XICOR       ; SCK low
    bset      #CS,@XICOR        ; CS high
    rts

; Name:      _wrdd_cmnd
; Function:   Sends the command to disable writing to the Xicor X5043 EEPROM
; Calls:     _send_byte
; Expects:   Nothing
; Returns:   Nothing
; Registers: r01
; Remarks:

_wrdd_cmnd:
    bclr      #SCK,@XICOR       ; SCK low
    bclr      #CS,@XICOR        ; CS low
    mov.b     #WRDI,r01         ; Setup Write Disable instruction
    bsr        _send_byte:16
    bclr      #SCK,@XICOR       ; SCK low
    bset      #CS,@XICOR        ; CS high
    rts

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```

; Name:      _wrsr_cmnd
; Function:  Sends the command which enables writing to the WD0, WD1, BP0 and
;           BP1 bits of the Xicor X5043 EEPROM status register
; Calls:    _send_byte, _poll_write
; Expects:  Block Protect/Watchdog Timer bits in r0l
; Returns:  Nothing
; Registers: r0l, e0
; Remarks:

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_wrsr_cmnd:
    mov.w      r0,e0          ; Temporarily preserve WDT/BP bits
    bclr      #SCK,@XICOR    ; SCK low
    bclr      #CS,@XICOR    ; CS low
    mov.b     #WRSR,r0l      ; Setup Write Status Register instruction
    bsr      _send_byte:16
    mov.w     e0,r0          ; Recover WDT/BP bits
    bsr      _send_byte:16
    bclr      #SCK,@XICOR    ; SCK low
    bset      #CS,@XICOR    ; CS high
    bsr      _poll_write:16
    rts

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; Name:      _rdsr_cmnd
; Function:  Sends the command which reads the contents of the Xicor X5043
;           EEPROM status register
; Calls:    _send_byte, _recv_byte
; Expects:  Nothing
; Returns:  Status in r0l
; Registers: r0l
; Remarks:

```

```

_rdsr_cmnd:
    bclr      #SCK,@XICOR    ; SCK low
    bclr      #CS,@XICOR    ; CS low
    mov.b     #RDSR,r0l      ; Setup Read Status Register instruction
    bsr      _send_byte:16
    bsr      _recv_byte:16
    bclr      #SCK,@XICOR    ; SCK low
    bset      #CS,@XICOR    ; CS high
    rts

```

```

; Name:      _byte_write
; Function:  Writes a single byte to the Xicor X5043 EEPROM memory array
; Calls:    _send_byte, _poll_write
; Expects:  Byte to be sent in r0l, address in r1 (0x0000-0x01FF)
; Returns:  Nothing
; Registers: r0l, r1, e0
; Remarks:

```

```

_byte_write:
    bclr      #SCK,@XICOR    ; SCK low
    bclr      #CS,@XICOR    ; CS low
    mov.w     r0,e0          ; Temporarily preserve the byte
    mov.b     #WRITE,r0l     ; Setup Write instruction
    rotr.b   r1h             ; Rotate the address MSB into Carry
    bst      #ADDRBIT,r0l    ; Stuff it
    bsr      _send_byte:16
    mov.b     r1l,r0l        ; Fetch address LS byte
    bsr      _send_byte:16

```

```

    mov.w    e0,r0          ; Recover the byte
    bsr     _send_byte:16
    bclr   #SCK,@XICOR    ; SCK low
    bset   #CS,@XICOR    ; CS high
    bsr     _poll_write:16
    rts

; Name:      _byte_read
; Function:  Reads a single byte from the Xicor X5043 EEPROM memory array
; Calls:    _send_byte, _recv_byte
; Expects:  Serial EEPROM byte address in r1 (0x0000-0x01FF)
; Returns:  Byte read in r0l
; Registers: r0l, r1, e0
; Remarks:

_byte_read:
    bclr   #SCK,@XICOR    ; SCK low
    bclr   #CS,@XICOR    ; CS low
    mov.b  #READ,r0l     ; Setup Read instruction
    rotr.b r1h           ; Rotate the address MSB into Carry
    bst    #ADDRBIT,r0l  ; Stuff it
    bsr     _send_byte:16
    mov.b  r1l,r0l       ; Fetch address LS byte
    bsr     _send_byte:16 ; ... and send it
    bsr     _recv_byte:16 ; Receive byte from EEPROM
    bclr   #SCK,@XICOR    ; SCK low
    bset   #CS,@XICOR    ; CS high
    rts

; Name:      _page_write
; Function:  Sends a full page (4 bytes) to the Xicor X5043 EEPROM
; Calls:    _send_byte, _poll_write
; Expects:  Serial EEPROM destination starting address in r1, pointer to
;           source bytes (4) in er2
; Returns:  Nothing
; Registers: r0l, r0h, r1, er2
; Remarks:

_page_write:
    bclr   #SCK,@XICOR    ; SCK low
    bclr   #CS,@XICOR    ; CS low
    mov.b  #WRITE,r0l     ; Setup Write instruction
    rotr.b r1h           ; Rotate the address MSB into Carry
    bst    #ADDRBIT,r0l  ; Stuff it
    bsr     _send_byte:16
    mov.b  r1l,r0l       ; Fetch address LS byte
    and.b  #0b11111100,r0l ; Mask driv1 to page boundary
    bsr     _send_byte:16
    mov.b  #PAGESIZE,r3l
_page_wrloop:
    mov.b  @er2+,r0l     ; Fetch byte to send, point to next one
    bsr     _send_byte:16
    dec.b  r3l           ; Click off another sent byte
    bne    _page_wrloop
    bclr   #SCK,@XICOR    ; SCK low
    bset   #CS,@XICOR    ; CS high
    bsr     _poll_write:16
    rts

; Name:      _read_seq
; Function:  Reads a sequence of bytes from the Xicor X5043 Serial EEPROM

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```
; Calls:      _send_byte, _recv_byte
; Expects:    EEPROM source starting address in r1 (0x0000-0x01FF), count of
;             bytes to read in e1, pointer to start of destination storage in er2
; Returns:    Byte array read in memory
; Registers:  r0l, r0h, r1, e1, er2
; Remarks:
```

```
_read_seq:
    bclr      #SCK,@XICOR      ; SCK low
    bclr      #CS,@XICOR      ; CS low
    mov.b     #READ,r0l        ; Setup Read instruction
    rotr.b    r1h              ; Rotate the address MSB into Carry
    bst       #ADDRBIT,r0l     ; Stuff it
    bsr       _send_byte:16
    mov.b     r1l,r0l          ; Fetch address LS byte
    bsr       _send_byte:16
```

```
_read_seqloop:
    bsr       _recv_byte:16
    mov.b     r0l,@er2         ; Store EEPROM byte into memory
    inc.l     #1,er2           ; Point to next storage location
    dec.w     #1,e1            ; Click off another byte read
    bne       _read_seqloop
    bclr      #SCK,@XICOR      ; SCK low
    bset      #CS,@XICOR      ; CS high
    rts
```

```
; Name:      _write_seq
; Function:   Writes a sequence of bytes to the Xicor X5043 Serial EEPROM
; Calls:      _send_byte, _poll_write, _wren_cmnd
; Expects:    EEPROM destination starting address in r1 (0x0000-0x01FF), count of
;             bytes to write in e1, pointer to start of source storage in er2
; Returns:    Nothing
; Registers:  r0l, r0h, r1, e1, er2, r3, e3
; Remarks:    Takes advantage of page write mode to minimize write times
```

```
_write_seq:
    bclr      #SCK,@XICOR      ; SCK low
    bclr      #CS,@XICOR      ; CS low
    mov.w     r1,e3            ; preserve EEPROM destination address
    mov.b     #WRITE,r0l       ; Setup Write instruction
    rotr.b    r1h              ; Rotate the address MSB into Carry
    bst       #ADDRBIT,r0l     ; Stuff it
    bsr       _send_byte:16
    mov.b     r1l,r0l          ; Fetch address LS byte
    bsr       _send_byte:16
_write_seqloop:
    mov.b     @er2+,r0l        ; Fetch byte to write & point to next one
    bsr       _send_byte:16
    dec.w     #1,e1            ; Click off another byte written
    inc.w     #1,e3            ; Point to next destination address
    mov.w     e3,r3            ; ... and scratchpad it
    and.b     #0b00000011,r3l   ; Keep destination address page bits
    beq       _wrseq_pagend    ; '00' means prior address was page end
    or.w     e1,e1             ; Is the byte count zero?
    bne       _write_seqloop   ; No, continue with this page
    bclr      #SCK,@XICOR      ; SCK low
    bset      #CS,@XICOR      ; CS high
    bsr       _poll_write:16
    rts
_wrseq_pagend:
    bclr      #SCK,@XICOR      ; SCK low
```

```

    bset      #CS,@XICOR      ; CS high
    bsr      _poll_write:16   ; Is the write still in progress in EEPROM?
    or.w     e1,e1            ; Is the byte count zero?
    beq      _wrseq_done     ; Yes, we're done
    bsr      _wren_cmnd:16   ; No, more to do so re-enable writing
    mov.w    e3,r1           ; Recover next EEPROM address as expected
    bra      _write_seq      ; Back to the EEPROM
_wrseq_done:
    rts

; Name:      _send_byte
; Function:   Sends a byte to the Xicor X5043 EEPROM, serially shifting MSB
;            first
; Calls:     None
; Expects:   Byte to be sent in r0l
; Returns:   Nothing
; Registers: r0l, r0h
; Remarks:

_send_byte:
    mov.b    #8,r0h          ; Setup bit count
_send_loop:
    bclr     #SCK,@XICOR     ; SCK low
    rotxl.b  r0l             ; Slip next MSB into Carry
    bst      #SI,@XICOR     ; Copy Carry to I/O port bit
    bset     #SCK,@XICOR     ; SCK high
    dec.b    r0h             ; Click off a bit
    bne      _send_loop     ; Continue if not done
    bclr     #SI,@XICOR     ; SI low
    rts

; Name:      _recv_byte
; Function:   Receives a byte from the Xicor X5043 EEPROM, serially shifting MSB
;            first
; Calls:     None
; Expects:   Nothing
; Returns:   Received byte in r0l
; Registers: r0l, r0h
; Remarks:

_recv_byte:
    mov.b    #8,r0h          ; Setup bit count
_recv_loop:
    bset     #SCK,@XICOR     ; SCK high
    nop
    nop
    nop                    ; Guarantee limited clock rate
    bclr     #SCK,@XICOR     ; SCK low
    bld      #SO,@XICOR     ; Copy input port bit to Carry
    rotxl.b  r0l             ; Slip Carry into LSB
    dec.b    r0h             ; Click off a bit
    bne      _recv_loop     ; Continue if not done
    rts

; Name:      _poll_write
; Function:   Polls for the completion of the non-volatile write cycle by
;            examining the Write-In-Progress bit of the status register
; Calls:     _rdsr_cmnd
; Expects:   Nothing
; Returns:   Nothing
; Registers: r1l

```

```
; Remarks:

_poll_write:
    mov.b        #MAXPOLLS,r11        ; Setup maximum number of poll attempts
_poll_loop:
    bsr         _rdsr_cmnd:16        ; Fetch the X5043 Status Register content
    btst        #WIPBIT,r01         ; Is the Write-In-Progress bit zero?
    beq         _poll_loop1         ; Yes, write is complete
    dec.b       r11                 ; No, click off another poll attempt
    bne         _poll_loop          ; If we haven't exceeded maximum polls ...
_poll_loop1:
    rts

; Name:         _wdog_reset
; Function:     Resets the watchdog timer
; Calls:        None
; Expects:      Nothing
; Returns:      Nothing
; Registers:    None
; Remarks:

_wdog_reset:
    bclr        #CS,@XICOR
    nop
    nop
    nop
    bset        #CS,@XICOR
    rts

; Data tables

    .align     0
_dataset0:
    .byte      DATABYTE0
    .byte      DATABYTE1
    .byte      DATABYTE2
    .byte      DATABYTE3
```

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