MICROCHIP

AN571

Communicating With EEPROM In MTA85XXX

1.0 INTRODUCTION

The Microchip MTA85XXX family of microcontrollers are multichip modules which contain a PIC16C54A or PIC16C58A microcontroller and a Microchip Technology 24LC01B or 24LC02B EEPROM. This application note is intended to provide users with the most efficient code for I²C™-like communication between the EEPROM and the microcontroller in a PICSEE™ configuration, which will leave the user a maximum amount of code space and data RAM for the core application. The code contained in this application note will allow the PIC16C5XA microcontroller to act as the I²C master. The 24LC0XB EEPROM devices have I²C slave protocol implemented on-chip. Please refer to the Microchip Databook for further details on the 24LC0XB EEPROM. Note that this application note is optimized for use in either the PICSEE, or PIC16C5X plus EEPROM from Microchip. If a discrete PIC16C5X and generic serial EEPROM are to be used, refer to application note AN554 which details a complete I²C implementation.

The files which compose this application note (and their encapsulated post script print files) can be found on the Microchip BBS. The EEPROM communication code contained within this application note can be easily inserted into the users application code.

The frequency of operation is assumed to be 4MHz and the code has been verified over the entire operating voltage range of the MTA85XXX. This code was tested with the fuse settings:

OSC = XT, WDT = ON, CP = OFF, CKSUM = 6715

2.0 OPERATION

2.1 General Operation

This application note will function with both bonding options of the MTA85XXX. Please refer to the MTA85XXX datasheet for further details. This application note will light LEDs on port B to indicate that the data is being written to the EEPROM or to output data read from the EEPROM.

The SDA and SCL bits of the EEPROM must be initialized to '1's before calling any of the EEPROM subroutines. This is done in the beginning of the MAIN routine. The start bit will not be initiated properly if these bits are not initialized prior to calling the EEPROM routines.

The registers EEADD and EEDATA are used to communicate EEPROM address and data information to and from the EEPROM, as described below.

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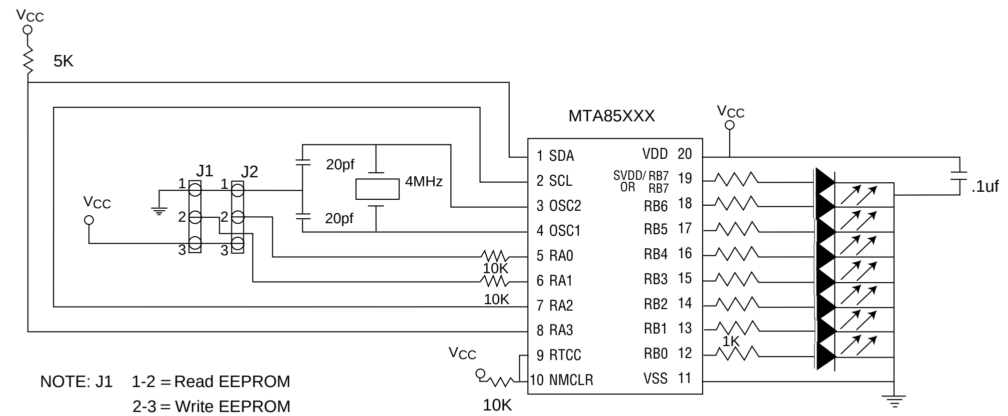
FIGURE 2-1 SCHEMATIC



NOTE: J1 1-2 = Read EEPROM
2-3 = Write EEPROM

J2 1-2 = 1K EEPROM (MTA85XX1)
2-3 = 2K EEPROM (MTA85XX2)

2.2 Hardware Configuration

The schematic for this application note is located in figure 2-1. For the user's application, the pins used for SDA and SCL can be easily redefined and the switches will not be necessary. This application example shows the MTA85XXX driving an array of LEDs to indicate writing to the EEPROM is in progress.

2.3 Switches for array size and to determine read/write

Bits RA0 and RA1 are used to determine if the user would like to read or write the array and to select the array size (1K or 2K). Bits RA2 and RA3 are used for SCL and SDA.

RA0 = '0' for 1K EEPROM

RA1 = '0' for read EEPROM

RA0 = '1' for 2K EEPROM

RA1 = '1' for write EEPROM

2.4 EEPROM Subroutines

The code in this application note is capable of performing byte writes, current address reads, and random address reads. The names of the subroutines are:

Write_Byte	Write data supplied in register EEDATA at address supplied in register EEADD
Read_Random	Read data into register EEDATA from address supplied in register EEADD
Read_Current	Read data into register EEDATA from current address in EEPROM memory.

Note that the EEPROMs used in the MTA85XXX devices are also capable of page writes, however, page writes are not detailed by this application note. Refer to AN567 for details on page write.

2.5 Write_Byte Operation

During a Write_Byte operation the master will set address and data information into the EEADD and EEDATA registers. After receiving the acknowledge from the EEPROM that the current EEADD and EEDATA have been received, new values will be loaded into the EEADD and EEDATA registers. The EEPROM initiates a self timed write after the acknowledge, during which time it will not accept or acknowledge other input. The master falls into a loop trying to input the new address and data into the EEPROM. This loop will continue until the EEPROM finishes the self timed write and acknowledges receipt of the new address and data information.

This application note uses the 8-bit port B to provide an LED display. During a write, the LEDs should initialize to all '1' and then set to '0', 1 bit at a time, with each bit indicating that another 1/8th of the EEPROM array has been written. The entire operation takes less than 1 second after applying power or resetting the part. The data is initialized to FFH and the address to 00H. The address is incremented by 1 and the data decremented by 1 after each byte is written, until the EE array is full. An AAH is output to port B after the write has completed (actually as the last byte is writing).

2.6 Read_Current and Read_Random Operation

A read operation will attempt to read the data at the supplied or current address until an acknowledge is received. If an acknowledge is not received, the part will time out after a WDT period. If a Read_Random is being performed, the address is supplied in EEADD. If a Read_Current is being performed, the current address pointer inside the EEPROM is used. In both Read_Random and Read_Current the data is read into the EEDATA register.

In this application note, the port B LEDs are used to display the array content during a read operation. A 1-second timer is called between each byte so the data can be read on the LEDs. Note that with the MTA85X1X version (RB7 = $SEEV_{DD}$), RB7 must always = '1' when the EEPROM is being accessed. The EEPROM address pointer (used for a read current address) will be reset to the last EEPROM address if RB7 is set to a '0' at any time. Due to this, the RB7 pin is always set to a '1' during a Read_Current operation (even if the data read is a '0' in the high order bit, a one will be output on RB7 to keep from resetting the EEPROM's internal address). MTA85X0X users may want to comment out the line which sets the RB7 to a '1' during a Read_Current operation, so that they will receive the data read from the EEPROM on the LEDs without the data appearing on RB7 altered.

2.7 Code Size

The total amount of program memory space required is 148 bytes. The major sections are as follows:

EEPROM Subroutines	71 bytes
EEPROM Initialization	4 bytes initialize SDA and SCL
Read/Write Setup	13 bytes
Read Array	27 bytes
Write Array	15 bytes
1 second timer	14 bytes
End of program loop	4 bytes

3.0 TIMINGS (ASSUME 4MHZ)

Detailed timing diagrams are given in Section 8.

Write operation will take approximately 350µs + standard write time (Figure 8-1).

Read random address operation will take approximately 350µs (Figure 8-2).

Read current address will take approximately 250µs (Figure 8-3).

4.0 I^{2}C COMPATIBILITY

NOTE: Code is not strictly I^{2}C compatible on all timing parameters, but is designed to work with a Microchip 24LC01B or 24LC02B EEPROM from 3 to 6.25 volts. Commented NOPs have been included which can be put in place to gain I^{2}C timing compatibility. Also note that ‘1’s are driven onto the bus (not floated) by the master in most write circumstances, except where bus contention from the EEPROM slave could result.

5.0 ASSEMBLY CODE LISTING

```
TITLE “APP-NOTE PER I2C-BUS”
LIST P=16C54 , C=132
;LIST   P=PIC16C58  C=132

; PIC16C5X to 24LC01B or 24LC02B EEPROM communication code.
; Based on Franco code.

; FUSE SETTINGS:
; OSC = XT, WDT = ON, CP = OFF, CKSUM =

; INTRODUCTION:
; The Microchip MTA85XXX family of microcontrollers are multichip modules
; which contain a PIC16C5XA microcontroller and a 24LC01B or 24LC02B EEPROM.
; This application note is intended to provide users with highly compressed
; assembly code for communication between the EEPROM and the Microcontroller,
; which will leave the user a maximum amount of code space for the core
; application.

; For use in a users application, the file EEPROM.asm has been generated.
; This file contains the EEPROM subroutines and assembler constants used in
; these subrourines, stripped from this application note.  Although the file
; cannot be compiled, it is available for easy insertion into the user’s
; application code.

; EEPROM SUBROUTINES:
; Write_Byte   - Write data supplied in EEDATA at address supplied in EEADD
; Read_Random  - Read data into EEDATA from address supplied in EEADD
; Read_Current - Read data into EEDATA from address currently in EEPROM

; OPERATION:
; For detailed operating information and other important information about
; this application note, read file AN571.doc

;***************************************************************************
;****************************  Variable Listing  ***************************
;***************************************************************************
OK          EQU     01H
NO          EQU     00H
;INDIRECT   EQU     00H         ; Indirect Address Register
;RTCLOCK    EQU     01H         ; Real time counter clock
PC          EQU     02H         ; Program counter
STATUS      EQU     03H         ; Status register
;PD         EQU     03H         ; Power down bit in STATUS
PORTA       EQU     05H         ; Port A control register
PORTB       EQU     06H         ; Port B control register
I2C_PORT    EQU     05H         ; Port A control register, used for I2C
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SCL         EQU     02H          ; EEPROM Clock, SCL (I/O bit 2)
SDA         EQU     03H          ; EEPROM Data,  SDA (I/O bit 3)
EE_OK       EQU     07H          ; Bit 7 in PC_OFFSET used as OK flag for EE
PC_OFFSET   EQU     07H          ; PC offset register (low order 4 bits),
                               ;  value based on operating mode of EEPROM.
                               ;  Also, bit 7 used for EE_OK flag
EEADDR      EQU     08H          ; EEPROM Address
EEDATA      EQU     09H          ; EEPROM Data
EEBYTE      EQU     0AH          ; Byte sent to or received from
                               ; EEPROM (control, address, or data)
COUNTER     EQU     0BH          ; Bit counter for serial transfer


   ORG     0
   GOTO     START

;***************************************************************************
;***************************  EEPROM Subroutines  *************************
;***************************************************************************
; Communication for EEPROM based on I2C protocol, with Acknowledge.
;
; Byte_Write: Byte write routine
;       Inputs:  EEPROM Address   EEADDR
;                EEPROM Data      EEDATA
;       Outputs: Return 01 in W if OK, else return 00 in W
;
; Read_Current: Read EEPROM at address currently held by EE device.
;       Inputs:  NONE
;       Outputs: EEPROM Data       EEDATA
;                Return 01 in W if OK, else return 00 in W
;
; Read_Random: Read EEPROM byte at supplied address
;       Inputs:  EEPROM Address    EEADDR
;       Outputs: EEPROM Data       EEDATA
;                Return 01 in W if OK, else return 00 in W
;
; Note: EEPROM subroutines will set bit 7 in PC_OFFSET register if the
;       EEPROM acknowledged OK, else that bit will be cleared.  This bit
;       can be checked instead of referring to the value returned in W
;***************************************************************************

;********************** Set up EEPROM control bytes ************************
;***************************************************************************
READ_CURRENT
    MOVLW   B'10000100'   ; PC offset for read current addr.  EE_OK bit7='1'
    MOVWF   PC_OFFSET     ; Load PC offset
    GOTO    INIT_READ_CONTROL

WRITE_BYTE
    MOVLW   B'10000000'   ; PC offset for write byte.  EE_OK: bit7 = '1'
    GOTO    INIT_WRITE_CONTROL

READ_RANDOM
    MOVLW   B'10000011'   ; PC offset for read random.  EE_OK: bit7 = '1'

INIT_WRITE_CONTROL
    MOVWF   PC_OFFSET     ; Load PC offset register, value preset in W
    MOVLW   B'10100000'   ; Control byte with write bit, bit 0 = '0'

START_BIT
      BCF     I2C_PORT,SDA  ; Start bit, SDA and SCL preset to '1'


;******* Set up output data (control, address, or data) and counter ********
;***************************************************************************
PREP_TRANSFER_BYTE
    MOVWF   EEBYTE        ; Byte to transfer to EEPROM already in W
    MOVLW   B'00000011'   ; SDA and SCL set to output
    TRIS    I2C_PORT
```

```
    MOVLW   .8            ; Counter to transfer 8 bits
    MOVWF   COUNTER


;************  Clock out data (control, address, or data) byte  ************
;**************************************************************************
OUTPUT_BYTE
    BCF     I2C_PORT,SCL  ; Set clock low during data set-up
    RLF     EEBYTE        ; Rotate left, high order bit into carry bit
    BCF     I2C_PORT,SDA  ; Set data low, if rotated carry bit is
    SKPNC                 ;   a ‘1’, then:
    BSF     I2C_PORT,SDA  ; reset data pin to a one, otherwise leave low
    BSF     I2C_PORT,SCL  ; clock data into EEPROM
    DECFSZ  COUNTER       ; Repeat until entire byte is sent
    GOTO    OUTPUT_BYTE
;**************************  Acknowledge Check ****************************
;**************************************************************************
    MOVLW   B’00001011'      ; SDA = input, SCL = output
    SKPNC                    ; if SDA = 1 then tristate port to allow
    TRIS    I2C_PORT         ;   pullup to hold ‘1’, avoiding bus contention
                       ;   if EEPROM acks in < 1us after clock goes low
    BCF     I2C_PORT,SCL     ; Set SCL low, 0.5us < ack valid < 3us
    TRIS    I2C_PORT         ; If SDA = ‘0’ wait until SCL is low to set SDA to
                       ;   input. If done above, could have sent STOP bit
;   NOP                      ; May be necessary for SCL Tlow  at low voltage,
                       ;   also give resistor time to pull up bus if last
                       ;   bit written = ‘0’ and there is no ack from slave
    BSF     I2C_PORT,SCL     ; Raise SCL, EEPROM acknowledge still valid
    BTFSC   I2C_PORT,SDA     ; Check SDA for acknowledge (low)
    BCF     PC_OFFSET,EE_OK  ; If SDA not low (no ack), set error flag
    BCF     I2C_PORT,SCL     ; Lower SCL, EEPROM release bus
    BTFSS   PC_OFFSET,EE_OK  ; If no error continue, else stop bit
    GOTO    STOP_BIT


;*****  Set up program counter offset, based on EEPROM operating mode  *****
;**************************************************************************
    MOVF    PC_OFFSET,W
    ANDLW   B’00001111'
    ADDWF   PC
    GOTO    INIT_ADDRESS      ;PC offset=0, write control done, send address
    GOTO    INIT_WRITE_DATA   ;PC offset=1, write address done, send data
    GOTO    STOP_BIT          ;PC offset=2, write done, send stop bit
    GOTO    INIT_ADDRESS      ;PC offset=3, write control done, send address
    GOTO    INIT_READ_CONTROL ;PC offset=4, send read control
    GOTO    READ_BIT_COUNTER  ;PC offset=5, set counter and read byte
    GOTO    STOP_BIT          ;PC offset=6, random read done, send stop


;**********  Initialize EEPROM data (address, data, or control) bytes  ******
;**************************************************************************
INIT_ADDRESS
    INCF    PC_OFFSET       ; Increment PC offset to 2 (write) or to 4 (read)
    MOVF    EEADDR,W        ; Put EEPROM address in W, ready to send to EEPROM
    GOTO    PREP_TRANSFER_BYTE

INIT_WRITE_DATA
    INCF    PC_OFFSET       ; Increment PC offset to go to STOP_BIT next
    MOVF    EEDATA,W        ; Put EEPROM data in W, ready to send to EEPROM
    GOTO    PREP_TRANSFER_BYTE

INIT_READ_CONTROL
    BSF     I2C_PORT,SCL    ; Raise SCL
    INCF    PC_OFFSET       ; Increment PC offset to go to READ_BIT_COUNTER next
    MOVLW   B’10100001'     ; Set up read control byte, ready to send to EEPROM
    GOTO    START_BIT       ; bit 0 = ‘1’ for read operation
```

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;**************************  Read EEPROM data  *****************************
;***************************************************************************
READ_BIT_COUNTER
    MOVLW    .8              ; Set counter so 8 bits will be read into EEDATA
    MOVWF    COUNTER

READ_BYTE
    BSF      I2C_PORT,SCL    ; Raise SCL, SDA valid.  SDA still input from ack
    SETC                     ; Assume bit to be read = 1
    BTFSS    I2C_PORT,SDA    ; Check if SDA = 1
    CLRC                     ; if SDA not = 1 then clear carry bit
    RLF      EEDATA          ; rotate carry bit (=SDA) into EEDATA;
    BCF      I2C_PORT,SCL    ; Lower SCL
    DECFSZ   COUNTER         ; Decrement counter
    GOTO     READ_BYTE       ; Read next bit if not finished reading byte


;******************  Generate a STOP bit and RETURN  **********************
;***************************************************************************
STOP_BIT
    BCF      I2C_PORT,SDA    ; SDA=0, on TRIS, to prepare for transition to '1'
    MOVLW    B'00000011'     ; SDA and SCL set to outputs, Bit0 and Bit1 ' input
    TRIS     I2C_PORT
    BSF      I2C_PORT,SCL    ; SCL = 1 to prepare for STOP bit
;   NOP                      ; 4 NOPs necessary for I2C spec Tsu:sto = 4.7us
    BSF      I2C_PORT,SDA    ; Stop bit, SDA transition to '1' while SCL high
    BTFSS    PC_OFFSET,EE_OK ; Check for error
    RETLW    NO              ; if error, send back NO
    RETLW    OK              ; if no error, send back OK

;   Note: SDA and SCL still being driven by master, both set to outputs.
;****************************************************************************
;************************  End EEPROM Subroutines  **************************


;***************************************************************************
;*****************************  MAIN routine  ******************************
;***************************************************************************
START

;***************************  Initialize EEPROM  ***************************
;***************************************************************************
    MOVLW    B'00000011'     ; SDA and SCL = output, Bit0 and Bit1 = input
    TRIS     I2C_PORT
    BSF      I2C_PORT,SCL    ; Initialize SCL and SDA to '1'
    BSF      I2C_PORT,SDA


;*** VARIABLE FOR MAIN ROUTINE THAT ARE NOT USED IN EEPROM SUBROUTINES ****
;***************************************************************************

COUNT        EQU     0CH ; REGISTER FOR # OF BYTES IN ARRAY WRITTEN OR READ
LEDS         EQU     0DH ; REGISTER TO HOLD DATA TO OUTPUT TO PORT
TIMER_OL     EQU     0EH ; REGISTER FOR OUTER  LOOP VARIABLE FOR TIMER
TIMER_ML     EQU     0FH ; REGISTER FOR MIDDLE LOOP VARIABLE FOR TIMER
TIMER_IL     EQU     10H ; REGISTER INNER  LOOP VARIABLE FOR TIMER
EE1KPARTIAL  EQU     10H ; 1/8TH OF 1K ARRAY (128 BYTES TOTAL)
EE2KPARTIAL  EQU     20H ; 1/8TH OF 2K ARRAY (256 BYTES TOTAL)
EE1KFULL     EQU     80H ; 128
EE2KFULL     EQU     00H ; WILL = FFH AFTER DECREMENT, EFFECTIVELY = 256
SIZE         EQU     00H ; BIT0 ON PORT WILL BE READ TO DETERMINE ARRAY SIZE
READORWRITE  EQU     01H ; BIT1 ON PORT WILL BE READ TO DETERMINE IF USER
                         ; WANTS TO READ OR WRITE THE ARRAY
EEVDD        EQU     07H ; BIT FOR EEPROM VDD ON MTA85X1X DEVICES
```

```
;**********************  Read / Write  Set-Up  *****************************
;***************************************************************************

    MOVLW   000H
    TRIS    PORTB             ; PORTB = OUTPUT
    MOVWF   EEADDR            ; 1ST ADDRESS = 00H
    MOVLW   0FFH              ; INITIALIZE DATA TO 'FF'
    MOVWF   LEDS              ; INITIALIZE PORTB OUTPUT FOR % DONE INDICATOR
    MOVWF   PORTB             ; SET PORT B TO ALL '1's
    MOVWF   EEDATA            ; INITIALIZE DATA TO ALL '1'

    BTFSS   PORTA,READORWRITE ; IF RA1 = '1' THEN WRITE, RA1 = '0' THEN READ
    GOTO    SETSIZE_READ

SET_SIZE
    MOVLW   EE1KPARTIAL       ; INIT COUNTER TO 1/8 OF ARRAY SIZE, 1K
    BTFSC   PORTA,SIZE        ; IF RA0 = '0' THEN 1K EEPROM, IF '1' THEN 2K
    MOVLW   EE2KPARTIAL       ; INIT COUNTER TO 1/8 OF ARRAY SIZE, 2K
    MOVWF   COUNT


;*****************************  Write Array  ********************************
;****************************************************************************
CALL_WRITE
    CALL    WRITE_BYTE
    CLRWDT                    ; DON'T TIME OUT DURING EE OPERATIONS
    BTFSS   PC_OFFSET,EE_OK   ; TEST EE_OK BIT DETERMINED DURING ACK CHECK
    GOTO    CALL_WRITE        ; IF NO ACKNOWLEDGE, ASSUME PART IS STILL
    INCF    EEADDR            ; WRITING AND KEEP TRYING UNTIL GET THROUGH.
    DECF    EEDATA            ; IF PART DOES ACK, CHANGE DATA AND ADDRESS
    DECFSZ  COUNT             ; EVERY 1/8TH OF ARRAY CHANGE OUTPUT LEDs
    GOTO    CALL_WRITE


;    *******  UPDATE LED OUTPUTS TO INDICATE ARRAY BEING WRITTEN *******
    BTFSS   LEDS,06H          ; IF BIT6 IS CLEAR BEFORE SHIFT THEN ARRAY IS
    GOTO    INFINITELOOP      ; FINISHED WRITING (EXCEPT LAST BYTE STILL NOT
                              ; DONE) DO NOT CLEAR BIT7 OR MTA85X1X PRODUCTS
                              ; WILL LOSE THEIR VDD AND NOT FINISH LAST BYTE
    BCF     STATUS,0          ; SET CARRY BIT TO '0'
    RLF     LEDS              ; INCREMENT % DONE INDICATOR
    MOVF    LEDS,W
    MOVWF   PORTB
    GOTO    SET_SIZE

;*************************  Timer 1-second  ********************************
;****************************************************************************
TIMER
    MOVLW    .107
    MOVWF    TIMER_OL
OUTTER_LOOP
    CLRWDT
    MOVLW    .25
    MOVWF    TIMER_ML
MIDDLE_LOOP
    MOVLW    .123
    MOVWF    TIMER_IL
INNER_LOOP
    DECFSZ   TIMER_IL
    GOTO     INNER_LOOP
    DECFSZ   TIMER_ML
    GOTO     MIDDLE_LOOP
    DECFSZ   TIMER_OL
    GOTO     OUTTER_LOOP
    RETLW    00H
;***************************************************************************


;****************************  Read Array  *********************************
```

```
;******************************************************************************
SETSIZE_READ
    MOVLW   EE1KFULL          ; INIT COUNTER TO ARRAY SIZE, 1K
    BTFSC   PORTA,SIZE        ; IF RA0 = ‘0’ THEN 1K EEPROM, IF ‘1’ THEN 2K
    MOVLW   EE2KFULL          ; INIT COUNTER TO ARRAY SIZE, 2K
    MOVWF   COUNT

CALL_READ_RANDOM
    CALL    READ_RANDOM
    BTFSS   PC_OFFSET,EE_OK   ; TEST EE_OK BYTE DETERMINED DURING ACK CHECK
    GOTO    CALL_READ_RANDOM  ; IF NO ACKNOWLEDGE, TRY AGAIN UNTIL RESET.
    INCF    EEADDR
    MOVF    EEDATA,W
    MOVWF   PORTB
    CALL    TIMER             ; SLOW DOWN OUTPUT SO IT IS READABLE ON LEDs
    BSF     PORTB,EEVDD       ; Always set RB7 to ‘1’ for MTA85X1X devices
    DECFSZ  COUNT             ;   May see flash on LED.  If rise time is
    GOTO    CALL_READ_RANDOM  ;   to slow, EEPROM may not be powered-up yet

; RESET SIZE_READ
    MOVLW   EE1KFULL          ; INIT COUNTER TO ARRAY SIZE, 1K
    BTFSC   PORTA,SIZE        ; IF RA0 = ‘0’ THEN 1K EEPROM, IF ‘1’ THEN 2K
    MOVLW   EE2KFULL          ; INIT COUNTER TO ARRAY SIZE, 2K
    MOVWF   COUNT

CALL_READ_CURRENT
    CALL    READ_CURRENT
    BTFSS   PC_OFFSET,EE_OK   ; TEST EE_OK BYTE DETERMINED DURING ACK CHECK
    GOTO    CALL_READ_CURRENT ; IF NO ACKNOWLEDGE, TRY AGAIN UNTIL RESET.
    BSF     EEDATA,EEVDD      ; Always set RB7 to ‘1’ for MTA85X1X devices
    MOVF    EEDATA,W          ; During READ_CURRENT RB7 CANNOT go to a ‘0’
    MOVWF   PORTB             ; or EEPROM internal address will be reset
    CALL    TIMER             ; SLOW DOWN OUTPUT SO IT IS READABLE ON LEDs
    DECFSZ  COUNT
    GOTO    CALL_READ_CURRENT
;   NOTE: Data observed on port B will always show a ‘1’ regardless of what
;         was read.  MTA85X1X pinout devices (RB7=SVDD) will reset the EEPROM
;         internal address pointer if RB7 = 0.  If the user has the MTA85X0X
;         pinout, the BSF EEDATA,EEVDD line above can be commented out.

;**************************  End of Program Loop  **************************
;*****************************************************************************
INFINITELOOP
    MOVLW   0AAH    ; NOTE: Bit7 = ‘1’ to let EEPROM finish writing, MTA85X1X
    MOVWF   PORTB
    CLRWDT
    GOTO    INFINITELOOP

;******************************************************************************
;*******************************  End MAIN  *********************************
   END
```

6.0 TIMING DIAGRAMS

FIGURE 6.1 WRITE_BYTE

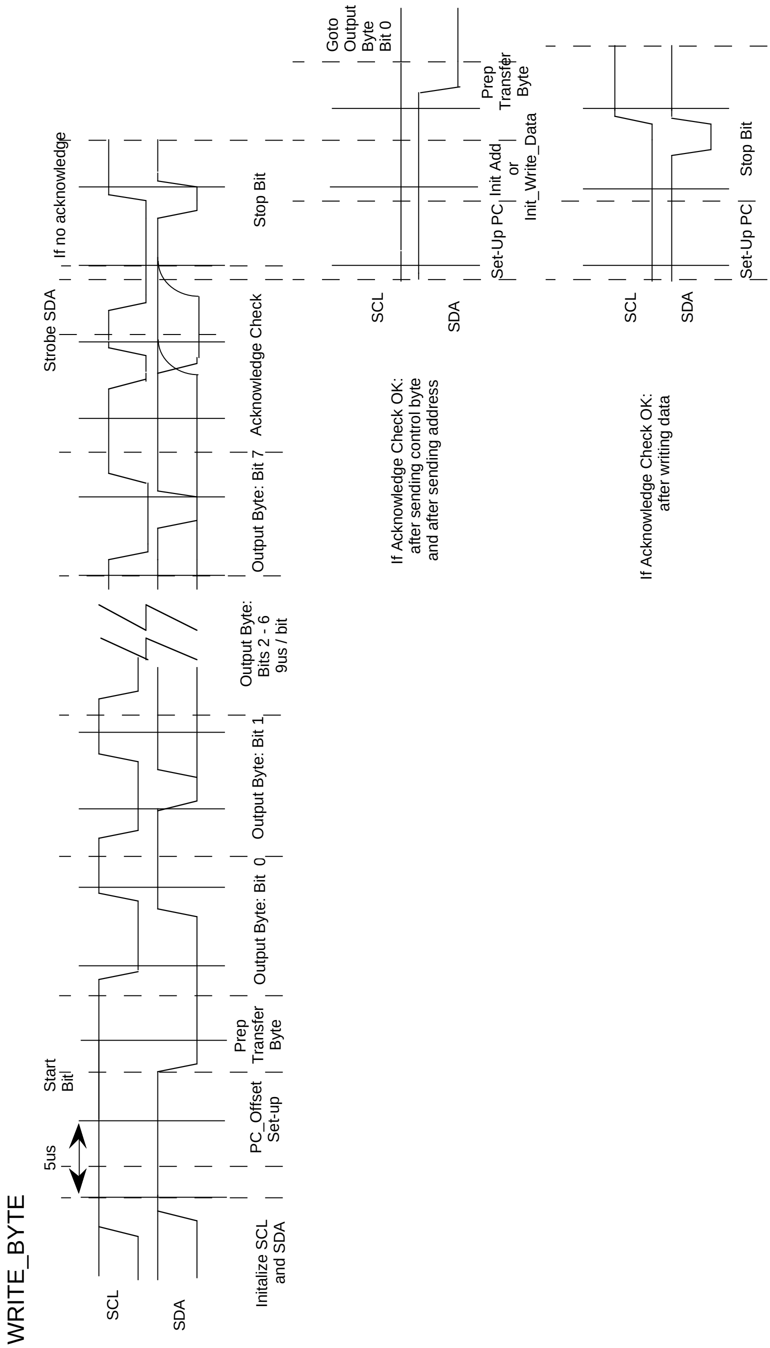

FIGURE 6.2 READ_RANDOM

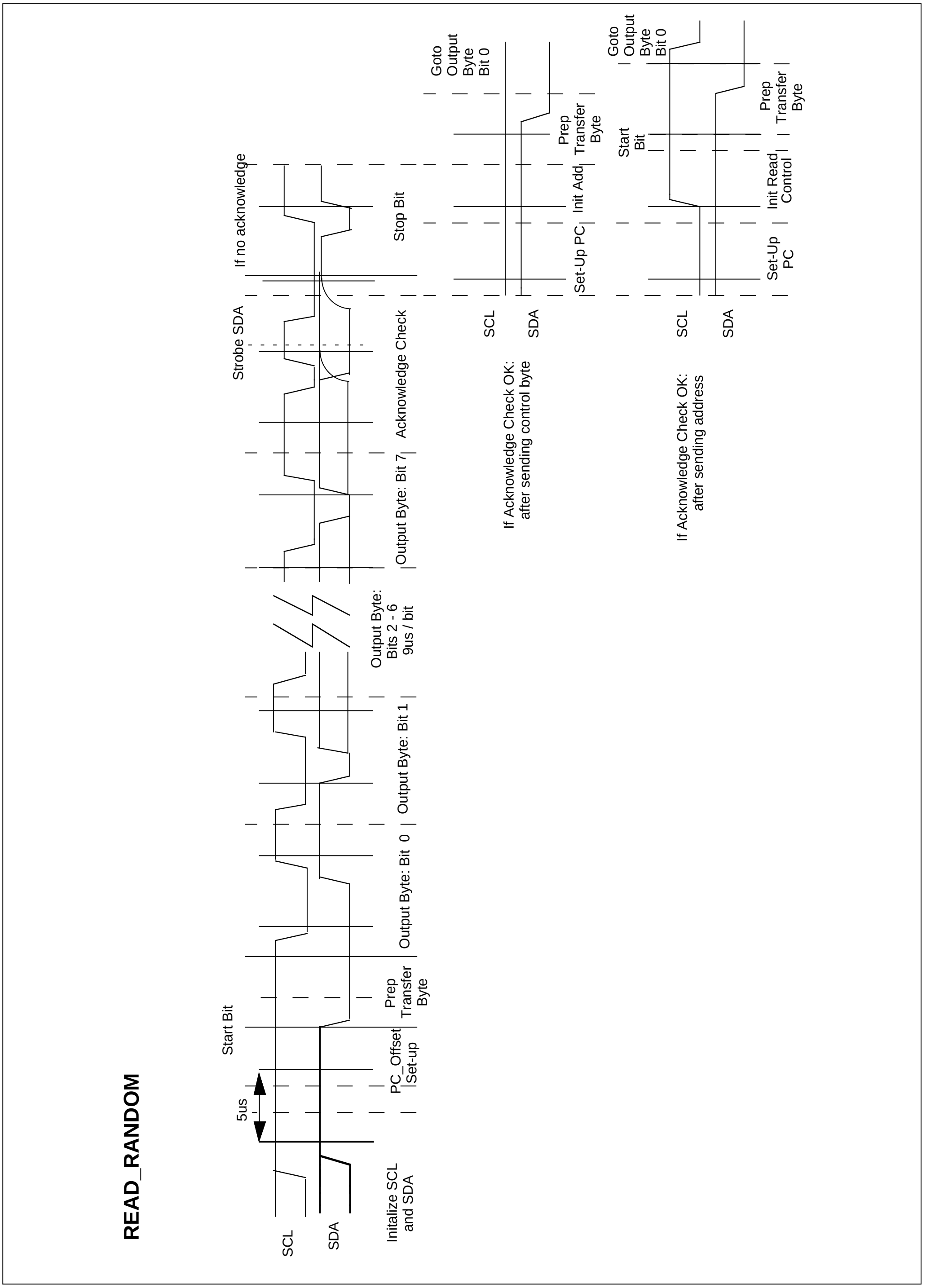

FIGURE 6.2 READ_RANDOM (CONTINUED)

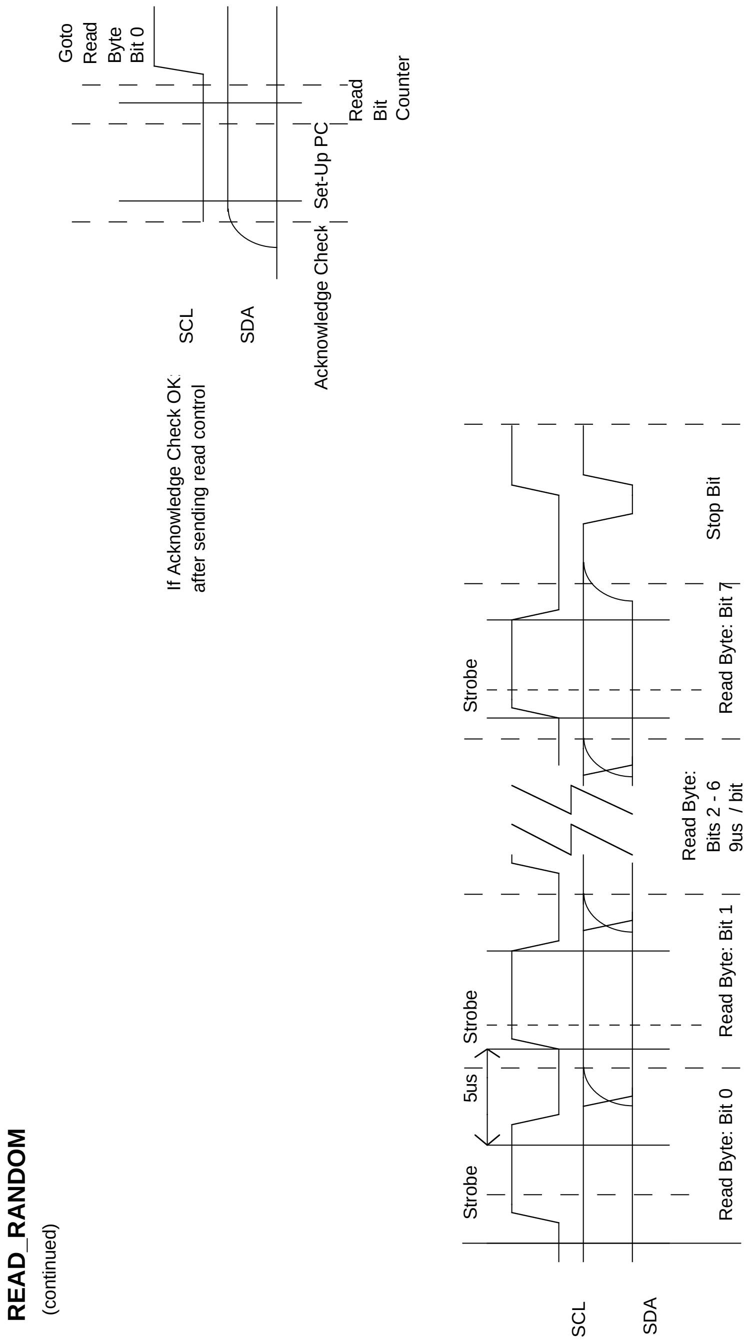

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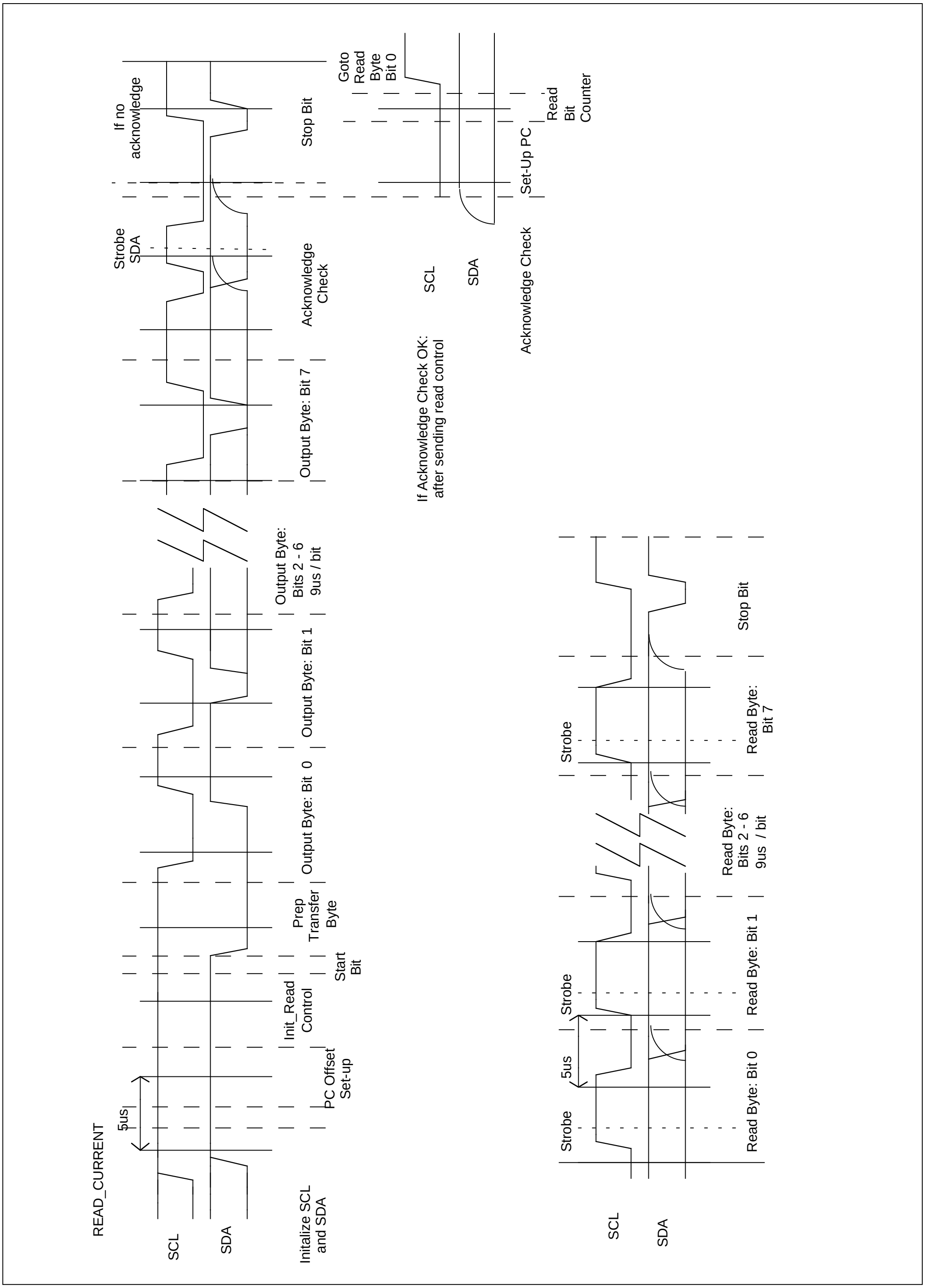
FIGURE 6.3 READ_CURRENT



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