

The following code demonstrates how the Intersil X24C44, X24C45 serial NOVRAMs could be interfaced to the 6805 microcontroller family when connected as shown in Figure 1. The interface uses port A, with the PA3 pin connected to the serial clock (SK), PA2 connected to chip enable (CE), and PA4

connected to both serial data input (SI) and serial data output (SO) of the NOVRAM. Additional code can be found on the Intersil website at <http://www.intersil.com> that will implement interfaces between Motorola microcontrollers and other Intersil serial devices.

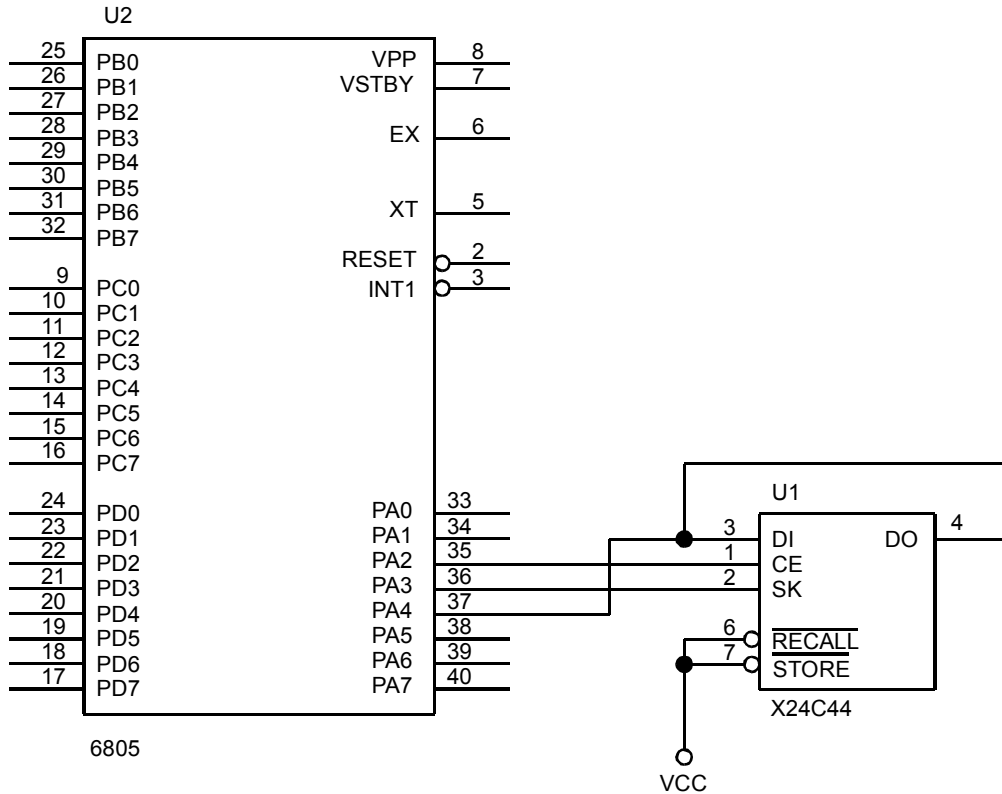


FIGURE 1. TYPICAL HARDWARE CONNECTION FOR INTERFACING AN X24C44 TO A 6805 MICROCONTROLLER.

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*****
* THIS CODE WAS DESIGNED TO DEMONSTRATE HOW THE X24C44 COULD BE INTERFACED TO *
* THE 68HC05 MICROCONTROLLER. THE INTERFACE USES 3 LINES FROM PORT A (PA2, *
* PA3, AND PA4) TO COMMUNICATE. THE DI AND DO PINS ON THE X24C44 ARE TIED *
* TOGETHER WHICH ALLOWS 1 LESS PORT LINE TO BE USED. *
*
* THE CODE SHOWN DEMONSTRATES RCL, WREN, READ, WRITE, AND STORE *
* INSTRUCTIONS. THE REMAINING INSTRUCTIONS (WRDS AND ENAS) CAN BE ISSUED *
* USING THE SAME ROUTINE AS OTHER NON-DATA INSTRUCTIONS. *
*
* THE PROGRAM ISSUES A SEQUENCE OF INSTRUCTIONS TO READ THE CONTENTS OF *
* ADDRESS 5 AND STORES THE SAME VALUE IN ADDRESS 9. THE SEQUENCE OF *
* INSTRUCTIONS IS AS FOLLOWS : *
*
* 1. RCL          SETS THE PREVIOUS RECALL LATCH *
* 2. WREN         SETS THE WRITE ENABLE LATCH *
* 3. READ         DATA FROM ADDRESS 5 IS READ *
* 4. WRITE        THE DATA READ DURING STEP 3 IS WRITTEN TO ADDRESS 9 *
* 5. STO          THE RAM'S CONTENTS IS TRANSFERED TO THE EEPROM *
*
* DATA TRANSFER IS PERFORMED WITH THE MOST SIGNIFICANT BIT FIRST. *
*****
SKBITE    QU    3          MASK INDICATING PORTD SK POSITION
CEBITE    QU    2          MASK INDICATING PORTD CE POSITION
DIOBITE   QU    4          MASK INDICATING PORTD DATA POSITION
DOUTE     QU    $1C        MASK TO MAKE DI/O AN OUTPUT
DINE      QU    $0C        MASK TO MAKE DI/O AN INPUT
DMASKE    QU    $10        MASK TO LOOK FOR DATA FROM X24C44
WRDSE     QU    $80        RESET WRITE ENABLE LATCH
STOE      QU    $81        TRANSFERS FROM RAM TO EEPROM
SLEEPE    QU    $82        PLACES PART INTO POWER DOWN MODE
WRITEE    QU    $83        RAM WRITE
WRENE     QU    $84        SET WRITE ENABLE LATCH
RCL       QU    $85        TRANSFERS FROM EEPROM TO RAM, RESETS
*          WRITE ENABLE LATCH
READE     QU    $86        RAM READ
DDRAE     QU    $04        DATA DIRECTION REGISTER FOR PORT A
PORTAE    QU    $00        ADDRESS FOR PORT A
ADDRE     QU    $80        LOCATION FOR X24C44 ADDRESS TO ACCESS
INSTE     QU    $81        INSTRUCTION FOR PART
RWDATE    QU    $82        LOCATION FOR X24C44 DATA TRANSFERED
COUNT   QU    $84        COUNTER VARIABLE
TEMP1     EQU    $85

*****
* RESET VECTOR TO BEGINNING OF PROGRAM CODE *
*****

        ORG    $1FFE        RESET VECTOR TO PROGRAM ENTRY POINT
        FDB    $0100

*****
* START OF PROGRAM EXECUTION *
*****

        ORG    $0100        BEGINNING OF EXECUTABLE CODE

BEGIN:   LDA    #DOUT
        STA    DDRA        MAKE CE, SK, DI/O OUTPUTS
        LDA    #$00
```

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```
STA  PORTA          INITIALIZE CE, SK, DI/O TO ZEROS
LDA  #RCL          PERFORM A RECALL TO SET
STA  INST          THE RECALL LATCH
JSR  CEHIGH
JSR  OUTBYT
JSR  CELOW
LDA  #WREN        PERFORM A WRITE ENABLE TO SET
STA  INST          THE WRITE ENABLE LATCH
JSR  CEHIGH
JSR  OUTBYT
JSR  CELOW
LDA  #$05         READ THE CONTENTS OF ADDRESS 5
STA  ADDR         THE VALUE READ WILL BE IN STORED
JSR  RDWRD        IN RWDATA
LDA  #$09         WRITE THE DATA JUST READ INTO
STA  ADDR         ADDRESS 9
JSR  WRWRD
LDA  #STO         PERFORM A STORE OPERATION
STA  INST
JSR  CEHIGH
JSR  OUTBYT
JSR  CELOW
BRA*                LOOP UNTIL RESET
```

```
*****
* WRITE THE WORD SPECIFIED IN RWDAT. THE ADDRESS TO *
* BE WRITTEN IS SPECIFIED IN ADDR.                 *
*****
```

```
WRWRD: JSR  CEHIGH      WRITE VALUE IN RWDATA INTO LOCATION
        LDA  ADDR       SPECIFIED IN ADDR
        LSLA          JUSTIFY ADDRESS IN INSTRUCTION
        LSLA
        LSLA
        ORA  #WRITE     MASK IN WRITE INSTRUCTION
        STA  INST
        JSR  OUTBYT     SEND WRITE INSTRUCTION TO DUT
        LDA  RWDAT
        STA  INST
        JSR  OUTBYT     SEND IN UPPER BYTE OF DATA
        LDA  RWDAT+1
        STA  INST
        JSR  OUTBYT     SEND IN LOWER BYTE OF DATA
        JSR  CELOW
        RTS
```

```
*****
* READ THE WORD AT THE LOCATION SPECIFIED IN ADDR. THE *
* DATA READ WILL BE PLACED IN RWDAT.                 *
*****
```

```
RDWRD: JSR  CEHIGH      READ THE ADDRESS SPECIFIED IN ADDR
        LDA  ADDR
        LSLA          JUSTIFY ADDRESS TO READ
        LSLA
        LSLA
        ORA  #READ     MASK IN READ INSTRUCTION
        STA  INST
        JSR  SEND7     SEND IN 7 BITS OF READ INSTRUCTION
        LDA  #DIN      MAKE DATA LINE AN INPUT
        STA  DDRA
        JSR  CLOCK     SEND EIGHTH CLOCK PULSE FOR READ INSTRUCTION
        LDA  #$10      PREPARE TO SHIFT IN 16 BITS
```

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```
      STA    COUNT
BITX:  CLC          ASSUME BIT IS GOING TO BE A ZERO (CLEAR CARRY)
      LDA    PORTA  READ BIT VALUE
      AND    #DMASK MASK BIT OUT OF BYTE READ
      BEQ    NO1    LEAVE CARRY FLAG ALONE IF BIT IS A 0
      SEC    SET     CARRY IF BIT IS A 1
NO1:   ROL    RWDAT+1 ROLL CARRY FLAG INTO DATA WORD
      ROL    RWDAT
      JSR    CLOCK  SEND A CLOCK PULSE
      DEC    COUNT  LOOP UNTIL 16 BITS ARE READ
      BNE    BITX
      LDA    #DOUT  MAKE DATA LINE AN OUTPUT
      STA    DDRA
      JSR    CELOW  BRING CE LOW
      RTS
```

```
*****
* SEND DATA OUT TO THE PART. THE DATA TO BE SENT IS *
* LOCATED IN INST. *
*****
```

```
SEND7: LDA    #$07    SHIFT OUT 7 BITS FOR READ INSTRUCTION
      STA    COUNT
      BRA    LOOPO
OUTBYT: LDA    #$08    PREPARE TO SHIFT OUT 8 BITS
      STA    COUNT
LOOPO:  ROL    INST
      BCC    IS0      JUMP IF DATA SHOULD BE 0
      BSET   #DIOBIT,PORTA SEND 1 TO DI/O
      BRA    IS1
IS0:    BCLR   #DIOBIT,PORTA SEND 0 TO DI/O
IS1:    JSR    CLOCK  SEND CLOCK SIGNAL
      DEC    COUNT
      BNE    LOOPO    LOOP UNTIL ALL 8 BITS HAVE BEEN SENT
      RTS
```

```
*****
* BRING CE HIGH *
*****
```

```
CEHIGH: BSET   #CEBIT,PORTA BRING CE HIGH
      RTS
```

```
*****
* BRING CE LOW *
*****
```

```
CELOW: BCLR   #DIOBIT,PORTA BRING DATA LINE LOW
      BCLR   #CEBIT,PORTA BRING CE LOW
      RTS
```

```
*****
* ISSUE A CLOCK PULSE. *
*****
```

```
CLOCK: BSET   #SKBIT,PORTA BRING SK HIGH
      BCLR   #SKBIT,PORTA BRING SK LOW
      RTS
```

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