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Using the SCI on Modular MCUs: An Example

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Introduction

The serial communication interface (SCI) is part of the queued serial module (QSM) and multi-channel communication interface (MCCI) on modular microcontrollers. It is used to communicate with external devices and other MCUs via an asynchronous serial bus.

The example program published here was assembled with the assembler available from P&E Microsystems. The CPU32 code was assembled with IASM32, and the CPU16 code was assembled with IASM16. The code was run on P&E's debugger (ICD32 for the CPU32 code and ICD16 for the CPU16 code).

The program can be used for debugging purposes. For example, if the system is not working properly, this program could be used to print error messages to the computer screen.

Example Routine

This example routine will print a 5-character message to the computer screen using the SCI. If using the ICD32 or ICD16 debugger, complete these steps before running this program:

1. Connect an RS-232 cable from a serial port on the personal computer to the serial connector on the development board.
2. Once in the debugger, set the serial communications protocol to the correct COM port, 9600 baud, no parity, eight data bits, and one stop bit. For example, if using COM 2, type in the command: serial 2 9600 n 8 1.
3. Now, enable the serial communications by typing: serialon
4. Finally, enter this program and run it by typing:

g 400 (CPU32 code) or g 200 (CPU16 code)

CPU32 Code

```
SCCR0   EQU     $FFFC08
SCCR1   EQU     $FFFC0A
SCSR    EQU     $FFFC0C
SCDR    EQU     $FFFC0E
SYNCR   EQU     $FFFA04
SYPCR   EQU     $FFFA21

        ORG      $400                    ;begin program at $400, immediately after
                                         ;the exception table
INIT_SIM
        MOVE.B #$7F,(SYNCR).L            ;increase clock speed
        CLR.B (SYPCR).L                  ;disable software watchdog
INIT_SCI
        MOVE.W #$0037,(SCCR0).L          ;set the SCI baud rate to 9600
        MOVE.W #$000C,(SCCR1).L          ;enable the receiver and transmitter
PRINT
        LEA (MESSAGE).L,A0               ;load the effective address of the
                                         ;message
                                         ;to be printed into address register A0.
* The next two commands load the effective address of the last character
* of the message into address register A1.
```

```
       MOVE.L A0,A1
       ADDA.L #$5,A1

* The next three commands check to see if the transmit data register is empty
* by looking at the TDRE bit in the SCI status register (SCSR). If the TDRE bit
* is zero, then there is data in register TDR that has not yet been sent to the
* transmit serial shifter. If the TDRE bit is one, then the transfer has
* occurred, and a new character may be written to register TDR. Thus, this
* sequence of code loops until the TDRE bit is one.

LOOP
       MOVE.W (SCSR).L,D0
       ANDI.W #$0100,D0
       BEQ LOOP
        MOVE.B (A0)+,D0                    ;move the current letter of the message
                                           ;into D0. Then, increment A0 to point to
                                           ;the next letter
       MOVE.W D0,(SCDR).L                  ;transfer the current letter to SCDR
       CMPA.L A1,A0                        ;check to see if at the end of the
                                           ;message
       BNE LOOP                            ;if not, print another character
FINISH
       BRA FINISH                          ;stay here when done
MESSAGE
       FCB '12345’                         ;"12345" will be printed


CPU16 CODE

SCCR0   EQU     $FC08
SCCR1   EQU     $FC0A
SCSR    EQU     $FC0C
SCDR    EQU     $FC0E
SYNCR   EQU     $FA04
SYPCR   EQU     $FA21

        ORG      $200                      ;begin program at $200,immediately after
                                           ;the exception table
INIT_SIM
       LDAB #$0F
       TBEK
       CLRB
       TBXK
       LDAA #$7F
       STAA SYNCR                          ;increase clock speed
       CLR SYPCR                           ;disable software watchdog
```

```
INIT_SCI
       LDD #$0037
       STD SCCR0                            ;set the SCI baud rate to 9600
       LDD #$000C
       STD SCCR1                            ;enable the receiver and transmitter
PRINT
       LDX #MESSAGE                         ;load the address of the message
                                            ;to be printed into address register X.
       LDE #$0005                           ;counter that will count to end of
                                            ;message

* The next three commands check to see if the transmit data register is empty
* by looking at the TDRE bit in the SCI status register (SCSR). If TDREt is zero,
* then there is data in register TDR that has not yet been sent to the
* transmit serial shifter. If the TDRE bit is one, then the transfer has
* occurred, and a new character may be written to register TDR. Thus, this
* sequence of code loops until the TDRE bit is one.

LOOP    LDAB 0,X                             ;1st char in accumulator B
CHAR    LDAA SCSR                           ;see if TDRE bit in SCI Status Register
        ANDA #$01                           ;is cleared
        BEQ CHAR                             ;wait until it is
        CLRA
        STD     SCDR                        ;store char to be printed in data
                                            ;register
        AIX     #1                           ;point to next char
        SUBE   #$01
        BNE     LOOP                         ;loop to print next char
FINISH
        BRA     FINISH                       ;stay here when done
MESSAGE
        FCB     '12345'                      ;"12345" will be printed
```

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