EXAMPLE SCI TRANSMISSION

OBJECTIVE
This example has the following objectives:

- Review the use of serial communication interface (SCI) for transmission
- Illustrate the sending of a character through SCI

PROGRAM SCI_TRANSMIT
This program is an example of SCI transmission. The character T is being sent to SCDR when TDRE is set.

FLOWCHART AND CODE
The program flowchart is shown to the right of the program instructions. Note the initialization block, which contains reg. X initialization and SCI initialization. After initialization, the character T is loaded into accB. Then, the status of TDRE (transmission data register empty) flag is checked in a loop. When TDRE is found set, the loop is exited and the contents of accB is stored in SCDR (serial communication data register). This operation automatically resets TDRE. Now, the program loops back to the beginning and tries to send again.

The essential code for the program is shown to the right of the program flowchart. This essential code was incorporated into the standard asm template to generate the file SCI_transmit.asm.

EXECUTION
Note that the reset value of SCSR is \%11000000, i.e., it has the flags TDRE and TC set. This indicate that the transmitter is ready to transmit.

a) Press the RUN button. The program should loop on LABEL3 and exit the loop when the condition TDRE=1 is satisfy. This condition is checked with the mask \%10000000. The mask is applied on the value found in SCSR. When bit 7 in SCSR is set, the mask senses it and the condition for exiting the loop is satisfied. Since TDRE=1 from the reset, the loop is passed through and exited.

b) When the ‘check TDRE’ loop is exited, the program gets to the line

\[ \text{STAB SCDR,X} \]

This line is a breakpoint. At this moment, the screen looks like this:

c) Step manually to the next line, which stores accB into SCDR. This store operation automatically resets TDRE. The screen looks like this:
Note that SCSR is %00000000. This proves that TDRE has been reset by the storing to SCDR. Also note that the value $54 from accB has not yet arrived in SCDR. (The reason for this is that the simulator has an internal delay when running SCI in manual mode.)

d) Press RUN again. The program loops several times on LABEL3 before exiting. While looping, you can see SCSR=%00000000, i.e., TDRE=0. When exiting, SCSR=%10000000, i.e., TDRE=1. When the program pause, the screen looks like this:

Note that SCSR=%10000000, i.e., TDRE=1. The transmission of the character was done, and SCI is ready to transmit again.

e) Press RUN again 2 times. Note that the character T has appeared in the serial receiver window. Your screen capture looks like this:
f) Press RUN again. You get an additional character in the serial receiver window. Your screen capture looks like this:

WHAT YOU HAVE LEARNED
In this example, you have learned:

- The use of serial communication interface (SCI) for transmission
- The sending of a character through SCI
- New words and notations: SCSR, SCDR, TDRE.