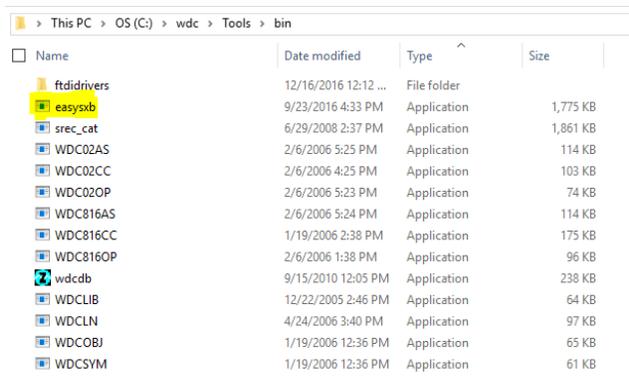


MENSCH™ Microcomputer Project: Controlling 8 LED and Using EasySXB

By now, you should have already met your **MENSCH™** and are now excited to dig deeper. If you have not done so, please make sure you have gone through our [Getting Started Guide](#).

All of the executable for WDCTools can be found in the [C:\wdc\Tools\bin](#) directory. One of the many useful tools that you can find there is a Serial Terminal application created by Joe Davisson. He has allowed us to include EasySXB with our installs of WDCTools. You will find the 64-bit Windows version in the “bin” directory. Joe has the latest source on [Github](#) and latest downloads at [SourceForge](#).

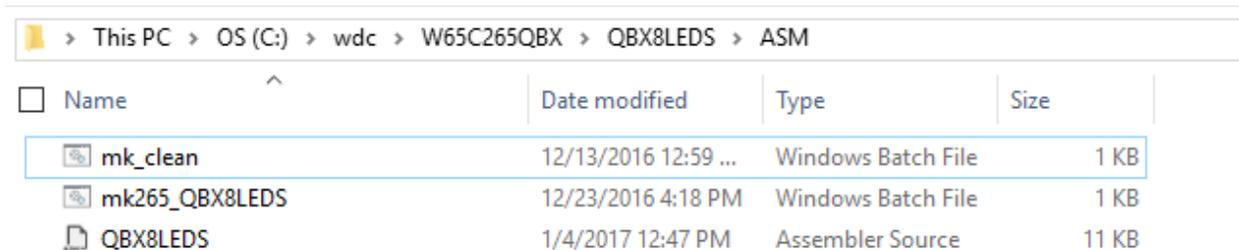


Name	Date modified	Type	Size
ftdidrivers	12/16/2016 12:12 ...	File folder	
easysxb	9/23/2016 4:33 PM	Application	1,775 KB
srec_cat	6/29/2008 2:37 PM	Application	1,861 KB
WDC02AS	2/6/2006 5:25 PM	Application	114 KB
WDC02CC	2/6/2006 4:25 PM	Application	103 KB
WDC02OP	2/6/2006 5:23 PM	Application	74 KB
WDC816AS	2/6/2006 5:24 PM	Application	114 KB
WDC816CC	1/19/2006 2:38 PM	Application	175 KB
WDC816OP	2/6/2006 1:38 PM	Application	96 KB
wdcdb	9/15/2010 12:05 PM	Application	238 KB
WDCLIB	12/22/2005 2:46 PM	Application	64 KB
WDCLN	4/24/2006 3:40 PM	Application	97 KB
WDCOBJ	1/19/2006 12:36 PM	Application	65 KB
WDCSYM	1/19/2006 12:36 PM	Application	61 KB

We will get started with the **MENSCH™** using a simple program to work with the 8 LED that are on the board. This project is included in the latest release of WDCTools. If you do not have it, you can upgrade or download the project from WDC’s Github page.

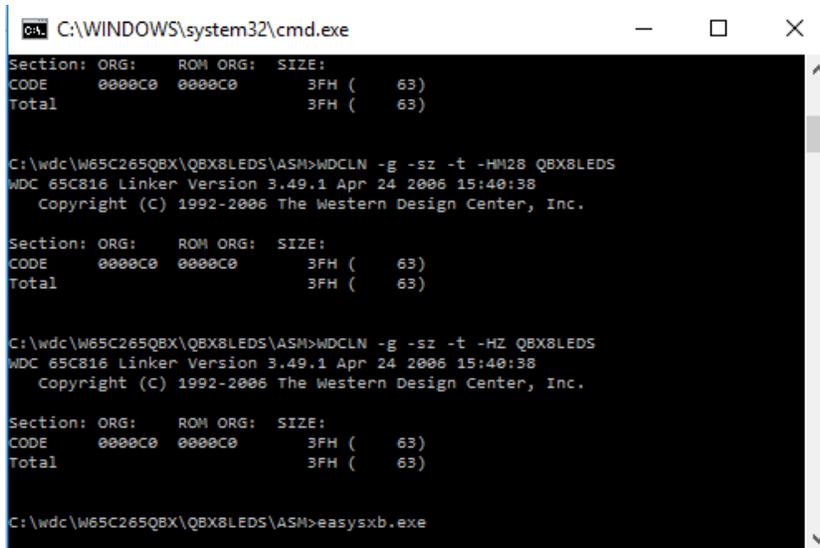
The project file is located at [C:\wdc\W65C265QBX\QBX8LEDS\ASM](#). This project has a batch file that will assemble and link the project. It will also launch EasySXB.

Double click on the mk265_QBX8LEDS.bat file to execute the batch file.



Name	Date modified	Type	Size
mk_clean	12/13/2016 12:59 ...	Windows Batch File	1 KB
mk265_QBX8LEDS	12/23/2016 4:18 PM	Windows Batch File	1 KB
QBX8LEDS	1/4/2017 12:47 PM	Assembler Source	11 KB

Once the batch file runs, a windows Command window appears. It will stay on the screen until you close it. It should be the same as below if everything ran correctly.



```
C:\WINDOWS\system32\cmd.exe
Section:  ORG:      ROM ORG:  SIZE:
CODE     0000C0  0000C0    3FH ( 63)
Total   0000C0  0000C0    3FH ( 63)

C:\wdc\W65C265QBX\QBX8LEDS\ASM>WDCLN -g -sz -t -HM28 QBX8LEDS
WDC 65C816 Linker Version 3.49.1 Apr 24 2006 15:40:38
  Copyright (C) 1992-2006 The Western Design Center, Inc.

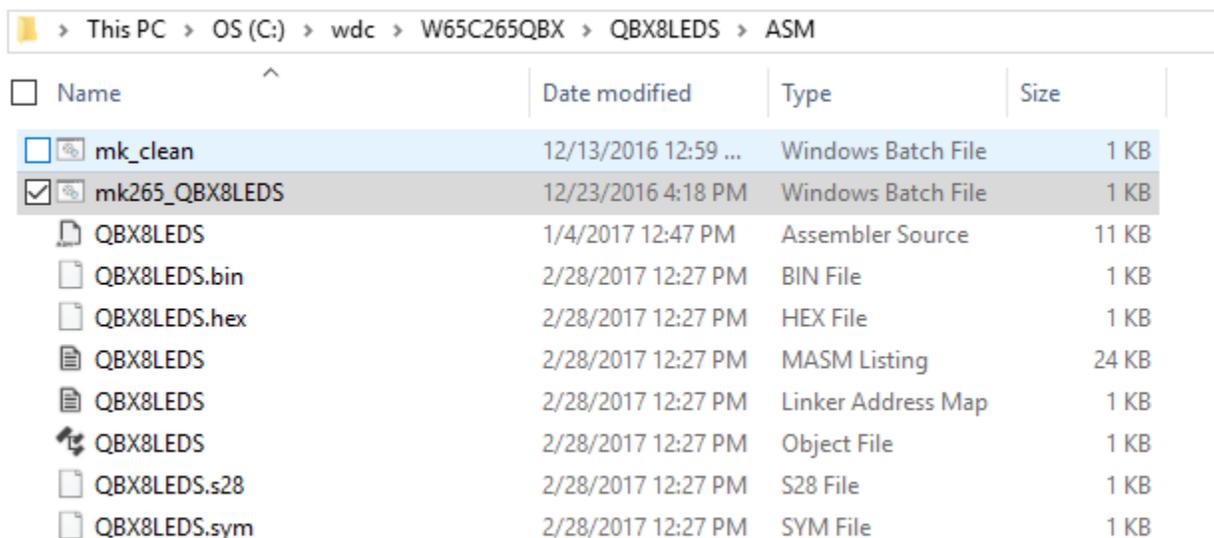
Section:  ORG:      ROM ORG:  SIZE:
CODE     0000C0  0000C0    3FH ( 63)
Total   0000C0  0000C0    3FH ( 63)

C:\wdc\W65C265QBX\QBX8LEDS\ASM>WDCLN -g -sz -t -HZ QBX8LEDS
WDC 65C816 Linker Version 3.49.1 Apr 24 2006 15:40:38
  Copyright (C) 1992-2006 The Western Design Center, Inc.

Section:  ORG:      ROM ORG:  SIZE:
CODE     0000C0  0000C0    3FH ( 63)
Total   0000C0  0000C0    3FH ( 63)

C:\wdc\W65C265QBX\QBX8LEDS\ASM>easysxb.exe
```

Back in your Windows Explorer window, you will see several new files were created. These include the .OBJ (Object) file that is used by the linker to make the .BIN (WDC Binary Format output), .HEX (Intel HEX Format Output), and .S28 (Motorola S-Record 28 Format output) files. EasySXB uses the .HEX file to load into the memory of the **MENSCH™**. A listing file (.LST) file is also created. You can view that file in any text editor and see both your code and the corresponding assembled addresses, opcodes, etc.



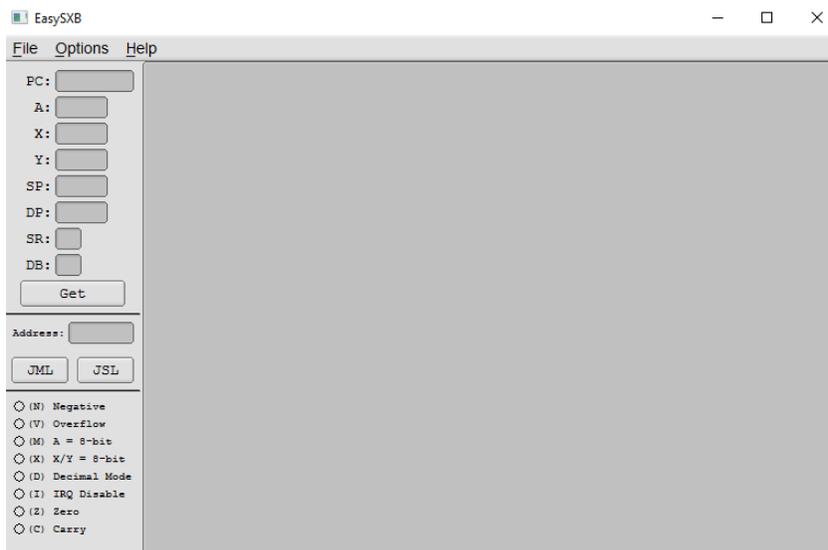
Name	Date modified	Type	Size
mk_clean	12/13/2016 12:59 ...	Windows Batch File	1 KB
mk265_QBX8LEDS	12/23/2016 4:18 PM	Windows Batch File	1 KB
QBX8LEDS	1/4/2017 12:47 PM	Assembler Source	11 KB
QBX8LEDS.bin	2/28/2017 12:27 PM	BIN File	1 KB
QBX8LEDS.hex	2/28/2017 12:27 PM	HEX File	1 KB
QBX8LEDS	2/28/2017 12:27 PM	MASM Listing	24 KB
QBX8LEDS	2/28/2017 12:27 PM	Linker Address Map	1 KB
QBX8LEDS	2/28/2017 12:27 PM	Object File	1 KB
QBX8LEDS.s28	2/28/2017 12:27 PM	S28 File	1 KB
QBX8LEDS.sym	2/28/2017 12:27 PM	SYM File	1 KB

The last window that opened is EasySXB. This is the Serial Terminal program that we usually use with the W65C134SXB and W65C265SXB. Since the **MENSCH™** can talk through its serial port and that connection is configured the same on the **MENSCH™** as it is on the W65C265SXB, we can use EasySXB with the **MENSCH™**. EasySXB has three Menu Options (File, Options, and Help). Below the Menu bar the application is has 4 Import sections. The first is the Registers section (located in the upper left corner). The values of each register are displayed here after the “GET” button is pushed. A terminal connection must be established before you can “GET” the register values.

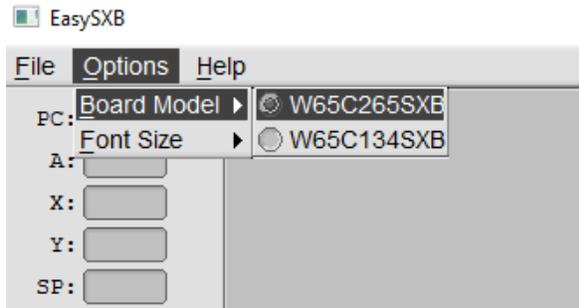
Just the register section is the “JUMP” section. You must input an address that your program is located in for the project. For the **MENSCH™** you must include the Bank Address followed by a colon, and then the address in HEX format. 00:0200 will be for address \$0200 in bank \$00.

The next section is the status register. Each part of the status register is indicated here. A green light means that the corresponding register flag is set HIGH (“1”). No light indicated the flag is not set (“0”). These values are also indicated by the “SR” value in the Register section.

To the right of all the previous sections is the Terminal Window. This is where all communication between the **MENSCH™** and EasySXB will be displayed.

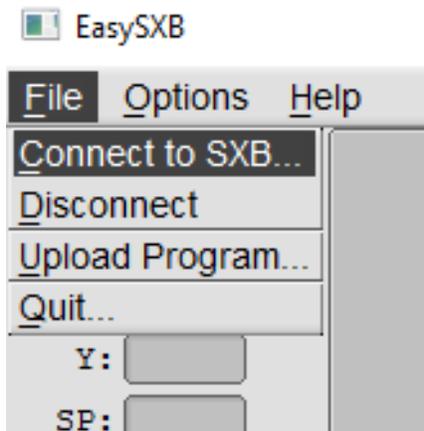


Before we can communicate, we must make sure we have the proper settings in EasySXB. For the **MENSCH™**, make sure that in the Option-Board Model menu, “W65C265SXB” is selected.



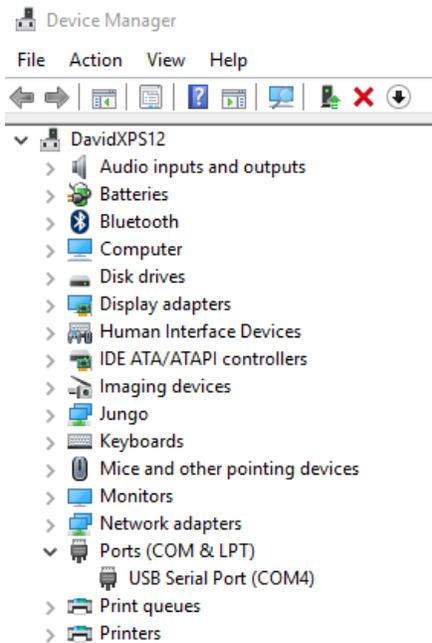
We are ready to connect our FTDI cable into both the USB port on our PC and the other end into the J5 connector of the **MENSCH™**. The black wire of the FTDI cable is PIN1. There is a PIN1 indicator on the **MENSCH™** (it is the furthest left pin). Be careful to plug the **MENSCH™** in correctly.

Now, “Connect to SXB” from the File Menu.

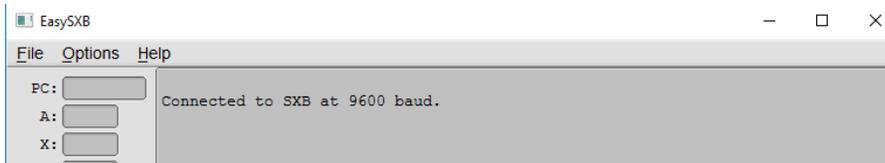


A prompt will appear asking for you a port to connect to. This is the COM port that the FTDI cable was assigned by Windows. You can find this by opening your Windows Device Manager.

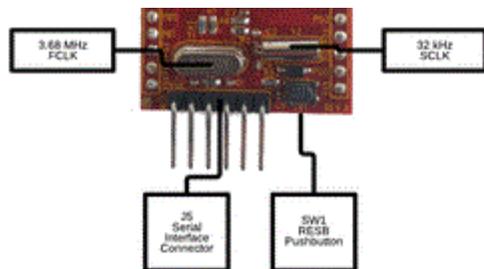
You will be looking for the “Ports (COM & LPT)” section like below. Type the number found after “COM” in the EasySXB prompt and press Connect.



There is now text in the Terminal Window section of EasySXB.

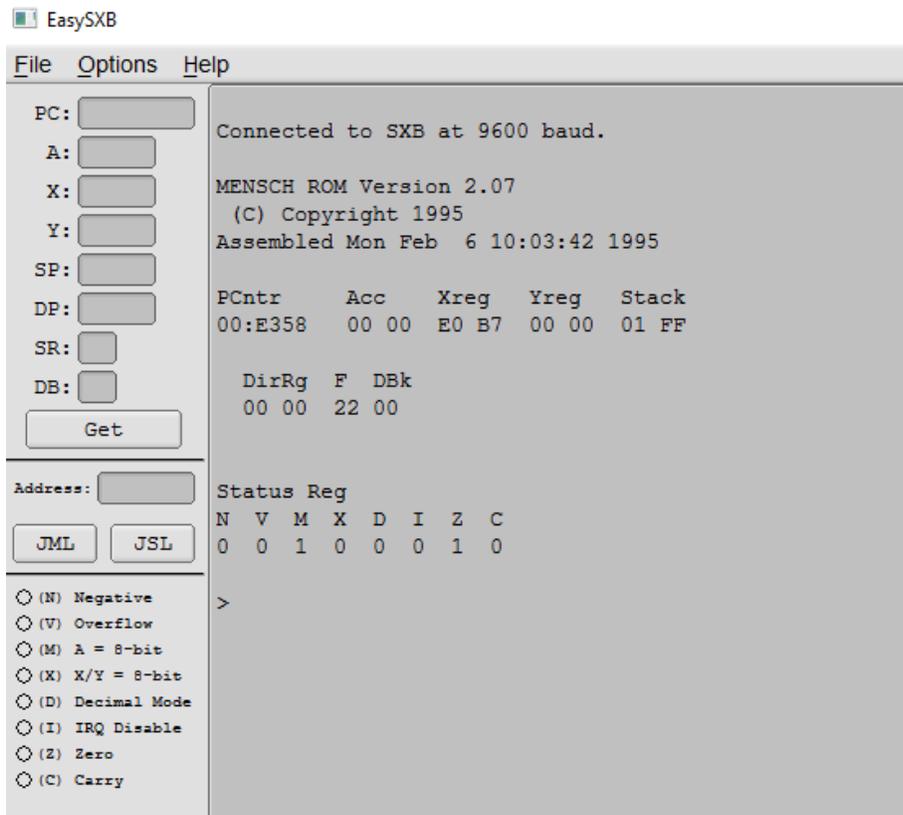


Now that EasySXB is connected to the **MENSCH™**, we can now communicate from the **MENSCH™** to EasySXB. Press the “SW1” switch on the **MENSCH™**. This is the reset switch.



One of the things that the **MENSCH™** will do on reset is transmit a welcome message on Serial Port 3 of the W65C265S chip. This welcome message can be seen below. Along with the welcome message, the **MENSCH™** will send the current values for all of the registers and

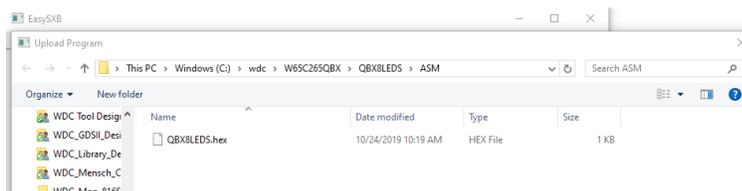
detailed Status Register flags. You can press the "GET" button in the Register section to see the register values appear there.



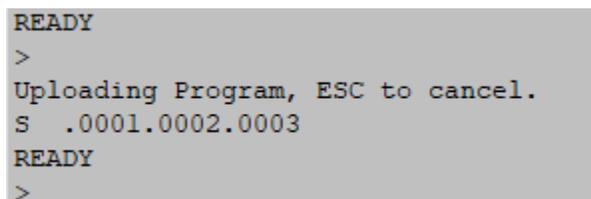
On reset these values will be the same as what was sent with the welcome message.



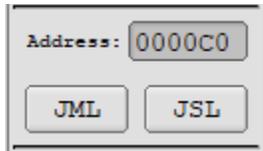
Now we can upload a simple program. Click on File → Upload Program. The Upload Program dialog box opens. Choose the HEX file that was created by the BAT file, then click the Open button.



The terminal will display that the program is uploaded correctly.



Type the starting location of your code. For the QBX8LEDs, it is at \$00:00C0 (do not type the \$, the ":" is optional). Now click on the JML (JuMp Long) or JSL (Jump to Subroutine Long). Both will work for this example.



You will notice that the EasySXB terminal display will update as follows:

```
READY
>J
Enter Address BB:AAAA 00:00C0

PCntr      Acc      Xreg      Yreg      Stack
00:00C0    00 AA    00 00    00 FE    01 FF

  DirRg    F    DBk
  00 00    26 00

Status Reg
N  V  M  X  D  I  Z  C
0  0  1  0  0  1  1  0

>
```

The lights on the MENSCH Microcomputer have changed as well. This example sets P7x to \$AA. Therefore starting with the farthest left LED (P77) lit, every other LED (P77, P75, P73, and P71) will be lit.

You can change the Assembly code to experiment with the LEDs. Just run the batch file again to assemble and link your changes. Enjoy!