Axman Application Note:
CME11E9EVBU and USB Serial Operation

This application note covers the work around to program or flash a user application program into the CME11E9-EVBU board external memory with a USB serial COM port conversion cable (HC-USB for example). Users with a host PC that does not provide a serial COM port will find that they have a problem trying to use the AXIDE software or other support programs that offer CONFIGURE or PROGRAM utility operations for the HC11 when applying the USB serial COM port conversion cable or the HC-USB cable.

Overview: Most users of the EVBU board at some point require the external memory to be programmed with a user application so the EVBU will run the application at Reset or Power on instead of the default Buffalo Monitor. Due to the HC11E series microcontroller embedded Bootload ROM program timing constraints, a host Personal Computer with an embedded or internal bus based serial COM port is required. Most new Laptop or Notebook style and many Desktop PC computers provided today do not offer an embedded COM serial port any longer. Users requiring a serial COM port must apply a USB serial conversion cable to generate a COM port, HC-USB for example. This application note provides a work around for the non-availability of the HC11 Bootloader operation.

Requirements:
1) CME11E9-EVBU board.
2) HC-USB conversion cable or other USB to Serial COM port conversion cable.
3) AXIDE terminal / utility software or other terminal software.
4) AXNOTE_EVBU-USBSerial.zip support file(s).
5) Host PC operating Windows XP/2000 or later with USB port.
6) Flat blade screwdriver or DIP IC extractor tool.
7) 22 or 24 GA solid core wire, 4 inches long.

SET-UP:
1) Install AXIDE software from support CD.
2) Extract the AXNOTE_EVBU-USBSerial.zip support files onto your host PC into the AXIDE3 installation directory.
3) Connect USB serial cable to host PC and Install USB Serial Cable support software. This software should provide a COM port selection for the AXIDE or other terminal software.
4) Verify EVBU board set-up and option jumper settings:
    a) MODA and MODB options = Open or Idle, not on both pins (Expanded Mode).
    b) MEM_EN = Installed on both pins.
    c) TRACE_PROG = Trace or open.
    d) Move the U7 device (AT28C64) to the U6 socket. Use flat blade screw driver or IC extractor to remove the IC from the U7 socket. Carefully install IC in U6 socket taking care not to bend any pins.
    e) Verify JP6 is installed on both pins.
    f) Verify JP5 and JP7 are open or idle, not on both pins.
5) Connect USB serial Cable between Host PC and the EVBU COM port.
6) Launch AXIDE and it will ask you for a COM port to apply or launch other terminal software. Select the COM port provided by the USB Serial cable. Configure communication settings as follows:
        Baud Rate   = 9600
        Data Bits   = 8
        Stop Bits   = 1
        Parity   = None
        Flow controls   = None or Hardware

Communication and Memory Test:

1) Test the USB serial cable connection and communication by powering on the EVBU board or pressing the EVBU board RESET switch once. The Buffalo Monitor prompt should appear on the AXIDE or other software terminal screen. If it does not, see the troubleshooting guide section below now to try to determine the problem.
2) At the Buffalo monitor prompt, press the PC "Enter" key. The Buffalo command prompt character ">" should appear.
3) To test the memory device in U6: Type in the Buffalo command "MM 8000" and press the PC "enter" key. The Buffalo will respond with a message: " 8000 xx _ " where the under bar "_" is the data cursor flashing and the "xx" is the current data value. Type in a new value such as 55 or AA and press the PC "Enter" key. Buffalo will respond with a "ROM Error" message. Type in the "." period key next and the Buffalo Command prompt (">") should return.
4) To see the U6 updated, type in the Buffalo command 'MD 8000" and press the Enter key. U6 contents will be displayed starting with address 8000. The value entered in step 3 should be present in the address 8000 data location.

Applying EVBU - U6 for Application Program Memory:

This section will provide details on how to apply the U6 location for loading and auto-starting user applications under the Buffalo. This operation replaces the Tutorial of the EVBU user manual where the CONFIGURE – ROMON bit = off and using AXIDE Program operation to load the U7 device for user application operation from Reset. EVBU and HC11 operating mode will still remain Expanded.

After your application code is operations under Buffalo monitor GO command execution, it can be moved to U6 to be started Automatically at Reset or Power on of the EVBU board. One advantage to this method is that if the Buffalo routine Jump table was applied in your application, it is still available when you move the code to U6.

1) To move code to the U6 memory position, edit your source code for the following:
a) Change the Program or ROM start location to $8000 hex. Do not move variables, data definitions, or stack location from the current RAM space.
b) If you did not set the Stack pointer, set it now in your source code to a RAM location. Note the stack will grow down from the set address, not up.
c) If you apply the SCI serial port in your source code and did not initialize the SCI, add the SCI initialization or use the Buffalo ONSCI jump table routine.
d) Add any restricted register updates (such as OPTION register) to your source code immediately following the Reset vector.
e) If you apply interrupts, do not change the way they are loaded now. Do not add the interrupt vector table to the source code, the Buffalo will vector to the Ram table as performed currently.
f) Re-assemble or compile your code with these changes and check for errors.

2) Load the Program U6 executable code onto the EVBU:
a) Type in the Buffalo "LOAD T" command at the Buffalo prompt on the terminal screen and press the "Enter" key. The Buffalo will be waiting for the S record file now.
b) Use the AXIDE "UPLOAD" command or other software "send ASCII or Text file" operation. Select the U6LOAD.S19 file to upload or send to the EVBU board. This file is provided in the EVBU-USBSerial.zip file.
c) If you get "TOO LONG" or ROM ERROR" messages when loading, stop and review settings and commands above, or see the Troubleshooting section of the document.
d) After loading the U6LOAD.s19 file and getting the "done" message and Buffalo prompt, go to the next step.

3) Load U6 with your application code:

    a) Following step 2 above you can enter the Buffalo command "CALL 2000" and press the enter key. The LOAD U6 application will prompt on the terminal: "Program U6 EEprom Utility".

    b) Using AXIDE UPLOAD operation, enable the "wait for reply character" option (faster method) or with other terminal software, set the line pace delay to 30ms. Select your application S record file to send and select OK. The file will be loaded into the U6 device at this point.

    c) When the Load utility software is finished, it will indicate "done" with no errors or indicate an error and provide the error address in the register "Y" view. If you have an error, review your code to make sure the address range 8000 – 9FFF is applied.

    d) Open or Idle the JP6 option now to protect the contents of U6.

4) Auto-starting Buffalo to U6 location:

Buffalo provides an Auto-Start feature that will execute code starting at location $B600 hex in the HC11 internal EEprom. this feature will be applied to actually start your application code in U6 instead. You need to know the actual starting address of your code if it is not $8000 hex to proceed.

    a) At the Buffalo command prompt type in the command "ASM B600" and press the "Enter" key.

    b) The Buffalo will respond with a message: "B600 STX $FFFF >" where the "B600" is important but the disassembled code instruction (STX $FFF) maybe different, do not worry about this. At the ">" command prompt type in the following instruction:

            JMP 8000<enter ; where enter is the enter key on the PC keyboard.
       Note that if you application does not start at 8000, use the actual start address of your application.

    c) Type in the "." character to exit the assembler mode in Buffalo and get the command prompt back (>).

    d) To enable the Buffalo Auto-Start operation: Install the 22 or 24GA solid wire from P4 / EVBU port pin PE0 to pin VCC. Alternate method is to apply a spare jumper shunt on the MCU Port pins 22 – 24. Either method will force the HC11 Port E0 pin high or to +5V.

    e) Press the EVBU Reset switch and release, or power down and up the EVBU board. Your application in U6 should start now instead of the Buffalo monitor. To restore the monitor, remove the wire or jumper that connects +5V/VCC to Port E0 and Reset the board.

Note: The EVBU SS:Keypad port operation and Keypad-LCD example codes will be effected by the Port E0 connection to +5V. If keypad operation is needed in your application, the Port E0 connection must be removed after Reset has occurred. An additional circuit maybe built in the EVBU breadboard area to replace the jumper or wire to +5V / VCC. This timing circuit will allow the keypad to operate normally after Reset.

Auto-start Timing Circuit:

Apply this circuit if keypad operation is required immediately after Reset and without user intervention to open the auto-start jumper wire or jumper.
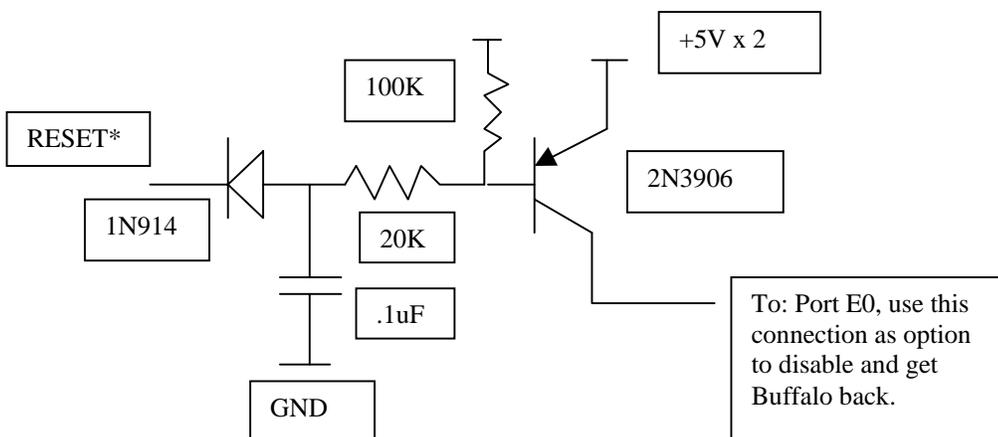
Troubleshooting:

1) No Buffalo Prompt on terminal screen:
   a) Disable option jumper or wire connection to Port E0 and Reset board.
   b) Install Option MODA on both pins, MODB open or idle, and RESET EVBU board. If Buffalo prompt appears it indicates the CONFIGURE – ROMON bit is disabled. To manually modify the CONFIG register follow this procedure:
   1) At Buffalo command prompt type in MM 103F<enter, where Enter is the PC enter key.
   2) At the 103F 0D prompt, type in 0F<enter, where enter is the PC Enter key.
   3) Open / idle MODA option jumper and press EVBU Reset switch. Buffalo prompt should appear now.
   c) Verify COM port assignment: Use AXIDE Files – Options menu and select different COM port assignment if suspect. Use Windows – Control Panel – System – hardware manger – Ports – LPT and COM and verify COM port is present and working. If you remove the USB cable from the PC, the COM port in use should be removed form the available COM ports list. Re-install USB – serial cable into PC and the assigned COM port should appear again. If it does not, review USB serial cable documentation and instructions.
   d) If AXIDE is suspect, use Windows accessory – Hyperterminal and set-up direct connection to the USB COM port.
   e) Verify EVBU is operational on another PC that has known working COM port. Review EVBU or USB serial as necessary when operation is determined. Contact support@axman.com if the EVBU has issue, repair charges may apply.

2) U6LOAD.s19 will not load, hangs and times out or has error messages from Buffalo:
   a) If Uploading the U6LOAD.S19 file and a timeout occurs, Verify the AXIDE UPLOAD option "wait for reply character" is not enabled and try it again.
   b) If "Too Long" or other error message is given by Buffalo, verify the following:
   1) MODA option jumper is open or Idle.
   2) MEM_EN option jumper is installed on both pins.
   3) Make sure you press the PC Enter key after typing the LOAD T command.
   4) Do a Buffalo MM 2000 command and modify the data value at address 2000. If you get a ROM Error message, The EVBU board is suspect, Remove all external connections on the BUS Port, LCD Port, and P4/EVBU port connectors, and Reset board to try again. Contact support@axman.com for more help.

3) U6LOAD operation gives error message or quits during download and does not respond:
   a) U6LOAD operation indicates load error:
   1) Verify AXIDE UPLOAD option "wait for reply character" is enabled or for other software that a 30ms line pace delay is applied.
   2) Inspect 'Y' register content from error prompt for address indication. Verify the address is in the U6 memory space of 8000 – 9FFF. Review code if not. If it is in the correct address range, try a Buffalo MM command at that address to verify memory operation.
   3) Remove U6 and inspect for bent lead on IC, repair and re-install.
   b) U6LOAD quits during Upload: Review application code and verify the address range 2000 – 2200 is not applied. This is the address range of the U6LOAD program. Any code left in this range is an error in the application and should be moved to the 8000 location.

Axiom Manufacturing
2813 Industrial Lane
Garland, TX 75041
(972) 926-9303, FAX (972) 926-6063
Internet: www.axman.com
Sales@axman.com