SMRX Bootloader

CCR100 Bootloader

The CCR-100 includes a bootloader allowing for field update of its firmware. These instructions provide details on doing a field update. The instructions are followed by technical details on the operation of the bootloader.

Windows

1. Insure that the CCR-100 has a revision date of 100813 or later. The revision date is visible on the display when the unit is first turned on. Earlier units will need to be returned to USL for update. Contact harold@uslinc.com for information on return for update.
2. If not already installed on your computer, get a copy of Tera Term at http://www.uslinc.com:8880/ftp/harold/cc/cc/ttermp23.zip and install it.
3. Install the Silicon Labs Virtual Com Port drivers, available at http://www.silabs.com/pages/DownloadDoc.aspx?FILEURL=Support%20Documents/Software/CP210x_VCP_Win_XP_S2K3_Vista_7.exe&src=SupportDocLibrary .
4. Turn off the CCR-100, then connect a USB cable between the CCR-100 and the host computer.
5. In the Device Manager, a "Silicon Labs CP210x USB to UART Bridge" should be visible under Ports. Note the COM number for this device.
6. Start Tera Term. Make the following settings:
    1. Setup - Serial Port:
        - COM3 (or the COM nunber noted in the last step)
        - Baud Rate: 38400
        - Parity: None
        - Stop: 1 bit
        - Flow Control: Xon/Xoff
        - Transmit Delay: 0ms/character, 50ms/line
7. Turn on the CCR-100. You should see a number representing the revision date of the bootloader (such as 100813). A green LED to the left and below the display will light.
8. In the file menu, select send file, then select the file to be sent (the hex file provided by USL). Hit OK.
9. You should see a bunch of lines of text go by on the screen. As they go by, the LED on the left side of the display will change color.
10. After the text stops rolling by, you should see a line with "ok" on it, indicating the bootload was successful. The CCR-100 will restart with the new code. The changed revision date can be verified.
11. Disconnect the USB cable and continue normal operation.

Linux

1. If not already installed, install minicom.
2. The following steps will probably have to be run as root, so log in as root.
3. Tail the messages log, then plug the CCR100 into a USB port with the CCR100 turned off. If the USB driver is installed (it comes pre-installed in Fedora distributions), the messages log will show the attachment of the CCR100 and show that it has been assigned a port (such as ttyUSB0).
4. Locate where minicom was installed. In Fedora, it is installed to /usr/bin/minicom .
5. Start /usr/bin/minicom -s . The -s parameter causes minicom to start with default parameters and allow you to set the defaults.
6. Under Serial Port Setup, select the port (ie, /dev/ttyUSB0) detected above.
7. Under bps/par/bits, select 38400, 8N1.
8. Set flow control to software.
9. Save the settings as default, then exit the configuration screen.
10. When the CCR-100 is turned on, you should see a number representing the bootloader revision date (such as 100813). The green LED to the left and below the display should light.
11. Type control-A Z O to configure the ASCII send protocol. Modify the ASCII protocol by typing the letter for it. Then press enter to move to the next field. Type a letter other than space (space clears the field), then type backspace (to get rid of the letter just typed), then space -l50 (dash L 50) to set the line delay to 50ms. Press return for each of the other fields, then another return to exit to the configuration menu. Save the configuration as default, then exit the menu. The ASCII protocol has now been modified to include a 50ms delay after each line.
12. Type control-A S to send an ascii file.
13. Select the ASCII protocol.
14. Select the file to be downloaded.
15. Text should scroll by in a window as it is uploaded to the CCR100. The LED to the left of the display will change color during the download.
16. On successful completion of the upload, "ok" will appear on minicom in the upload window.
17. The CCR100 will restart and the new firmware version can be verified.
18. Type control-A X to exit minicom.
19. Unplug the USB cable from the CCR100.
20. On future bootloads, minicom should be started without -s so the configuration set above will be used. Once connected to the CCR100, start with the control-A S instruction, above, to start the ascii upload.

Bootloader Details

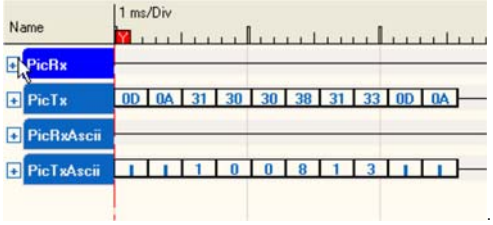
The SMRX bootloader is started when the SMRX is powered up with the USB connected to a host computer. The SMRX detects the presence of Vbus and goes into the bootload mode. LED1 lights green when the bootload mode is entered. Note that the USB chip is bus powered, so the host computer will recognize the SMRX even though the SMRX is powered off. The USB interface is the Silicon Labs CP2102 with its default settings (no custom VID or PID). These notes are based on using the Silicon Labs CP2102 virtual com port.

Tests were run using Tera Term. Settings are

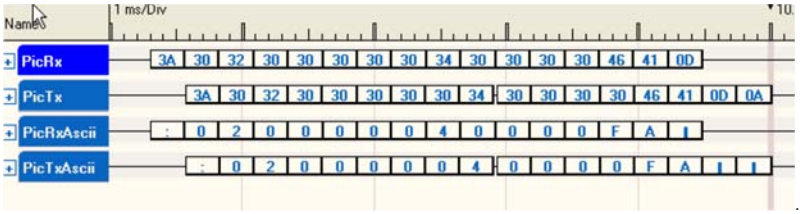
- 38.4kbps
- 8N1
- Xon / Xoff handshake
- 50ms per line transmit delay

The transmit delay is required because of latency through USB. It takes time for the Xoff to get back to Tera Term so it can stop transmission. The delay allows the Xoff to get back to Tera Term. A custom host could watch for the echo of the carriage return before starting the next line. As described below, the CR is not echoed until after the record is programmed in to the PIC. The hex file is sent to the SMRX using Tera Term using File - Send file.

Immediately after being powered up the PIC lights LED1 green and sends crlf, the bootloader code revision date, crlf. At this writing, it's 100813.

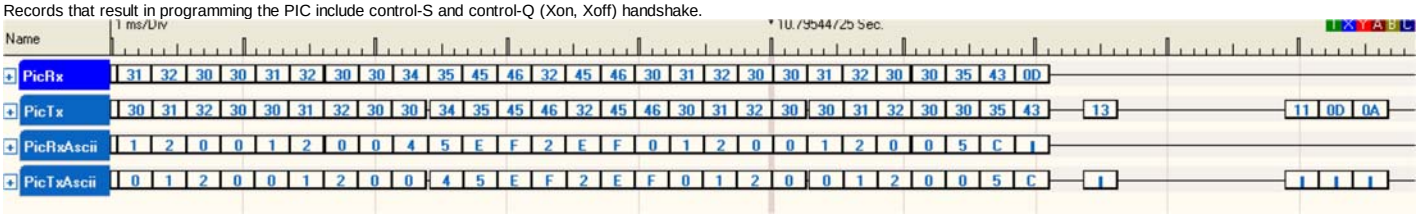


Characters except CR are immediately echoed. CR is echoed after the line of text has been interpreted. A LF is transmitted after the echoed CR.



. Note that this record sets an extended linear address and does not actually program the PIC at all.

Records that result in programming the PIC include control-S and control-Q (Xon, Xoff) handshake.



. Note that after the last character echoed (0x43, ASCII C) is followed by 0x13 (control-S) in the echo. After a delay of a little more than a millisecond, during which the PIC is programming the record to flash, a 0x11 (control-Q) is sent to tell the host to resume transmission. The control-Q is finally followed by the echoed carriage return (0x0d) and the appended line feed (0x0a). If there was a checksum failure on the record, a question mark is transmitted after the line feed that was appended to the echoed carriage return.

During the bootload, LED1 will change colors. The LED changes colors each time another 64 byte page is erased prior to that page being programmed.

After the bootload, the PIC sends crlf OK crlf if the data had no checksum failures. It sends crlf bad crlf if there was a checksum failure on any record.

Owner: **HaroldHallikainen** Last edited on September 21, 2010 9:45 am by **HaroldHallikainen**