FIRST DRIVER STATION KERNEL LOADER UPDATE INSTRUCTIONS

1 Introduction

This document describes steps to update the Driver Station (DS) v1.0 Kernel Loader (KL). The KL is used to boot the operating system (Linux) on the DS or load alternate operating systems or user programs.

The purpose is to open the Driver Station for use as an embedded software development/learning tool.

*1.1 *** Warnings ****

You must follow the instructions exactly!
Potential risk: you could lock-up the Driver Station – making it unusable.
If you are not comfortable with the risk, do not perform this procedure.

The loader does not impact the applications running on the Driver Station during normal operation.

1.2 Documentation

In addition to this document, you need a copy of the Utility Loader document:
http://www.kwikbyte.com/driverstation/doc/DS_utility_loader.pdf

1.3 Equipment

You need:

1) A means of communicating with the DS at a low-level. This document uses the DS USB Adapter Clip with supplied USB extension cable.
2) A PC. The host OS can be Windows® or Linux. Other OS may work, but have not been tested.

1.4 Software

You need:

1) A host PC terminal emulator program like HyperTerm, minicom, Kermit, etc.
2) The DS UL binary image.
   ftp://kwikbyte.com/pub/DS/binary/utilLoader.bin
   or
   http://www.kwikbyte.com/driverstation/binary/utilLoader.bin

3) The new kernel loader (current version is v1.2).
   http://www.kwikbyte.com/driverstation/binary/kernelLoaderv12.bin

4) The altLoader program.
   http://www.kwikbyte.com/driverstation/binary/altLoader.bin

1.5 Support

Please read the instructions carefully. If you have questions or helpful comments, please send them to driverstation@kwikbyte.com.

2 Kernel Loader Update Instructions

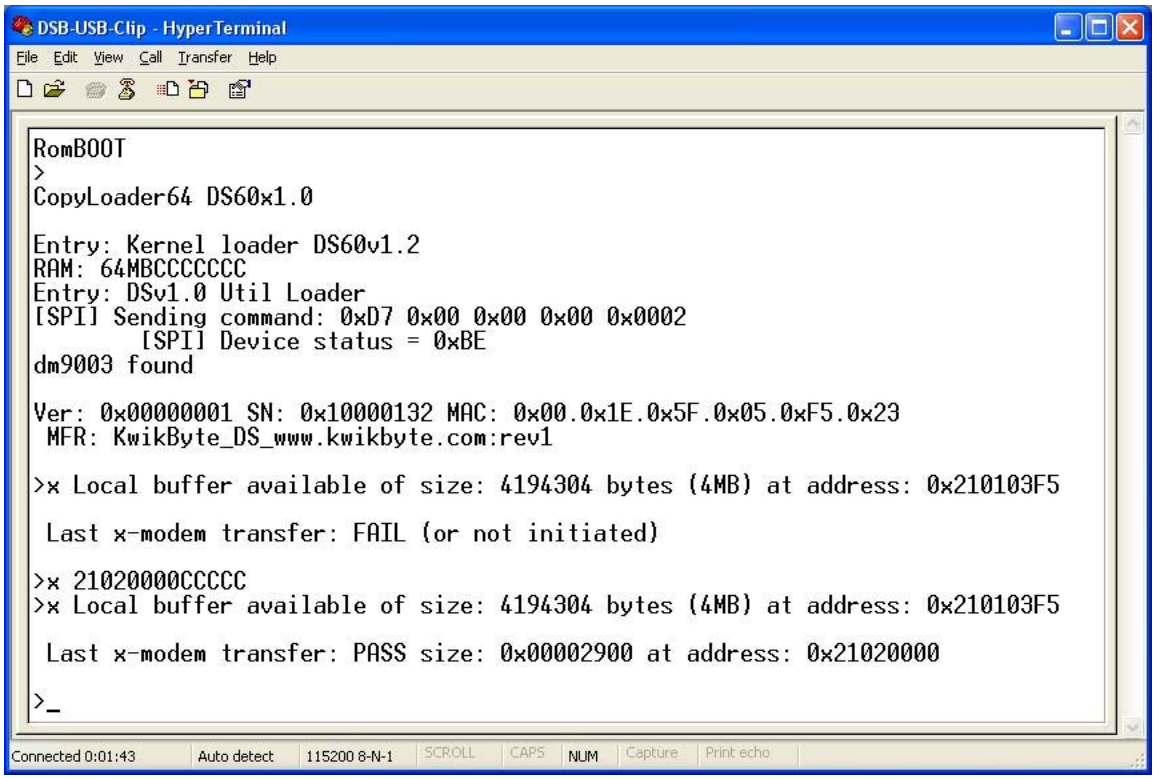
2.1 Load the UL

Follow the instructions from the UL document exactly (http://www.kwikbyte.com/driverstation/binary/utilLoader.bin) through step #23. Finish step #23. Stop. Do not perform step #24. You can now close that document because we won't use it any more in this process.

2.2 Update the KL

1) As performed previously, execute a transfer from the PC using Transfer -> Send File. Select the kernelLoaderv12.bin file for Xmodem download – just like we did earlier. Click Send and watch the progress. This only takes a few seconds because the file size is small.

2) The Driver Station now has the kernelLoaderv12.bin image in RAM. We need to program it to non-volatile memory (NVM). The NVM used on the Driver Station is serial flash. Type x Enter to get the size of the last transfer from the Driver Station's view.



3) This step is critical!!! Pay very close attention to the commands and make sure you type them exactly as listed.

   From this example, the transfer size is 0x2900. Unlock the boot loader with the following two commands:

   spi_erpx Enter
   spi_wrpx 0 Enter

   Let's program flash with a command of the format "spi_write <flash destination> <source address> <size>". In this case,

   spi_write 1080 21020000 2900 Enter

   Restore the lock on the boot loader with the following commands:

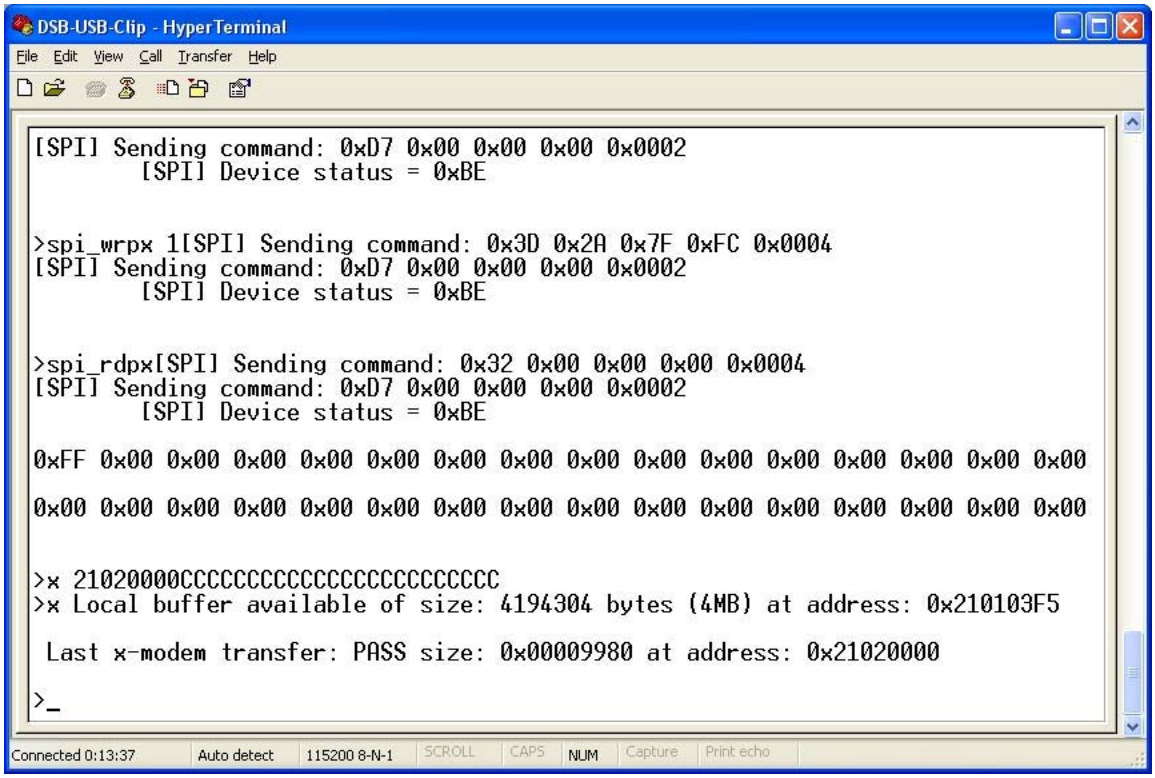
   spi_erpx Enter
   spi_wrpx 1 Enter

   You should see lots of "[SPI]" messages scrolling during these operations.

4) The kernel loader is now updated. Let's download the alternate OS loader while we are here. The rest of the steps are not as important as step #3 because they are considered recoverable. Initiate a transfer, again, to the same buffer address:

x 21020000 Enter

5) Notice the 'C' characters again and send the altLoader.bin file for Xmodem transfer. This takes about 6 seconds to transfer. Verify the transfer size by typing x Enter.



The transfer size is shown as 0x9980.

6) Now, let's program this image at the beginning of the last 256-page block of flash:

spi_write 7FE000 21020000 9980 Enter

7) Again, many [SPI] type message scroll by during the programming operation. After about 20 seconds, it completes with "Buffer written" message.

We're done with this process! Verify everything runs as normal by entering the command reset Enter.

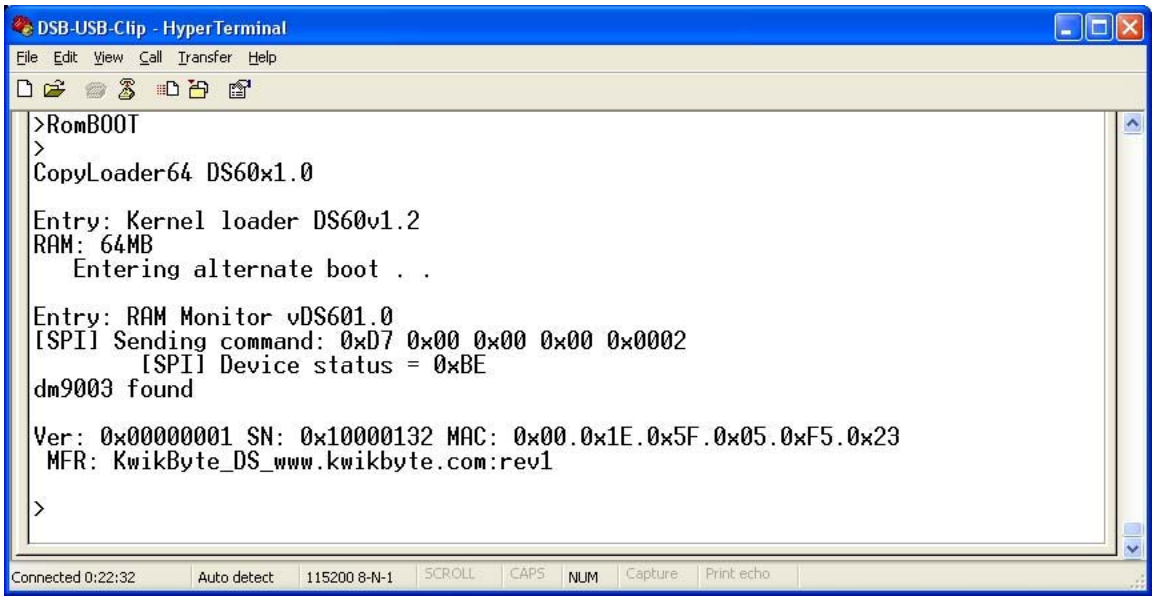
The only observable differences are

1) The boot-up logo is really strange! We will fix that (easily) in the next installment by loading your custom image.
2) The version reported by the kernel loader is now 1.2.

2.3 Results

The new kernel loader obtains the boot-up logo information from a separate flash location. This makes it very easy to modify the logo without changing the extra-important boot sections.

The new kernel loader also accepts a new "special key" sequence. If you apply power to the DS while holding the up-arrow and SELECT buttons, the DS will perform an alternate boot:



This feature will be used to boot another version of Linux.

3 Revisions

16JAN2009 Creation