



Document Name 7125 Firmware Loader User Manual
Revision: 1.0

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7125 Firmware Loader User Manual

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1.0 Definition

The 7125 firmware loader is a software utility that is used to load firmware components into the embedded subsystems of the 7125 Sonar. The firmware loader can run on any Windows host equipped with the necessary ports. The target subsystem can be programmed while directly connected to the host via a debug board or through the in-system communication link if the loader is running on the 7-P.

2.0 Software Installation

2.1 Host Computer Requirements

The firmware loader runs on any Windows host. For in-system loading, the host is the 7-P computer. For debug board programming, any Windows machine equipped with the necessary ports will work. The necessary ports include one parallel port and one serial com1 port.

2.2 Retrieving the Loader

The loader is archived under 7125_Firmware_Loader with Visual Source Safe at <\\Multibeam\VSSDatabase\SoftwareEng\7K> .

The loader is archived in the form of a self-extracting installer executable and is named 7125_Firmware_Loader_x.x_install.exe.

2.3 Installing the Loader

The loader is installed by executing the installer file retrieved from archive. A shortcut is automatically placed on the desktop.

2.4 Installing the Xilinx Impact Tool

The Xilinx Impact tool is archived for convenience under 7125_Firmware_Loader with Visual Source Safe at <\\Multibeam\VSSDatabase\SoftwareEng\7K> .

This tool must be installed for the PLD programming function of the loader to work. The file name of the installer is WebPACK_71_fcp_i.exe .

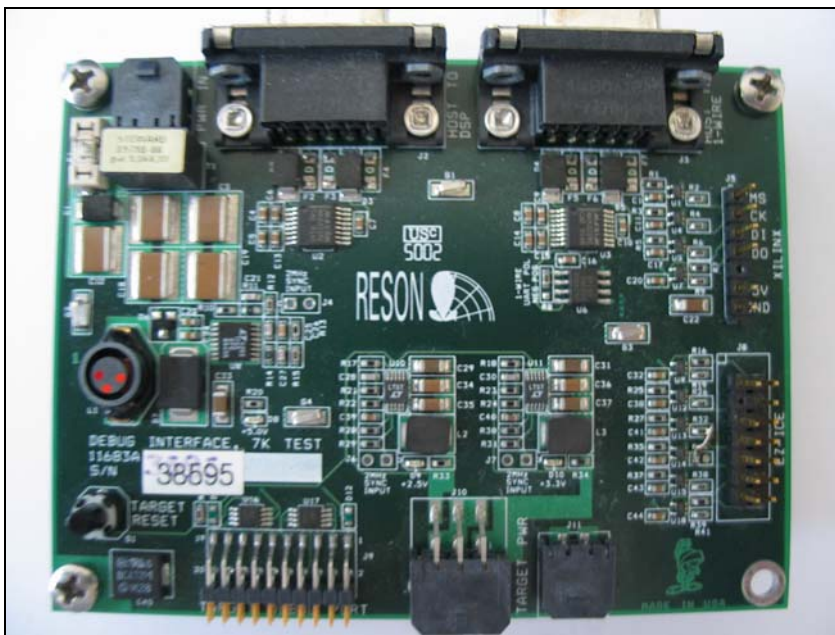
Execute the installer file and follow the instructions on the screen. This step is not necessary if the loader is strictly going to be used for in-system programming.

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3.1 Debug Board Description

The debug board is stock item **11683A** from RESON manufacturing. A copy of the schematic (debug_board_11683A.pdf) can be found in the VSS archive under 7125_Firmware_Loader at <\\Multibeam\VSSDatabase\SoftwareEng\7K>.

Notice the 12V inlet connector **J1** in the upper left corner.



3.2 Providing Power to the Debug Board

A 12 V harness feeds the debug board from an external source. It connects to **J1** at the debug board. Beware that there is another receptacle on the debug board that physically accepts the 12 V harness plug.

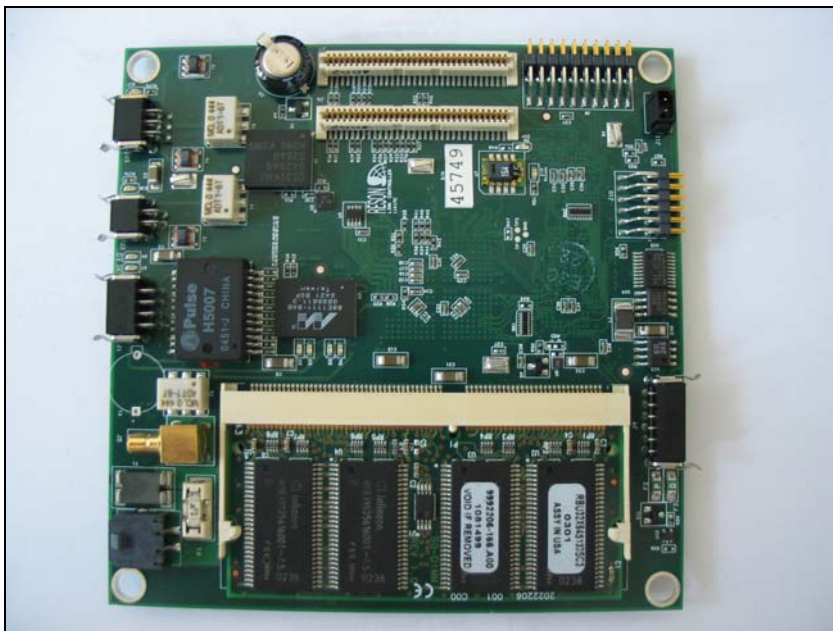
CAUTION: Connecting 12V into the wrong receptacle will destroy the debug board.



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3.3 Target Module

Pictured below is an example of a target module. In this case, a link controller module is shown. Notice the debug header in the upper-right corner and the 5V power inlet at the lower-left corner



3.4 Providing Power to the Target Module

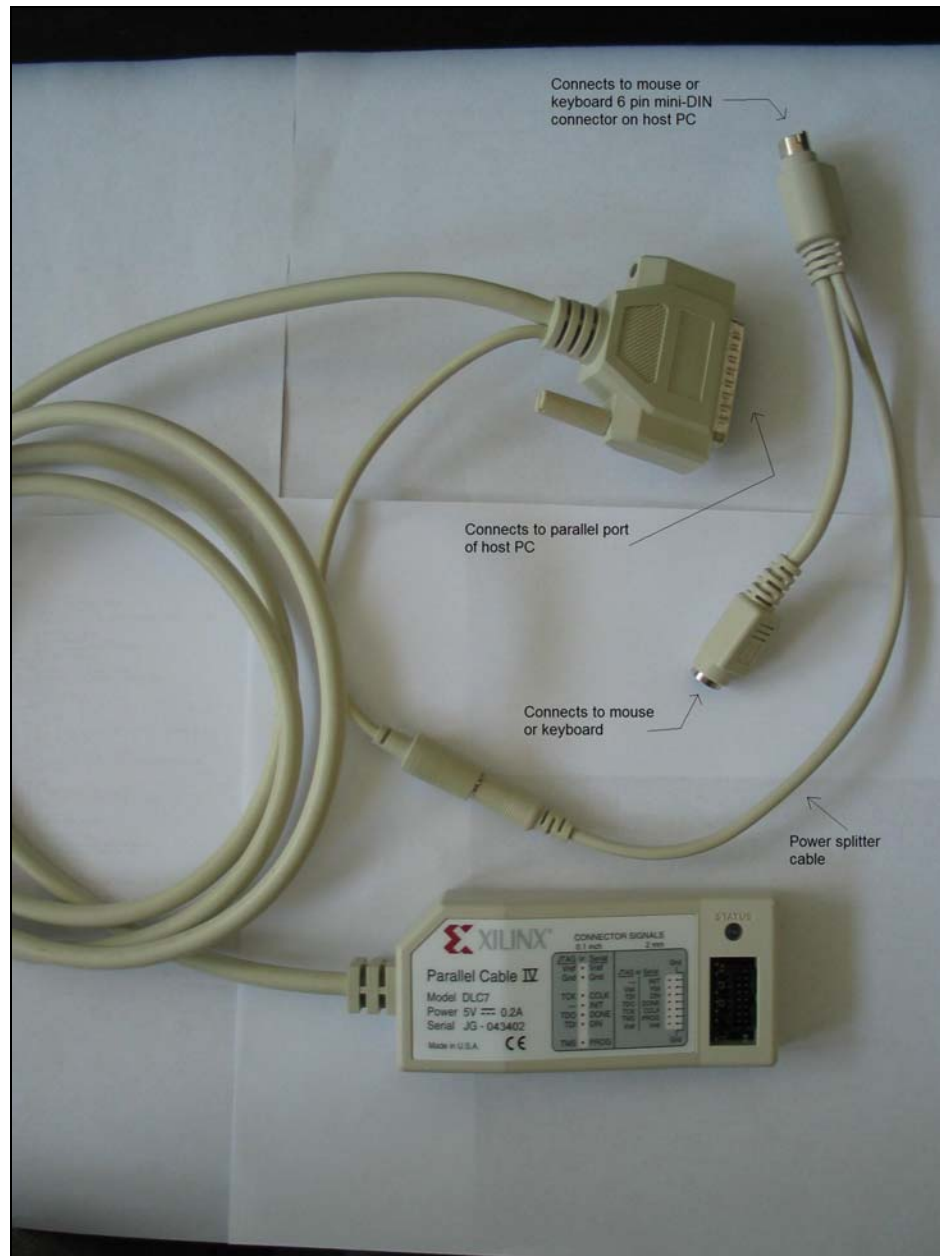
The debug board has a 5V outlet at location **J11**. This can be used to power the LM or LCU target module. Other modules need to be powered externally by other means. A harness such as the one pictured below is used when powering the target directly from the debug board.



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3.5 Xilinx Programming Pod Connection

The Xilinx parallel cable receives its +5V DC power from the mouse or keyboard 6-pin mini-DIN connector on the host PC via a splitter cable.



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3.6 Null Modem Cable Connection

One end of the null modem cable connects at the “HOST DSP” connector on the debug board and the other end connects to COM PORT 1 of the host PC.



3.7 Ribbon Harness Connection

The ribbon harness connects the target to debug board. The harness is connected pin 1 to pin 1.

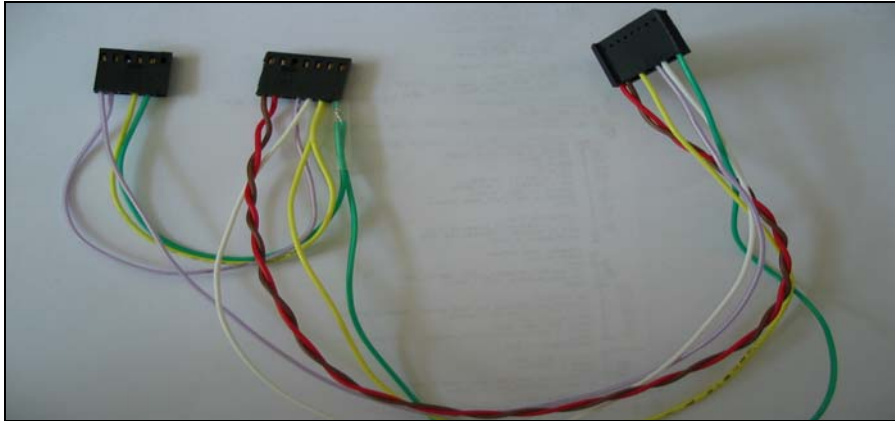


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3.8 JTAG Harness

The JTAG harness is not a stock item and needs to be assembled. A copy of the assembly diagram (debug_board_jtag_harness.pdf) can be found in the VSS archive under 7125_Firmware_Loader at:

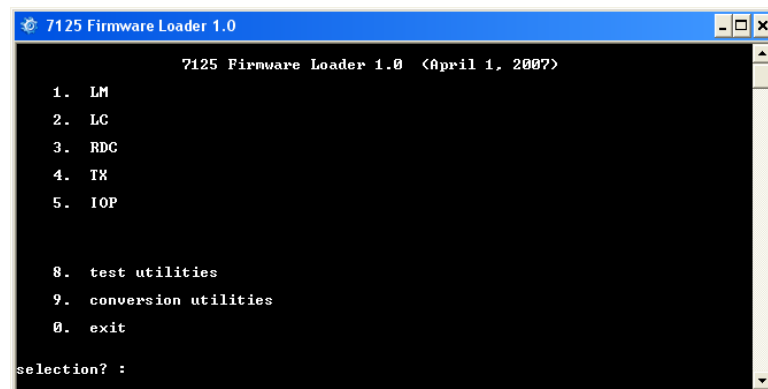
<\\Multibeam\VSSDatabase\SoftwareEng\7K>



4.0 Using the Loader

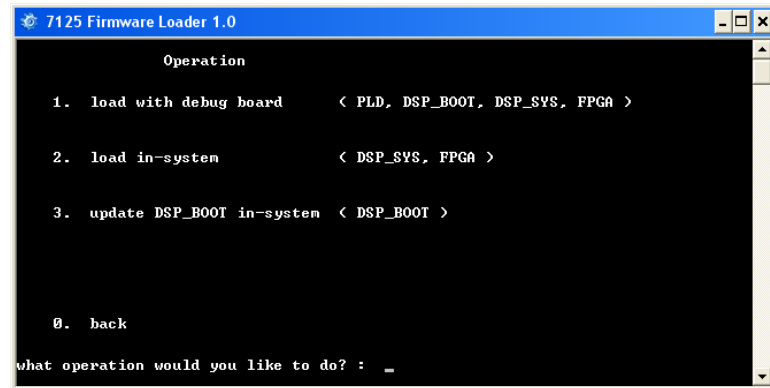
4.1 Main Menu

From the main menu a target module type can be selected for subsequent programming operations or one of the utility menus can be selected to get to functions other than regular programming.



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4.2 Programming Operations



4.2.1 Loading with the Debug Board

Loading with the debug board completely erases the flash and the cPLD and loads all firmware components for the selected module.

4.2.2 Loading In-System

Loading in-system only loads the DSP system and FPGA components. These are functionality-rich components and are the ones most likely to be in need of updates in the field from time to time.

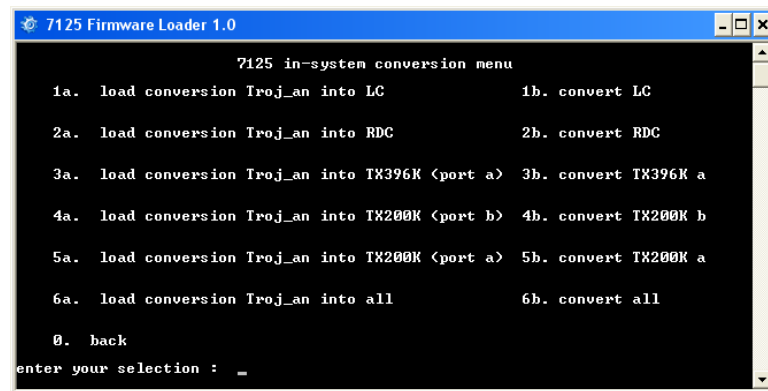
4.2.3 Updating DSP Boot In-System

It is also possible to update the DSP boot component in-system. However, this is not likely to be required very often (if ever) and is kept as a separate operation from the DSP_SYS /FPGA in-system load operation. It is preferable not to do this unnecessarily since there is a very small, but potential, risk of boot sector corruption associated with this operation.

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4.3 Conversion Utility

The conversion utility is used to convert pre-MR4 production modules to the new transfer-safe architecture through in-system connectivity. Once the target module is initialized with transfer safe firmware the utility has no longer any effect upon it. The conversion is a two-step process, with each step followed by a power cycling of the target module.



4.3.1 Step 1: Loading the Conversion Trojan

The first step involves loading a special firmware load referred to as a “conversion Trojan.” The conversion Trojan is compatible with the pre_MR4 boot code, but has a modified update flash function that will deposit subsequent firmware updates into regions of flash compatible with the transfer-safe architecture. The conversion Trojan also is modified in that it allows reprogramming of the boot sector.

4.3.2 Step 2: Converting the Module

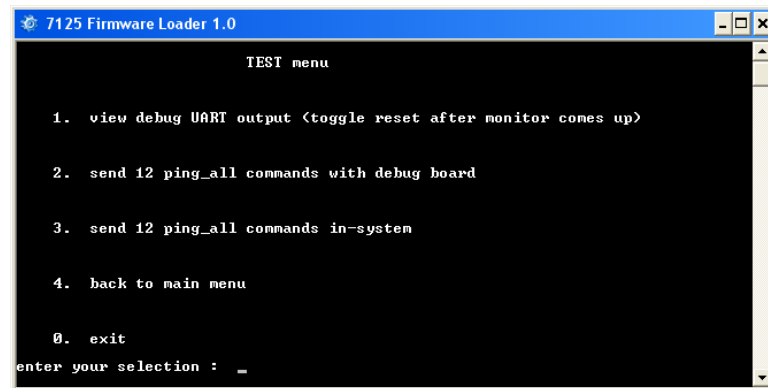
Once the conversion Trojan is loaded and running following target power cycling, the convert operation is selected to complete the conversion. The convert operation first loads new DSP_SYS and FPGA components to the module followed by the DSP boot component. A subsequent power cycling of the target will transfer operation to an all Transfer-Safe load.

4.3.3 Converting all Wet-End Modules Simultaneously

Converting a complete dual-frequency wet end simultaneously can be done by selecting “load conversion Trojan into all”, power cycling, selecting “convert all”, and when prompted to, power cycling again.

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4.4 Test Utilities



4.4.1 Viewing Debug UART Output

This function opens a terminal window to the com 1 host port, which in turn is connected to the debug UART of the target module's DSP through the null modem cable. Selecting this option and then pressing the reset button on the debug board will cause the DSP to reboot and print out greeting information that identifies revision number of the firmware components.

4.4.2 Sending Ping Commands with the Debug Board

This function sends 12 ping-all commands to the debug UART port of the target DSP. If the later is running, the red LED should toggle for each ping command message received.

4.4.3 Sending Ping Commands In-System

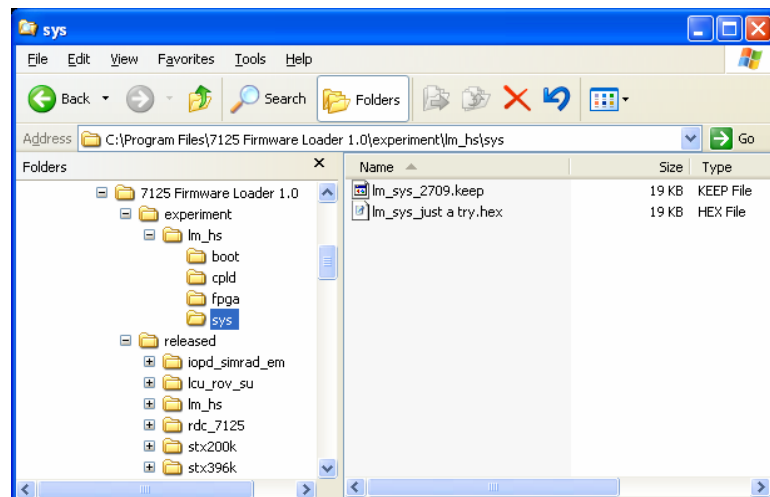
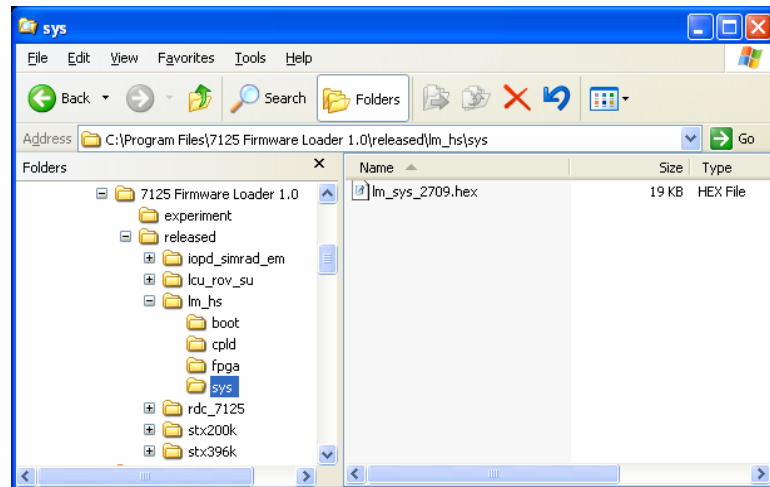
This function sends 12 ping-all commands in-system. All connected downstream modules should toggle their red LED as a result. This is a good way of inquiring into the health of downlink connectivity and of DSP running state in general.

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4.5 Adding and Loading an Experimental Firmware Bundle

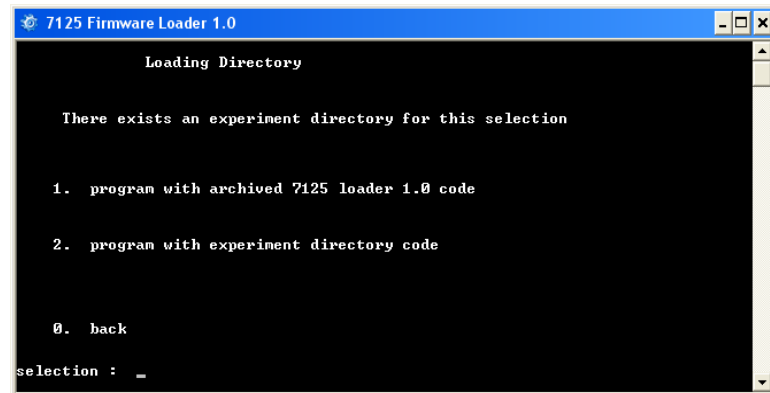
The loader is installed by default under c:\Program Files and contains all the firmware bundles for the various modules under the “released” directory. It is possible to set up an experiment bundle for one or more of the target module type by copying a pertinent bundle from the released directory to the experiment directory and substituting one of the components there.

The example below shows the LM bundle being copied over and modified such. The loader picks the file based on its extension. In this case, the active extension is .hex and renaming the original file to .keep will render it inactive.



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A special menu screen will thereafter appear when selecting the given module type – in this example an LM – to allow programming with the experimental bundle or with the baseline bundle found in the released directory.



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