

TERMINAL - Operational Overview

Modified by on 6-Nov-2013

Once the design is processed and downloaded into the physical FPGA device, the instrument can be used. Displays and controls for the instrument can be found on the device's associated instrument panel. This panel enables you to effectively use the instrument in your design.

The following sections detail initialization of the instrument, how the associated instrument panel is accessed, and subsequent use of the panel to send and receive text to/from the processor.

Initialization

After an external reset, you will need to initialize the Terminal module. This is a very simple procedure that involves:

- Writing to the Interrupt Control register and setting the txempty (INTCTRL.1) and rxnempty (INTCTRL.5) bits, thereby enabling interrupts.
- Writing 22h to the address for the Interrupt Status register, to ensure that the interrupt-generating txempty and rxnempty flags in the Status register (STATUS.1 and STATUS.5 respectively) are cleared. The txshempty flag (STATUS.3) which is initially set to '1' on reset will also be cleared by this write.

Accessing the TERMINAL Device's Instrument Panel

The host computer is connected to the target Terminal module using the IEEE 1149.1 (JTAG) standard interface. This is the physical interface, providing connection to physical pins of the FPGA device in which the instrument has been embedded.

The Nexus 5001 standard is used as the protocol for communications between the host and all devices that are debug-enabled with respect to this protocol. This includes the Terminal module, as well as other Nexus-compliant devices such as debug-enabled processors, frequency generators, logic analyzers, counters and digital I/O modules.

All such devices are connected in a chain - the Soft Devices chain - which is determined when the design has been implemented within the target FPGA device and presents within the **Devices** view (Figure 1). It is not a physical chain, in the sense that you can see no external wiring - the connections required between the Nexus-enabled devices are made internal to the FPGA itself.

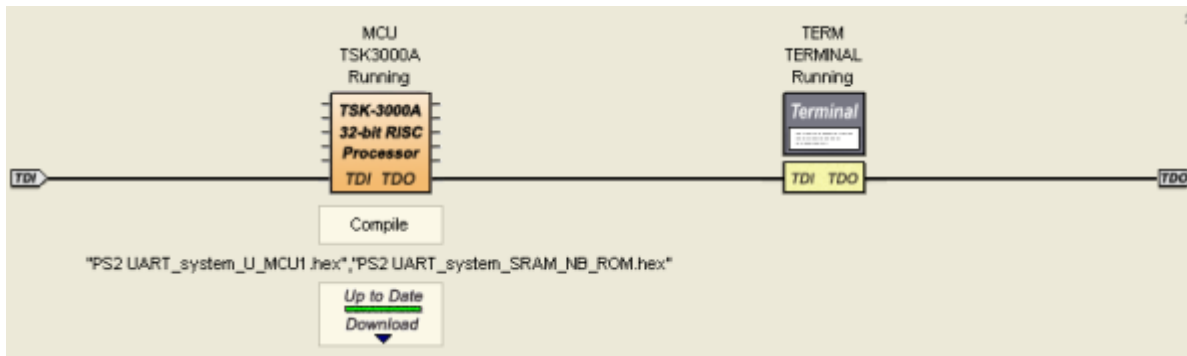


Figure 1. Nexus-enabled devices appearing in the Soft Devices chain.

The controls for a Terminal module used in a design can be accessed from the **Devices** view. Simply double-click on the icon representing the TERMINAL instrument whose controls you wish to access, in the Soft Devices region of the view. The **Instrument Rack - Soft Devices** panel will appear, with the chosen instrument added to the rack (Figure 2).

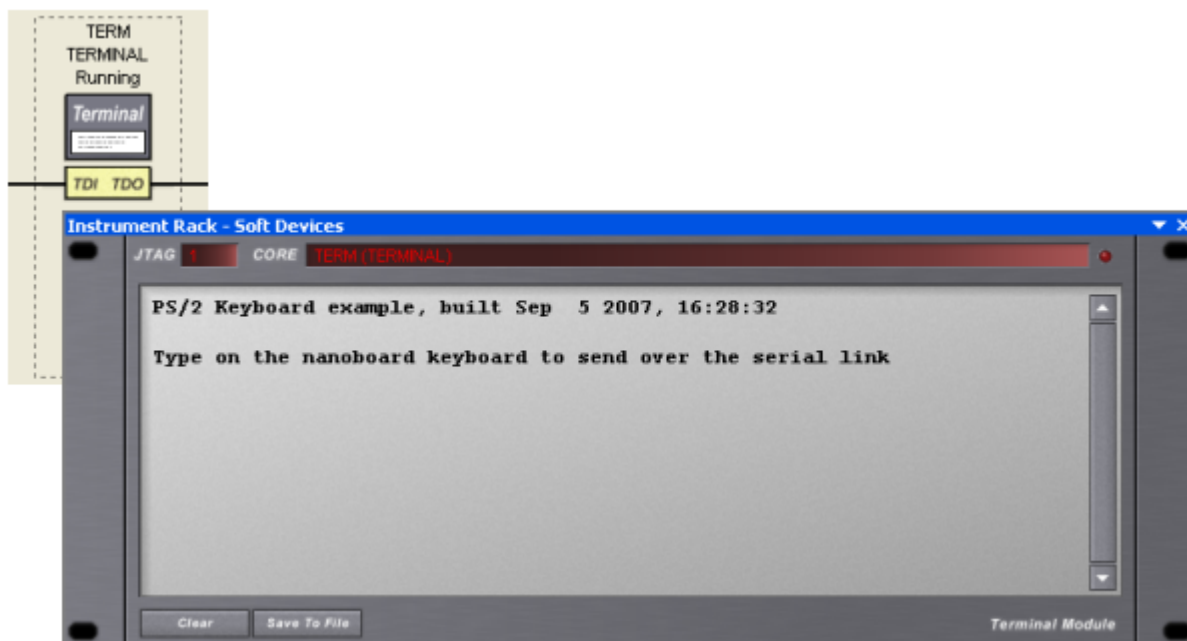


Figure 2. Accessing the Terminal module's instrument panel.

Each TERMINAL instrument that you have included in the design will appear, when double-clicked, as an instrument in the rack (along with any other Nexus-enabled devices).

Sending and Receiving Text

After an external reset, the instrument is effectively ready for use straight away. See the previous section on [Initialization](#) for setting up the instrument's interrupt generation capabilities.

If data is available in the Transmit Buffer (sent from the processor), the instrument will start sending it, via the Soft JTAG Chain, for display in the instrument panel. Figure 3 illustrates an example of displayed text. The text itself was typed on a remote PS/2 keyboard attached to a NanoBoard. The processor, having obtained the textual data using an intermediate PS2_W Controller, has then sent out this text to the connected Terminal module.

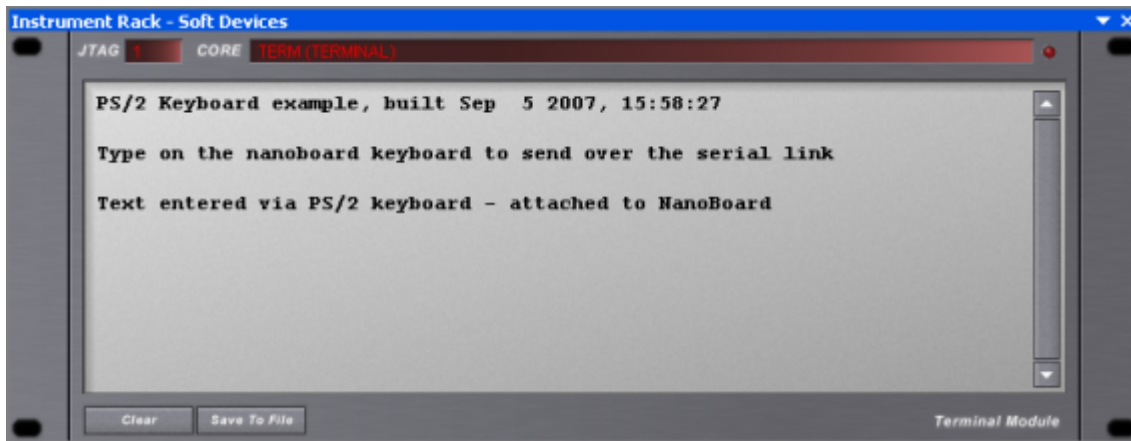


Figure 3. Example text sent from the processor and displayed in the Terminal module's instrument panel.

If text is typed directly into the instrument panel, the Receiver will automatically start receiving it, via the Soft JTAG Chain, to be subsequently read by the processor. Figure 4 illustrates an example of locally-typed text, destined to be read and processed by the embedded software code running on the target processor.

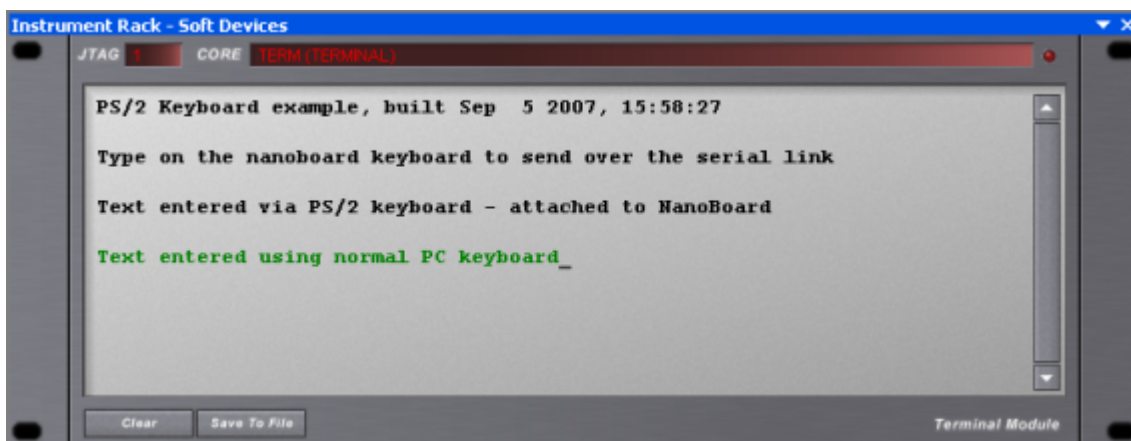


Figure 4. Example text entered directly into the Terminal module's instrument panel.

Text can be sent and received concurrently (i.e. the Terminal module is Full Duplex by nature).

Unlike the WB_UART8 component, the Baud Rate is not user definable for the Terminal module. Instead, the instrument operates at maximum possible speed, dependent on the transmission medium used for the JTAG link between the NanoBoard and the PC. This operational speed can vary considerably. For example, the maximum Baud Rate using a USB connection can be in the range 2000 - 2200 Baud. For a parallel port connection, this can be as high as 7000 Baud.

Additional Panel Functions

The instrument panel for the TERMINAL device provides several additional functions related to the text currently displayed. These features are summarized in the following sections.

Copying Text

The panel allows you to copy text to the clipboard. To do so, simply drag to highlight the text you wish to copy. A menu will appear, giving you the option to copy to the clipboard (Figure 5).

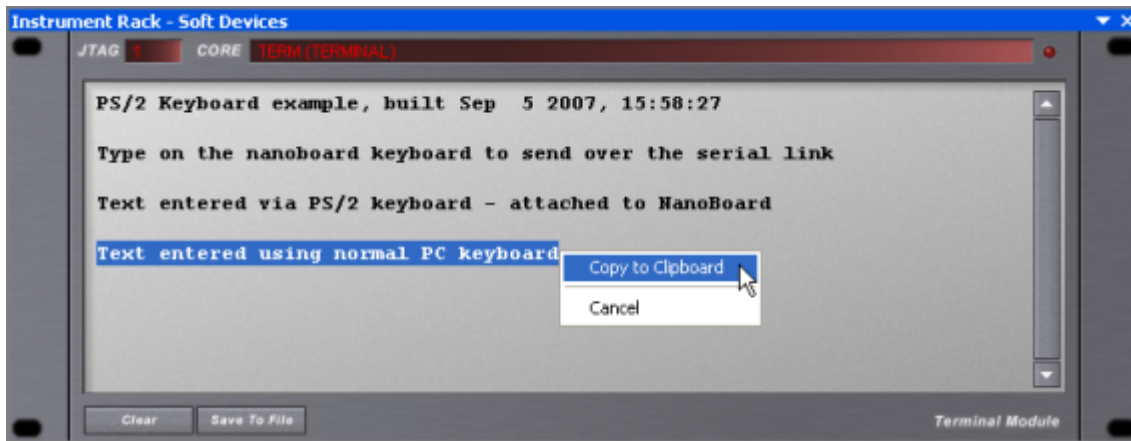


Figure 5. Copying highlighted text to the clipboard.

Saving Text

Should you wish to save the currently displayed text, you can do so. The panel enables you to save its content in a log file. Simply click on the **Save To File** button at the bottom left of the panel. The *Choose File To Save Terminal Log* dialog will appear, from where you can nominate where, and under what name, the resulting log file (*.log) is saved. Figure 6 illustrates an example generated log file.

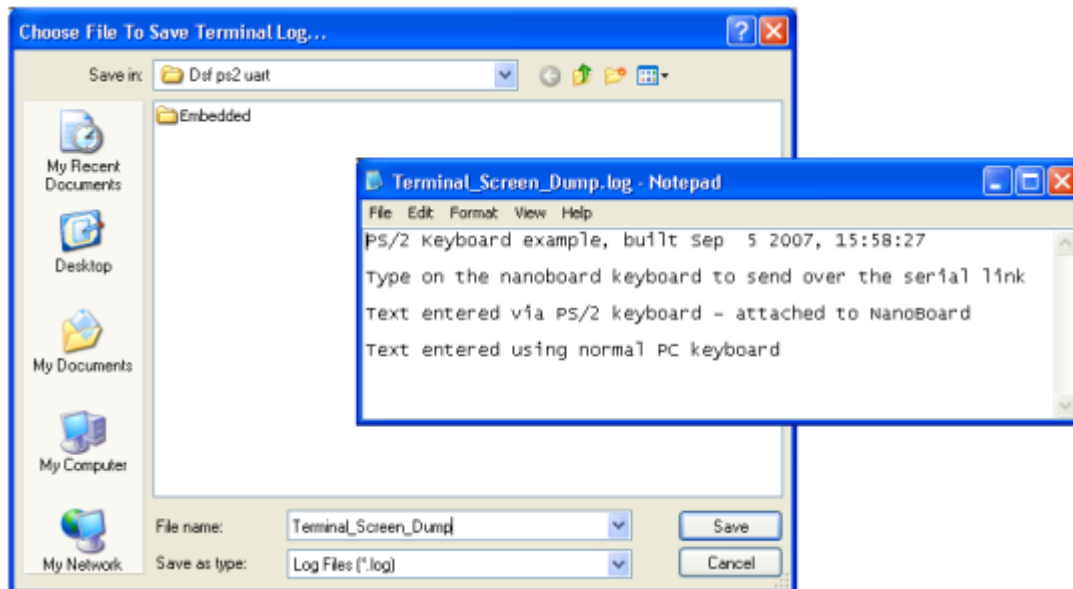


Figure 6. Saving all text to a designated log file.

Clearing Text

To clear all current text from the panel, simply click on the **Clear** button at the bottom left of the panel. All text will be cleared and the text cursor will be repositioned at the top left corner of the text window.