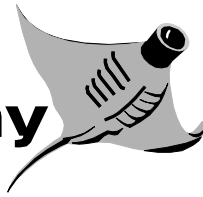


VideoRay Tech Note



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ID	VRTN-1
Title	RS-232 Hardware Installation on Pro II CPU Board
Date	6-Apr-04
Author	Tom Glebas
Keywords	PC Control, RS-232, Hardware, Upgrade
Type	Hardware
Sub-type	Upgrade
Model(s)	Pro II
Serial number(s)	Various (see Assessment to determine applicability)
Warranty impact	None
Summary	Some versions of the Pro II were delivered without RS-232 hardware. This tech note describes how to verify if the hardware is installed or not, and if not, how to install these hardware components.
Assessment	Visual inspection inside of the integrated controller box is required to determine applicability of this tech note to a specific unit. The RS-232 circuit typically resides on the Pro II CPU board. On some older models of this board, the interface chip and capacitors are not installed, although the board is configured for these parts. Also, the wiring should be checked to ensure the RS-232 wiring is intact. See the procedures section for details on how to disassemble, inspect and, if necessary, install these components.
Required parts	Pro II CPU board One RS-232 Interface IC Maxim MAX232N (Digi Key # 296-1402-5-ND) Five (5) 0.1 μ F 50V 10% capacitors (Digi Key # P4923-ND)
Required tools	Soldering iron Wire cutter
Required consumables	Solder
Authorized personnel	User
Experience required	Intermediate – experience with electronic circuits
Approximate time required	1 hour
Safety Concerns	WARNING! - Electrical Shock Hazard! Static electric shock damage to components

The VideoRay Pro II CPU circuit board is designed to support an RS-232 interface, however, not all versions of this board were configured with the required electronic components. Figure 1 shows a fully configured RS-232 circuit on a Pro II CPU board. Note the RS-232 Interface IC and capacitors in the lower left corner. Figure 2 shows a similar board without the required electronic components. Note the board in Figure 2 is designed to support the missing components (wire traces and holes), but they are not installed on the board.

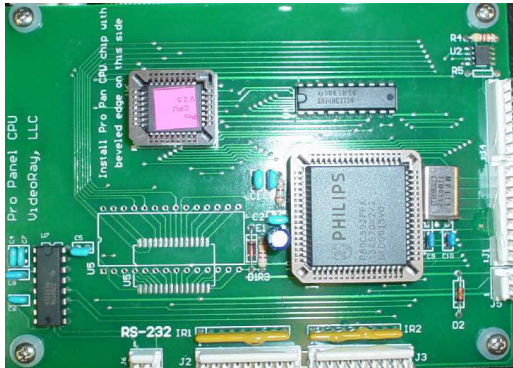


Figure 1 – Pro II CPU with RS-232 Electronic Components

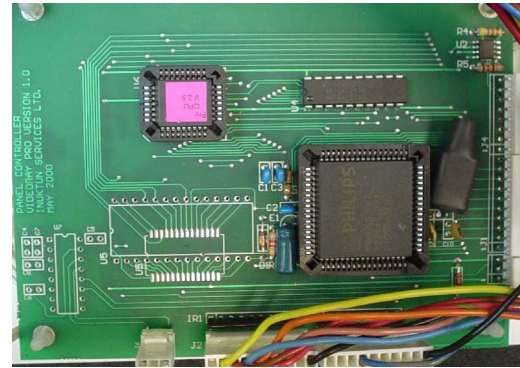


Figure 2 – Pro II CPU without R-232 Electronic Components

Figure 3 shows a close-up of a fully configured RS-232 circuit on a Pro II CPU board, and Figure 4 the RS-232 circuit space without the components.

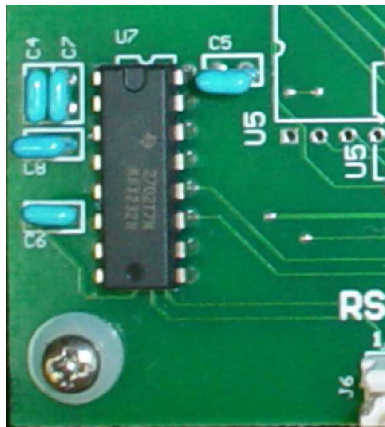


Figure 3 – RS-232 Components in Place

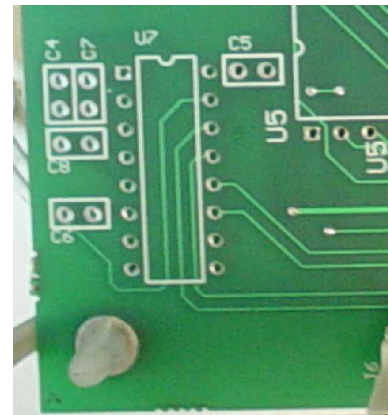


Figure 4 – RS-232 Components Not Installed

In order to inspect the hardware, it will be necessary to open the integrated control box. In order to add electronic components to Pro II CPU boards that do not have them already installed, it will be necessary to remove the Pro II CPU board as well.

WARNING! – Electric Shock Hazard! - The following steps require access inside of the integrated control box and possible risk of electric shock resulting in injury or death. Make sure to turn off the integrated control box power and disconnect the power cord from the electric supply. If you have any doubts about your abilities, consult with a professional or contact VideoRay.

Caution! – Static electricity can cause damage to electronic components. Do not handle any electronic components without first touching a ground to discharge any static build-up. A static free workstation is highly recommended.

Step 1 – Remove the Face Panel from the Integrated Control Box

Remove the screws from the perimeter of the face panel and gently lift it out of its case. Invert the panel and gently place it on a suitable work surface.

Step 2 - Locate the Pro II CPU Board

Figure 5 shows the inverted panel with the Pro II CPU board, which is the green board located in the bottom center of the figure.

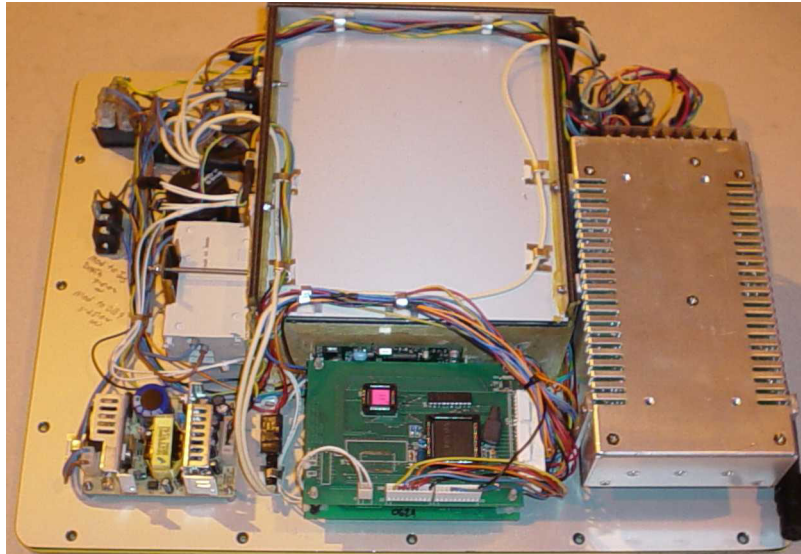


Figure 5 – Inverted Control Panel Showing the Pro II CPU Board

Step 3 – Inspect the RS-232 circuit on the Pro II CPU Board

Inspect the Pro II CPU board to determine if the RS-232 circuit is fully configured or needs to have the electronic components added. Refer to Figures 1 through 4 to assist in identification. If the RS-232 circuit is fully configured, you can replace the panel, because no further action is required (proceed to Step 7 for details).

Step 4 – Remove the Pro II CPU Board

Note the locations and orientations of the wire connections for easier replacement later. Labeling them and drawing a sketch is recommended. Remove the wire connections. Remove the screws that hold the Pro II CPU board to the panel (some boards are held in place by plastic retaining nuts as seen in Figures 2 and 4) and remove the board.

Step 5 – Install the RS-232 Electronic Components

Install the RS-232 interface IC Maxim MAX232N (Digi Key # 296-1402-5-ND) on the Pro II CPU board in the location labeled U7 and aligning the “U” shaped reference mark on the chip with the similar mark on the board. Solder the chip in place from the reverse side. Use the minimum amount of heat possible to avoid damaging the chip. One at a time, install and solder the five capacitors (Digi Key # P4923-ND) in the locations marked C4 through C8 on the board. Again, use the minimum heat possible. Remove any excess wire from the components – cut the wires about 2-4 mm (1/16 to 1/8 inch) from the board surface.

Step 6 – Replace the Pro II CPU Board

Replace the Pro II CPU board on the control panel, fasten it with screws (or nuts) and reconnect the wire connectors.

Step 7 – Replace the Face Panel on the Integrated Control Box

Replace the face panel in the integrated control box case and screw it in place.