## 2. Hardware Connectivity

2.2 Enabling Serial Communication with an External Device

Although the STK500 User Guide describes the pins dedicated for RS-232 serial communication as universal asynchronous receiver and transmitter (UART) pins [1], the ATmega8515L architecture allows for both synchronous and asynchronous receiving and transmitting [4]. Therefore, the pins are more accurately USART (universal synchronous/asynchronous receiver and transmitter) pins. The ATmega8515(L) Datasheet [4] contains a complete list of the USART specifications for the ATmega8515 MCU used in this project.

The RS232 SPARE serial port must be used for the board to receive data from or transmit data to an external device using its USART pins, even if the external target is the same host PC that is used to program the board. The RS232 CTRL port is dedicated only for programming the board, and the RS232 SPARE is dedicated for other serial communication such as sending measurement data to the host. The RXD and TXD pins of the RS232 SPARE header (not port) shown in Figure 2.5 need to be established both in hardware and in software to enable serial communication across the RS232 SPARE port. Data are sent via the TXD pin, and data are received via the RXD pin. The required setup to use the RS232 SPARE port is as follows:

2.2.1   Connect a two-wire cable from the RXD and TXD pins to the PD0 and PD1 pins of PORTD in this respective order as seen in Figure 2.6. **Note**: This is the required setup for using the RS232 SPARE serial port. The STK500 User Manual simply diagrams this and does not explicitly state that pins PD0 and PD1 of PORTD are dedicated for enabling USART communication. This is explicitly stated, however, by the ATmega8515(L) Datasheet [4] in the "Alternate Port Functions" section.

2.2.2   Connect the male-end of a serial cable to the RS232 SPARE serial port shown in Figure 2.2, and connect the other end of the serial cable to the target device.

2.2.3   Connect a 10-15 V AC or DC power supply (Figure 1.3 shows viable power supplies) to the power connector shown in Figure 2.3.
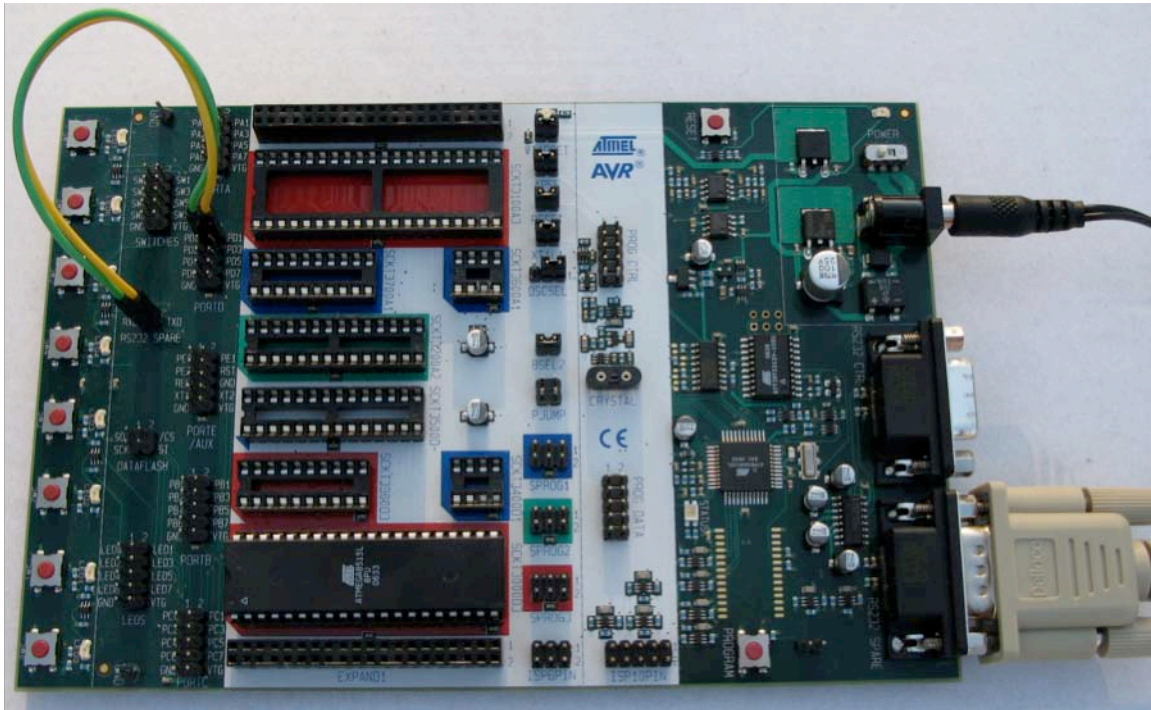
This concludes the hardware connectivity that enables serial communication to an external device. The final setup should look like the setup in Figure 2.7.
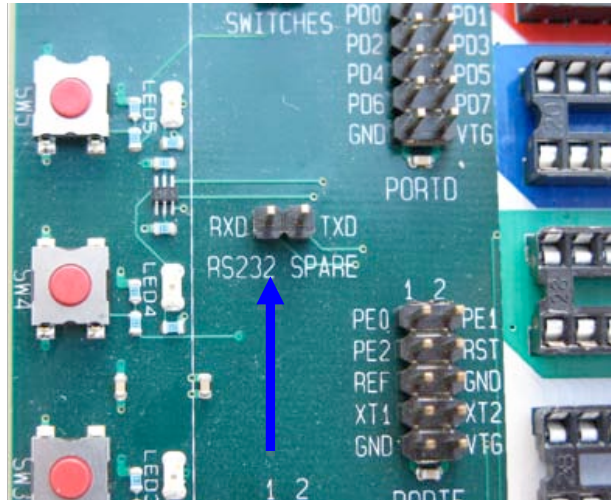
Figure 2.5 RXD and TXD pins of the RS232 SPARE port header.
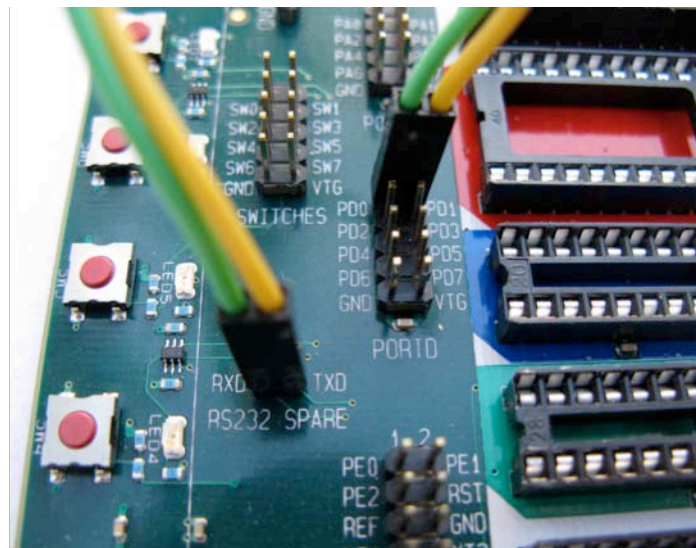
Figure 2.6 RXD to PD0 and TXD to PD1 connection. The green wire connects RXD and PD0 and the yellow wire connects TXD and PD1.

Figure 2.7 Required setup for external RS-232 serial communication.