

Serial Protocols

<https://learn.sparkfun.com/tutorials/serial-communication> - Good Introduction

UART

Details

UART is a serial protocol used for interacting with the system. May return a shell, and or access to the filesystem. Separate from JTAG.

Enumerate Pinout [Multimeter]

TX - Voltage fluctuates at boot¹ from 0 to 3.3/5.5v

RX - Constant low value below VCC and above GND

GND - Voltage is constant 0, has 4 traces in a cross shape²

VCC - Normally not used to if device already powered, should not fluctuate

¹ Fluctuation is caused from the debug messages being sent.

² Testing continuity of GND to other pins, shows other pins that may be grounded

Square outlined pin, normally is "pin 1"

JTAG

Details

Used for on-chip-debugging, generally allows for access to a GNU Debugger (GDB) for the JTAG host. Pinout for hidden console may be found with JTAGenum/JTAGulator. Then access GDB with a Bus Pirate or Shikra USB-to-Serial devices and debug applications using OpenOCD software.

Accessing Serial Consoles

BASH

```
sudo dmesg | grep -iC 5 usb
```

```
sudo screen -L /dev/ttyUSB0 115200
```

Alternatively, use the **Arduino IDE** serial console. Useful when input is off with the screen utility

In the screen command, 115200 is the baud rate of the serial communications

The baud rate can be determined using - <https://github.com/devttys0/baudrate.git>

Hardware Physical Tools

JTAGulator Identifies JTAG & UART pinouts.

JTAGenum¹ Identifies JTAG pinouts

Bus Pirate² FT232RL - USB to Serial, Use SOIC8 Clip to dump firmwares

Shikra³ FT232H(Q) - USB to Serial

RS-232 Generic Adapter⁴ USB to Serial

¹ JTAGenum Setup Tutorial:

<https://p16.praetorian.com/blog/jtagulator-vs-jtagenum-tools-for-identifying-jtag-pins-in-iot-devices>

² Bus Pirate Pinout Information

http://dangerousprototypes.com/docs/Common_Bus_Pirate_cable_pinouts

³ Shikra Pinout [UART] D0 - TX, D1 - RX

See also, Adafruit FT232H Breakout -

<https://cdn-learn.adafruit.com/downloads/pdf/adafruit-ft232h-breakout.pdf>

⁴ Male DB9: GND - Pin 5, TX - Pin 3, RX - Pin 2



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