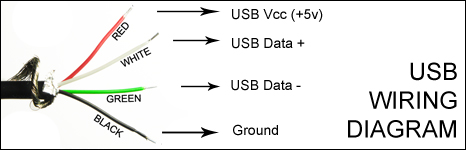
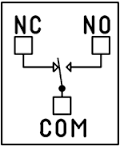
# Understanding the USB wiring

**A typical USB head 4 wires : Black, Red, Green and White. The below diagram shows their roles :**

****

# Understanding the Relay Board

The relay boards being used at intel are basic  [**USB-RLY08-B**](http://www.robot-electronics.co.uk/htm/usb_rly08btech.htm) **boards, which has in total, 8 relays on a single board. The relays are of SPDT (Single Pole Double Throw) type, which means that the COM wire will be connected to either NC or NO, depending whether it is OFF or ON, respectively.**

**You can see 3 pins for each relay, which are marked as follows :**

1. **C : C stands for Common. This is the common cable that needs to be shared.**
2. **NC : NC stands for Normally Connected. It means that the connection will be closed when the relay is powered off.**
3. **NO : NO stands for Normally Open. It means that the connection will be open when the relay is powered off.**

**It means that when the relay is :**

* **Powered OFF : C and NC will be connected**
* **Powered ON : C and NO will be connected**

# **Controlling the relays**

**Below is the table of codes for reference, in order to control the relays :**

|  |  |  |
| --- | --- | --- |
| Command | | Action |
| dec | hex |
| 56 | 38 | Get serial number - returns 8 bytes of ASCII that form the unique serial number for module, I.E "00001543" |
| 90 | 5A | Get software version - returns 2 bytes, the first being the Module ID which is 8, followed by the software version |
| 91 | 5B | Get relay states - sends a single byte back to the controller, bit high meaning the corresponding relay is powered |
| 92 | 5C | Set relay states - the next single byte will set all relays states, All on = 255 (11111111) All off = 0 |
| 100 | 64 | All relays on |
| 101 | 65 | Turn relay 1 on |
| 102 | 66 | Turn relay 2 on |
| 103 | 67 | Turn relay 3 on |
| 104 | 68 | Turn relay 4 on |
| 105 | 69 | Turn relay 5 on |
| 106 | 6A | Turn relay 6 on |
| 107 | 6B | Turn relay 7 on |
| 108 | 6C | Turn relay 8 on |
| 110 | 6E | All relays off |
| 111 | 6F | Turn relay 1 off |
| 112 | 70 | Turn relay 2 off |
| 113 | 71 | Turn relay 3 off |
| 114 | 72 | Turn relay 4 off |
| 115 | 73 | Turn relay 5 off |
| 116 | 74 | Turn relay 6 off |
| 117 | 75 | Turn relay 7 off |
| 118 | 76 | Turn relay 8 off |

**Convert the hex codes into ASCII values and issue command as below:   
echo <code> > /dev/ttyRelayCard**

# **PIN Diagram for 2-host Single-USB Relay Setup**

# **C:\Users\nkumarch\Downloads\relay.png**

The idea is to share the USB between Host Machine and Joule Board without manually unplugging it, instead doing it with Relay.

The process can be divided into 2 phases :

1. **Make the USB Bootable**

In this step, the USB will be connected to HOST machine, which can make the USB as bootable. Once done, unplug the USB from HOST machine using relay.

1. **Plug the USB to Board to flash it.**

Now, plug the USB to Board to be flashed and reboot the board. On reboot, the board should detect the USB as mounted.

[Note : This method automates the normal method of flashing/installing an OS using USB and supports both GRUB and Kernel Flinger methods. You may need to change the Boot Orders, depending on whether you are using GRUB or KernelFlinger]