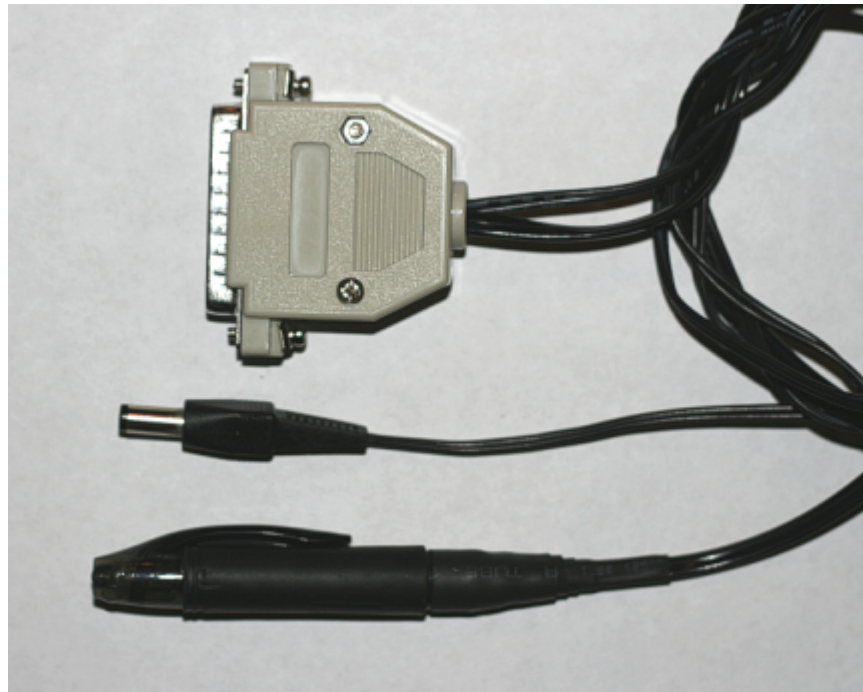


## Mini ITX PC Power and Infra Red (IR) Cannon Assembly Reference

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*Figure 1: Assembled Mini ITX Power Cable and IR Cannon Interfaced to the Cargo Bay 25-Pin D-SUB Connector*

Both the IR Cannon and Mini ITX PC power are interfaced to the Create Robot platform through the cargo bay 25 pin D-SUB connector. Figure 1 shows the final assembled power cable and IR cannon. Figure 2, shows the Create's cargo bay 25 connector pins and their function. A male D-SUB Connector is used to connect to the cargo bay connector:

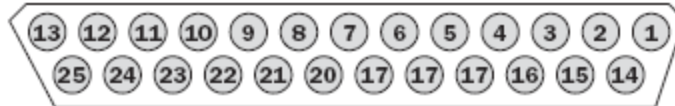
### **Part List:**



- 25-Position Male Solder D-Sub Connector: Radio Shack Part # 276-1547



- 25-Position Non-Shielded D-Sub Connector Hood: Radio Shack Part # 276-1549



Pin	Name	Description
1	RXD	0 - 5V Serial input to Create
2	TXD	0 - 5V Serial output from Create
3	Power control toggle	Turns Create on or off on a low-to-high transition
4	Analog input	0 - 5V analog input to Create
5	Digital input 1	0 - 5V digital input to Create
6	Digital input 3	0 - 5V digital input to Create
7	Digital output 1	0 - 5V, 20 mA digital output from Create
8	Switched 5V	Provides a regulated 5V 100 mA supply and analog reference voltage when Create is switched on
9	Vpwr	Create battery voltage (unregulated), 0.5A
10	Switched Vpwr	Provides battery power @ 1.5 A when Create is powered on.
11	Switched Vpwr	Provides battery power @ 1.5 A when Create is powered on.
12	Switched Vpwr	Provides battery power @ 1.5 A when Create is powered on.
13	Robot charging	When Create is charging, this pin is high (5V)
14	GND	Create battery ground
15	Device Detect/Baud Rate Change Pin	0-5V digital input to Create which can also be used to change the baud rate to 19200 (see below)
16	GND	Create battery ground
17	Digital input 0	0 - 5V digital input to Create
18	Digital input 2	0 - 5V digital input to Create
19	Digital output 0	0 - 5V, 20 mA digital output from Create
20	Digital output 2	0 - 5V, 20 mA digital output from Create
21	GND	Create battery ground
22	Low side driver 0	0.5A low side driver from Create
23	Low side driver 1	0.5A low side driver from Create
24	Low side driver 2	1.5A low side driver from Create
25	GND	Create battery ground

Figure 1, 25 pin D-SUB connector pins. (Create Open Interface Specification p4)

## **Mini ITX PC Power Cord Assembly**

### **Parts List:**



- Male DC Jack 2.5mm x 5.5mm x 10mm: Radio Shack Part Number: Catalog #: 274-1573
- Hookup Wire: 2 Conductor 18 or 20 gauge stranded wire 12"

### **Assembly:**

The center terminal on the power connector is wired to positive battery voltage, both pins 10 and 11 on the 25 Pin Male D-SUB Connector are used. The outer terminal of the power connector is connected to battery negative or ground, pin 25 of the Male D-SUB connector. Approximately 16" of power cable is needed.

### **Rationale:**

The Mini ITX PC requires an input voltage between 12 and 24v and draws consumes between 18W and 24W. The Create can use either the AA battery pack which operates at 18v or the APS rechargeable battery which at 16v. Assuming the APS battery is used with a PC power use of 24W a current of 1.5A needs to be provided. Pins 10, 11 and 12 of the cargo bay 25 pin D-SUB connector each provide a switched battery voltage with a maximum current draw of 1.5A. Since the current draw of the mini ITX PC is approaching the maximum current draw for one output pin two are used to ensure that the current does not exceed the specified 1.5A on a single output pin.

## IR Cannon Assembly

### Parts List:



- L1 = High-Output Infrared LED: Radio Shack Part# 276-143 (Size=5mm, Vf = 1.2v, If = 100mA).



- LED Holder (5mm): Radio Shack Part# 276-080
- Resistors: (0.25 W)
  - R1 = 100  $\Omega$
  - R2 = 39  $\Omega$
- Hookup wire 2 Conductor 24 Gauge
- Housing for IR Cannon (We used a Skilcraft ballpoint pen case)

### Assembly:

The resistors for the IR cannon circuit are housed within the 25 Pin D-Sub Casing. Thus: Connect R1 between pins 8 and 23 of the Male D-Sub Connector. Connect R2 to pin 23 of the D-Sub Connector. Insert L1 into the LED holder. Thread the hookup wire to connect the LED to the D-Sub Connector through the LED Cannon housing. Connect the cathode (Usually denoted as the lead next to a portion of the LED lens that is flat) of L1 to the other side of R2 via approximately 36" of hookup wire. Connect the other lead of the L1 to pin 8 of the D-Sub Connector via 36" of hookup wire.

### Rationale:

The Create send IR command (Create Open Interface Specification, p11), is used to send an encoded signal (byte) through low side driver #1, pin 23 of the cargo bay serial connector. If an infra-red LED is connected via the circuit shown in figure 2, the data byte can be received by the Create's omni directional IR receiver. The Create Open

Interface Specification calls for resistor R1 (100 Ω) to be placed in parallel with the IR circuit to serve as a preload. The value of R2 depends upon the forward voltage (Vf) and the forward current (If) of the chosen IR LED, and is calculated from the following equation:

$$R2 = \frac{V+ - Vf}{If}$$

In our case we are connecting the LED (where Vf=1.2 v and If=100mA) to a 5v power supply (V+). Thus substituting these values in equation 1:

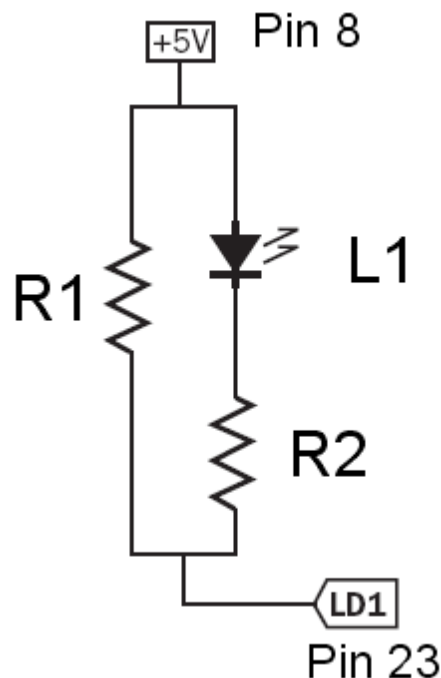


Figure 2: Circuit diagram for the connection of an Infra Red Light Emitting Diode (LED) to the Create Low Side Drive #1.

$$R2 = \frac{5.0v - 1.2v}{0.1A}$$

$$R2 = 38 \Omega.$$

Although other IR LEDs can be used care should be taken to not exceed a current draw of 100mA. To provide the 5v power called for in Create circuit diagram, Pin 8 of the D-Sub interface is used. This pin provides a switched (On when the create is on, otherwise off) regulated 5v power supply and is rated to provide up to 100mA of current.

#### **References:**

iRobot Create Open Interface Specification. <http://www.irobot.com/sp.cfm?pageid=294>