TEAM 358 - 2008 FIRST ELECTRICAL RULES SUMMARY

Wire Gauges <R47> <R70> <R71>

- ***12 AWG or larger*** diameter wire must be used for all circuits protected by a 40A circuit breaker.
- ***14 AWG or larger*** diameter wire must be used for all circuits protected by a 30A circuit breaker.
- ***18 AWG or larger*** diameter wire must be used for all circuits protected by a 20A circuit breaker.
- ***24 AWG*** *or larger* diameter wire must be used for providing power to pneumatic valves.

24 AWG *or larger* diameter wire must be used for:

- connecting sensors, switches, potentiometers, accelerometers, and other detection devices
- connecting a vision system to Robot Controller inputs,
- extending the PWM cables,
- connecting small muffin fans,
- wiring LEDs

Ribbon cable smaller than 24 AWG may be used to connect signal lines to the 9-pin ports on the Robot Controller.

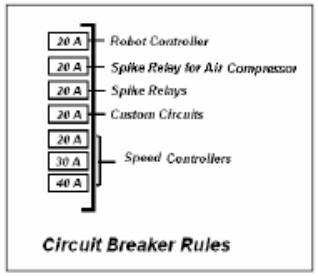
Wire Color Codes <R54>

All wires distributing power with a constant polarity (i.e., except for relay module, speed controller, or sensor outputs) shall be color-coded as follows:

- Use red, white, or brown wire for +12 Vdc and +5 Vdc connections.
- Use black or blue wire for common (-) connections.

Circuit Breaker Applications <R55>

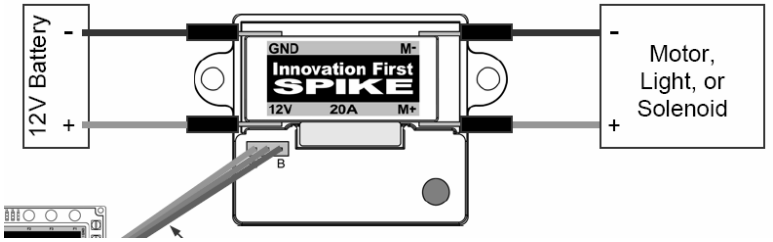
- The Robot Controller power feed must be protected with a 20A circuit breaker. No other electrical load can be connected to this breaker.
- If the compressor is used, the air compressor Spike relay power feed must be protected with a 20A fuse or 20A circuit breaker. No other electrical load can be connected to this breaker.
- Power feeds to custom circuits and additional electronics must be protected with a 20A circuit breaker.



Circuit Breaker Rules

- Speed controllers must be protected by 20A, 30A, or 40A circuit breakers.
- Relay modules must be protected with a 20A circuit breaker.

Spike (Blue) <IFI Manual>



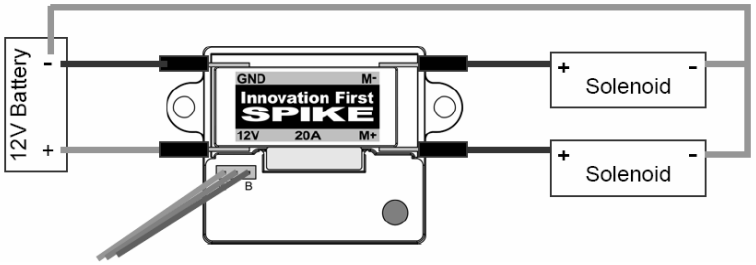


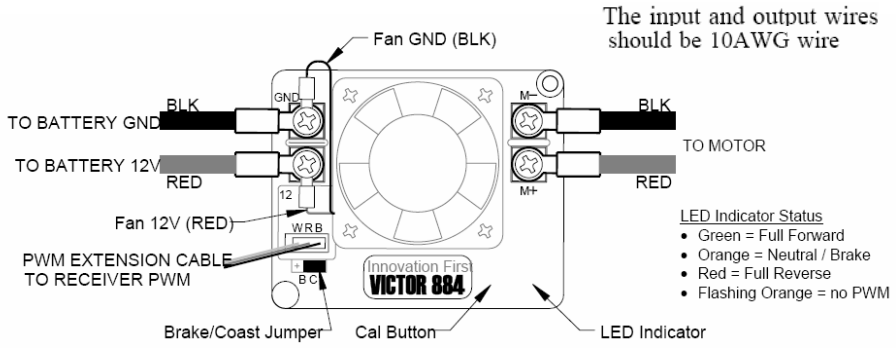
Table 1: Spike Blue P-BASIC software control, Spike output, Motor function

INPUTS		OUTPUTS			
Fwd(Wht)	Rev(Red)	M+	M-	Indicator	Motor Function
0	0	GND	GND	Orange	OFF / Brake Condition (default)
1	0	+12v	GND	Green	Motor rotates in one direction
0	1	GND	+12v	Red	Motor rotates in opposite direction
1	1	+12v	+12v	Off	OFF / Brake Condition

Notes:

1. 'Brake' refers to the dynamic stopping of the motor due to the shorting of the motor inputs. This condition is not optional when going to an off state.
2. The INPUT Fwd and Rev are defined as follows: 0 (Off) and 1 (On).

884 Victor <IFI Manual>



884 Victor (continued) <IFI Manual>

User Calibration:

1. Power ON the speed controller.
2. Press and hold the Cal button. After a moment, the LED indicator on the Victor will begin alternating between RED and GREEN to indicate a cal mode.
3. While continuing to hold the Cal button, move the joystick to the maximum and minimum positions. This can be done in any order and as many times as desired.
4. While continuing to hold the Cal button, return the joystick to center (neutral position).
5. Release the Cal button.
6. A flashing GREEN indicator confirms a successful calibration.
7. A flashing RED indicator denotes an unsuccessful calibration.

An unsuccessful calibration occurs when either:

a) Insufficient joystick travel was detected in forward and/or reverse.

b) The trim tab is too far from center.

Resetting Calibration to Factory Pre-calibration:

1. Power OFF the speed controller.
2. Press and hold the Cal button.
3. While continuing to hold the Cal button, Power ON the speed controller.
4. A flashing GREEN indicator denotes calibration is reset. Release the Cal button.

AWG Stranded Wire Table <G.6.1>

Size AWG	Size Diameter inch	Resistance ohm/1000'	6 feet Resistance (Ohms)	Voltage Drop (Volts)	Maximum Current Capacity
20	0.0369	10.360	0.0622	6.22	5 A
18	0.0465	6.520	0.0391	3.91	7 A
16	0.0587	4.080	0.0245	2.45	12 A
14	0.0740	2.580	0.0155	1.55	20 A
12	0.0933	1.620	0.0097	0.97	30 A
10	0.1177	1.020	0.0061	0.61	50 A
8	0.1484	0.640	0.0038	0.38	80 A
6	0.1871	0.402	0.0024	0.24	125 A
4	0.2360	0.253	0.0015	0.15	200 A

Calculation shown for 6 feet of wire @ 100 Amps @ 12Vdc
Max Current rating based on allowable 2.5% voltage drop

TEAM 358 – Robot Controller Pinouts

Analog inputs:

1. Arm Pot
2. Gyro
3. unused
4. unused
5. unused
6. unused
7. unused
8. unused
9. unused
10. unused
11. unused
12. unused
13. unused
14. unused
15. unused
16. unused

Digital Input/Output:

Interrupts:

1. Left Encoder "A" channel
2. Right Encoder "A" channel
3. unused
4. unused
5. unused
6. unused
7. Arm lower limit
8. Arm upper limit
9. Left Encoder "B" channel
10. Right Encoder "B" channel
11. Field position Left
12. Field position Center
13. Field position Right
14. Pressure sensor
15. Auto mode select switch
16. Auto mode select switch
17. Auto mode select switch
18. Auto mode select switch

Relay Outputs:

1. unused
2. unused
3. unused
4. Push-down pads (optional)
5. Puncher
6. Gear Shift
7. Grabber
8. Compressor

PWMs:

1. Left CIM motor 1
2. Left CIM motor 2
3. Right CIM motor 1
4. Right CIM motor 2
5. Arm motor
6. Lap Counter
7. unused
8. unused
9. unused
10. unused
11. unused
12. unused
13. Do Not Use
14. Do Not Use
15. Do Not Use
16. Do Not Use

TTL:

Unused

Operator Interface controls:

Port 1: 2-joystick drive
- a. Top button: Low gear
- b. Trigger: Push-down pads

Port 2: 2-joystick drive
- a. Top button: High gear
- b. Trigger: Push-down pads

Port 3: arm joystick
- a. y-axis up/down
- b. Trigger: Grabber
- c. Thumb: Puncher

Port 4
- a. unused

Robot user switches:

1. Left/Center/Right start position
2. Auto mode (0-9)
3. RC reset button
4. Prog button
5. Safety button for RC/Prog