Date: February 1, 2002

PRESSURE SWITCH

A number of teams have asked about using the pressure switches in the kit to control the operation of the pump, so that it will automatically turn off when it reaches maximum pressure and turn back on when needed. To do this, one or both pressure switches in the kit must be wired to the digital inputs in the Robot Controller, and the switches connected to the pneumatic system so that they can measure the pressure. A common place to measure the air pressure is in parallel with the output of the pump, before it is regulated down to 60 psi.

In the simplest setup, a single pressure switch is used, and the pump is turned off when the switch reaches the set point of the switch. This will work, but can lead to unnecessary cycling of the pump for just a small drop in stored pressure. A "better" configuration is to use the 2nd pressure switch, calibrated to a lower pressure set point, to allow a greater range of pressure drop before turning the pump back on. The difference between the upper and lower set points of the system is known as the "hysteresis" of the system.

In order to make the pump turn on and off automatically based on the inputs from the pressure switches, the control program running in the Robot Controller must be customized. To obtain a copy of the default program, please visit the Innovation First web site at www.innovationfirst.com. For the example code provided below, the following assumptions are made:

- The pump is powered by a Spike relay module controlled by Relay Output 7.
- The pressure switch with the <u>higher</u> set point is connected to Switch Input #15 on the Robot Controller's Digital Input port (ex.- pins 20 and 24).
- The pressure switch with the <u>lower</u> set point is connected to Switch Input #16 on the Robot Controller's Digital Input port (ex.- pins 25 and 23).
- You are starting with a copy of the default program.

To customize the control program, add the following two lines near the top of the code, under the heading "Define Aliases":

```
alias pressure_sw_hi        VAR rc_sw15
alias pressure_sw_lo        VAR rc_sw16
```

Next, find and comment out (add a ' mark at the beginning of the line) the two lines beginning with "relay7_" as follows:

```
'relay7_fwd = p4_sw_aux1                 'Port 4 Aux1 = Relay 7 Forward
'relay7_rev = p4_sw_aux2                 'Port 4 Aux2 = Relay 7 Reverse
```

For a simple system with a single switch, add the following two lines just below the lines you just commented out:

```
relay7_fwd = pressure_sw_hi
relay7_rev = 0
```

For an advanced system with two switches, add the following two lines just below the lines your just commented out:

```
relay7_fwd = pressure_sw_hi * (pressure_sw_lo + relay7_fwd) MAX 1
relay7_rev = 0
```

When you are done modifying the code, be sure to save it under a new filename. For instructions on downloading your custom control program to the Robot Controller, please visit the Innovation First web site at www.innovationfirst.com/firstrobotics. For information about the pressure switches, including how to adjust the pressure set points, please refer to the pneumatics manual supplied in the kit and also available on the FIRST web site.

CHAMPIONSHIP EVENT REGISTRATION ANNOUNCEMENT

There is an important announcement about registration for The Championship Event on the FIRST web site at: http://www.usfirst.org/robotics/ch_registration.htm

ADDITIONAL HARDWARE LIST

The following has been added to the additional hardware list:

Hinges	Any amount, Any size

INNOVATION FIRST

Innovation First, Inc. now has rolls of retro-reflective tape available for sale on their web site. Please refer to www.innovationfirst.com/firstrobotics. Cost is $90.00 per roll.