

Some Useful Parallel I/O Details

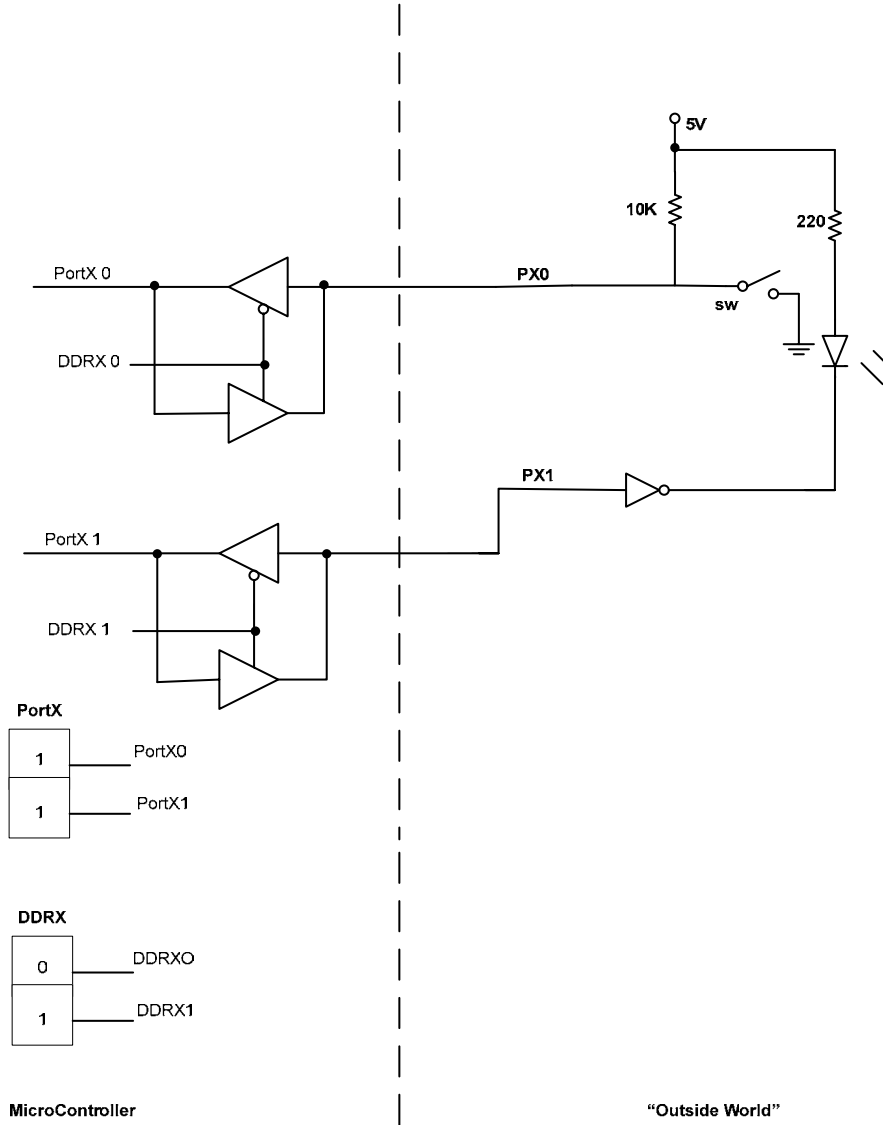
W. Barnes, 2006 fall

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Parallel Ports

- Used for Input and Output
 - Controlled through software with Data Direction Registers
 - Hardware consists of tri-state buffers
- Next slide shows a hypothetical 2-bit port
 - One bit configured for input and connected to a switch
 - One bit configured for output and connected to a LED
 - Notice the left side is the microcontroller and right side is the external hardware
 - Also notice the DDR and Port registers inside the microcontroller

Simple 2-bit Port

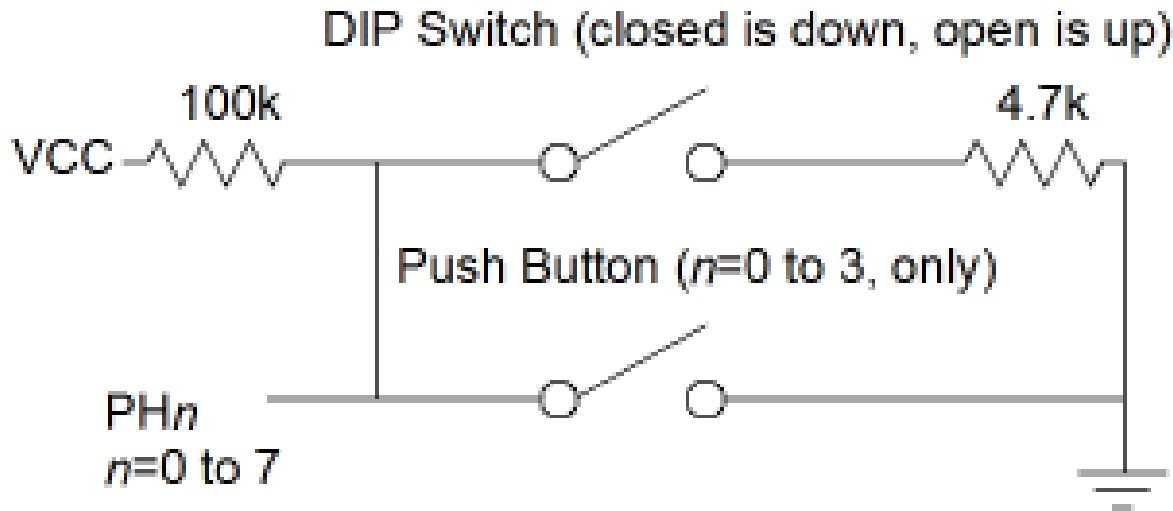


Dragon12 Port Use Information

Port	Port Address	Data Direction Register Address (DDRx)	Connected Hardware
B	\$0001	\$0003	8 LEDs <u>and</u> 7-seg LEDs
H	\$0261	\$0262	8 switches in a DIP <u>and</u> four push buttons
J	\$0268	\$026A	PJ1 = 1 enables 7-segment while PJ0 = 0 enables LEDs
P	\$0258	\$025A	PP0 thru PP3 enable/disable 7-seg LED

Input Switches Section of Dragon12

All these switches are connected Port H. The *four push buttons* are connected to PH0 – PH3 and are active low (note Vcc connected through the 100k) while the *eight dip switches* are connected to PH0 PH7. Shown below are one push button and one dip switch.



Program on Next Slide

- Problem: Develop a program which continuously monitors the dip switches on the Dragon12 and echos the switches on the LEDs
- Algorithm:
 1. Initialize necessary registers for I/O
 2. Read switches at port H
 3. Send number from switches to LEDs at port B
 4. Go back to (2)

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;web_sw_to_led.asm, 11/2006, ref. Dragon12 schematics
;Ignoring bounce issues, echo switch value on LEDs
;PJ1 = 1 enables 7-segment while PJ0 = 0 enables LEDs
;PH0 thru PH7 connected to DIP switches
;      but also PH0 thru PH3 are pushbuttons (in parallel)
portb      equ      $0001      ;LEDs and 7-seg LED port (Refer back to Port Use Slide)
portj      equ      $0268      ;7-segment and LEDs Enable/Disable
porth      equ      $0261      ;push button and rocker/DIP switches
portp      equ      $0258      ;connected to cathodes of 7-segments (DIG0 - DIG3)
ddrb       equ      $0003
ddrh       equ      $0262
ddrj       equ      $026A
ddrp       equ      $025A
output     equ      $FF
input      equ      $00
          org      $2000
          movb     #output, ddrj
          movb     #output, ddrb
          movb     #output, ddrp
          movb     #input, ddrh
          movb     #00, portj      ;enables LEDs
          movb     #$FF, portp    ;turns off 7-seg LED display using DIG0-DIG33
poll       ldaa     porth
          staa     portb
          bra      poll      ;never ends
end

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