

# Using 74xx574 D FF to expand PIC outputs

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*Source:* <http://sci.tech--archive.net/Archive/sci.electronics/2007--07/msg00003.html>

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  - *Date:* Mon, 16 Jul 2007 11:02:54 -0400
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Greetings. I'm having a problem that reaches beyond my basic knowledge of digital logic and electronics, and so I'm hoping an expert eye can spot the mistake.

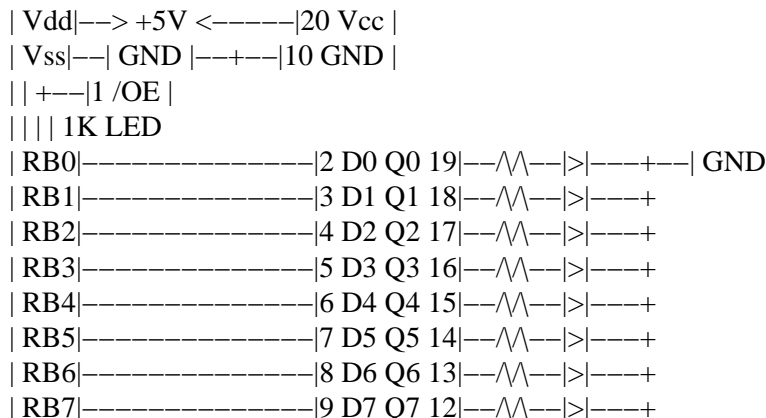
I'm working on a seemingly straightforward means of expanding the limited outputs of a PIC 16F88 to 32 pins by way of four 74ABT574 octal D-type flip-flops and a 2-to-4 decoder. The way the trivial design is supposed to work is that each RBn pin of the PIC is attached to a corresponding Dn pin on each of the four 574s. The program would assign their data round-robin style, assigning one word to PORTB and then clocking the destination DFFs using the demuxer. The outputs in this experiment are LEDs run via 1K resistors (3 or 4mA).

I've had some problems, though, and they're somewhat spurious. Sometimes, the outputs of the first 574 always echo PORTB; other times, one or more of the 574s read correctly except for a split second of flicker, which I'm guessing is a momentary read intended for another output, but I have no idea why.

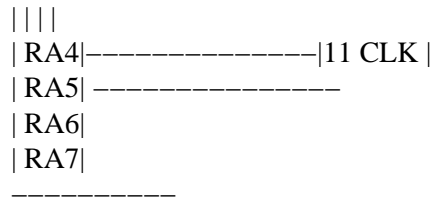
I've simplified the circuit to the minimum that should implement the functionality, done away with the demuxer and three of the four 574s, and the problem remains.

Here is the circuit:

16F88 74ABT574



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The same behavior is exhibited when the LEDs are reversed with cathode on the output and anode on +5V. In theory, I should also be able to switch the CLK of the 574 among RA4–RA7 to output any of the four different output patterns, which would be functionally identical to the full circuit. This does work, insofar as doing this echoes what each of the 574s would have been doing before, but is subject to the same glitches.

I've tried adjusting the delays on the clocks (which shouldn't be necessary; the 74ABT574 specifies a much higher clock frequency than I'm using), not just with the nops in the version at the end of this message but also plugging in an entire delay loop, and the problem remains. I find myself wishing I had an oscilloscope!

The program follows. Is there anything in the program—or, more likely, the circuit itself—that I need to try adjusting?

Thanks a zillion  
PSM

The program:

```
errorlevel -302
include "hgt_16f88.inc"

processor 16f88

org 0
goto Start

org 4
ISR
retfie

Start

BUF0 equ 0x30 ; - 0x33
ADDRESSBUFFER equ 0x40

Setup
bsf STATUS,5 ; set bank 1
movlw b'00000000'
movwf TRISA
```

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```
movlw b'00000000'  
movwf TRISB  
bcf STATUS,5 ; set bank 0  
  
clrf PORTA  
  
clrf BUF0  
clrf BUF0+1  
clrf BUF0+2  
clrf BUF0+3  
  
Loop  
; The first two count forward and backward, respectively  
incf BUF0,f  
decf BUF0+1,f  
  
; The third rolls one direction  
rlf BUF0+2,f  
btfsc STATUS,C  
bsf BUF0+2,0  
  
; The fourth rolls the other  
rrf BUF0+3,f  
btfsc STATUS,C  
bsf BUF0+3,7  
  
call SetExternalRegisters  
call Delay  
  
goto Loop  
  
Delay  
COUNTH equ 0x20  
COUNTL equ 0x21  
movlw 0x00  
movwf COUNTH  
movlw 0xDA  
movwf COUNTL  
  
Delay_Loop  
; 16-bit decrement  
; 9 instructions per loop  
; Time taken = 9 * 4 / osc speed  
; For 31.25kHz, 868 = about 1s.  
decf COUNTL,f  
incfsz COUNTL,w  
incf COUNTH,f  
decf COUNTH,f  
movf COUNTL,w  
iorwf COUNTH,w
```

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```
btfss STATUS,Z  
goto Delay_Loop  
return
```

```
SetExternalRegisters
```

```
; Manual version!
```

```
movf BUF0,w
```

```
movwf PORTB
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
bsf PORTA,4
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
bcf PORTA,4
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
movf BUF0+1,w
```

```
movwf PORTB
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
bsf PORTA,5
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```

```
bcf PORTA,5
```

```
nop
```

```
nop
```

```
nop
```

```
nop
```



## Using 74xx574 D FF to expand PIC outputs

```
nop  
nop  
nop
```

```
; Show a pattern that means "this isn't right"  
movlw b'11000011'  
movwf PORTB  
return
```

```
org 0x2007  
CONFIG1  
; Use internal oscillator at 31.25kHz  
dw 0x3f10  
end  
.
```