Masking

Blocking out stuff we're not interested in

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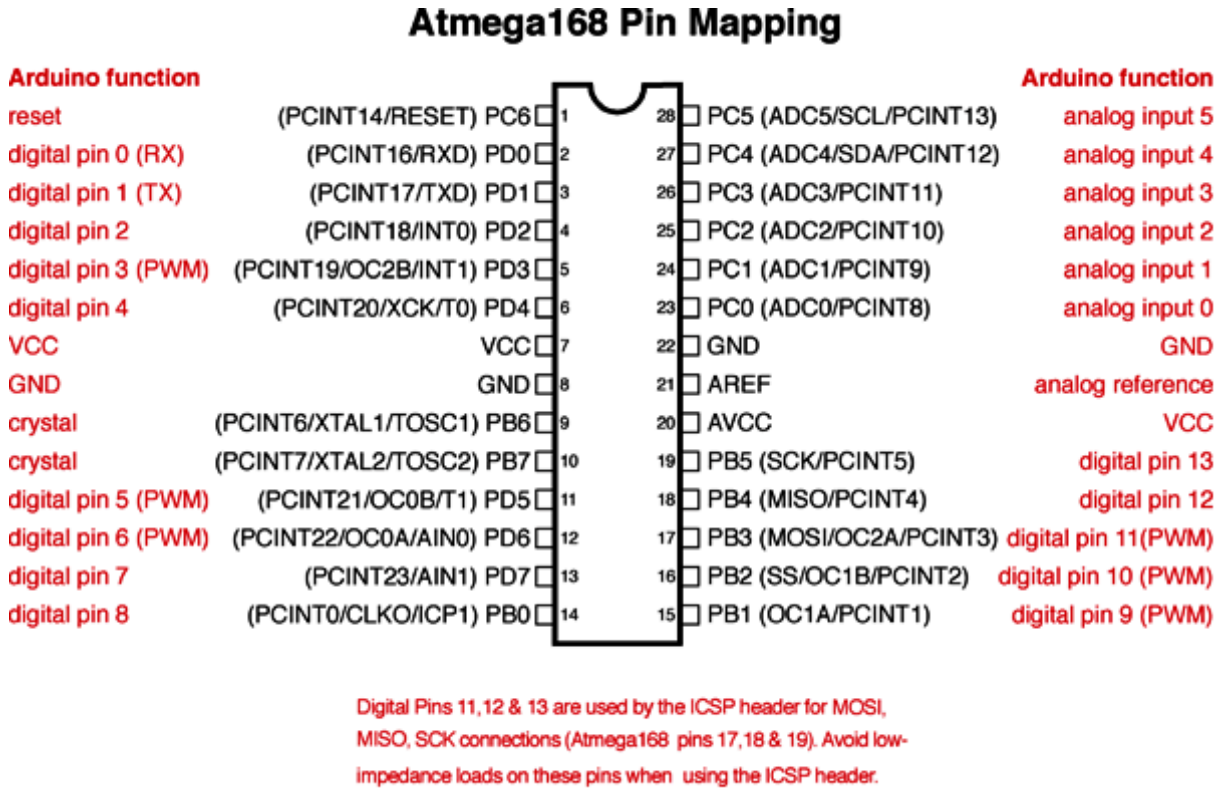
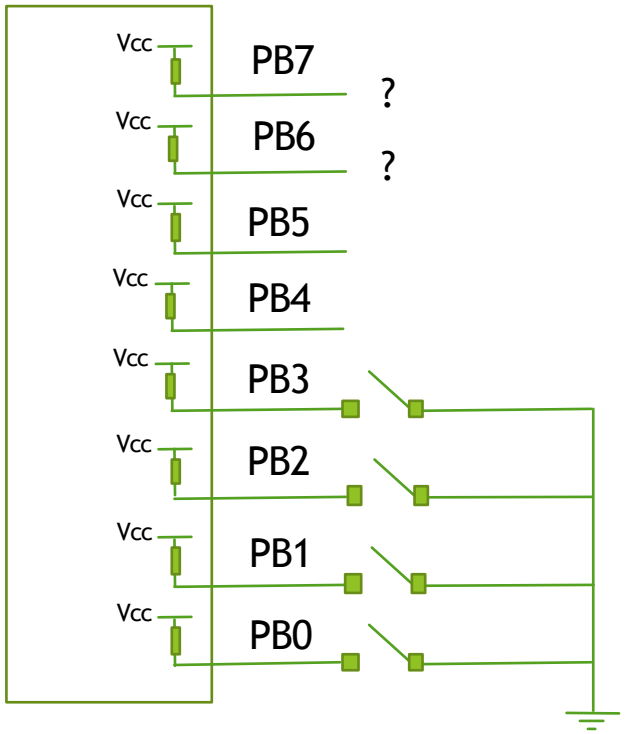
Reading 4 switches attached to PORTB



Digital Pins 11,12 & 13 are used by the ICSP header for MOSI, MISO, SCK connections (Atmega168 pins 17,18 & 19). Avoid low-impedance loads on these pins when using the ICSP header.

What is in PINB?



DDRB = 0x00;

DDRB	0	0	0	0	0	0	0	0

PORTB = 0xFF;

PORTB	1	1	1	1	1	1	1	1

PINB	?	?	1	1	1	1	1	1

```
if(PINB == 0xFF)   //?????

if(PINB == 0x3F)   //?????
```

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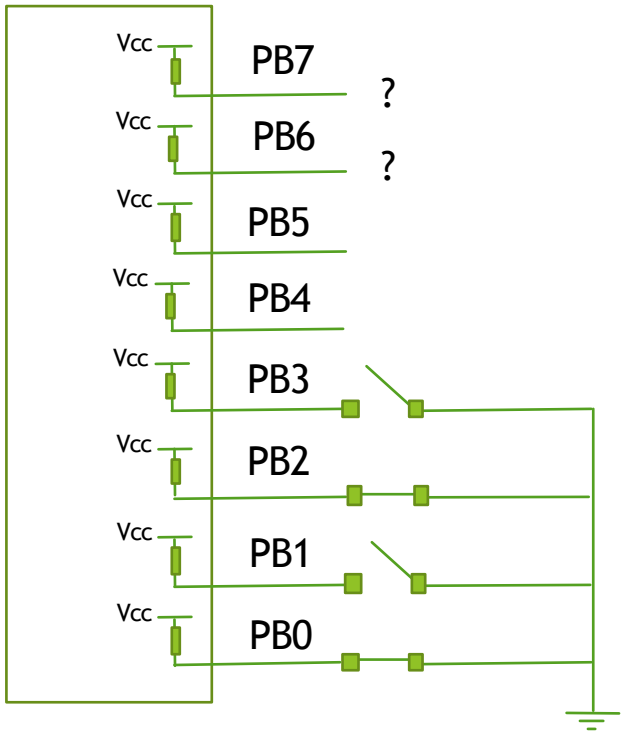
What is in PINB?



DDRB = 0x00;

DDRB	0	0	0	0	0	0	0	0

PORTB = 0xFF;

PORTB	1	1	1	1	1	1	1	1

PINB	?	?	1	1	1	0	1	0

```
if(PINB == 0xFA)   //?????

if(PINB == 0x3A)   //?????
```

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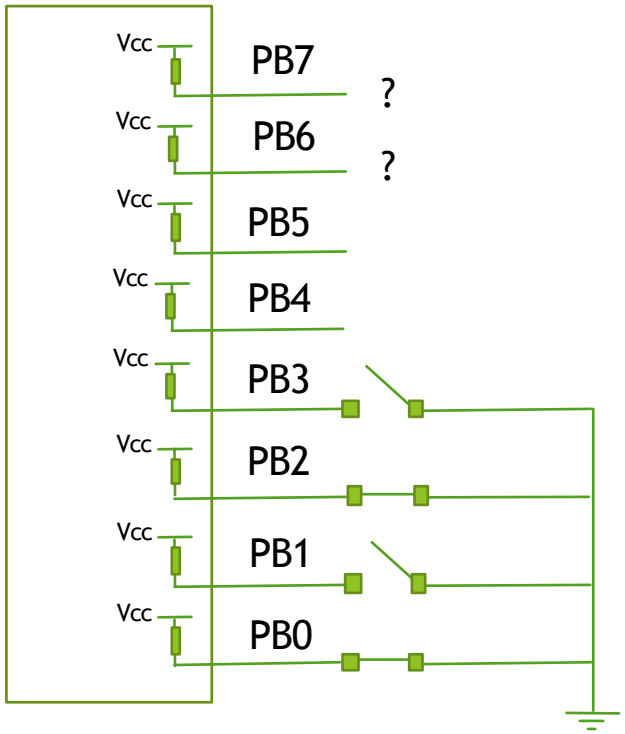
Better to “mask out” bits not interested in



PINB | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

```
x = PINB;
```

x | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

mask

```
x = x & 0x0F;
```

x | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

mask

0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | &

x | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |

```
if(x == 0x0A)
{
    ...
}
```

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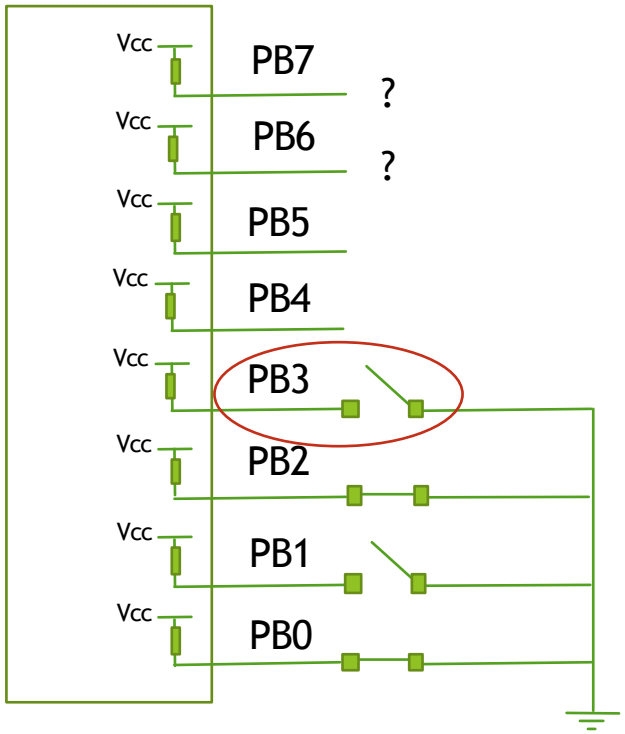
What if we only want to read one switch?



PINB | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

```
x = PINB;
```

x | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

mask

```
x = x & 0x08;
```

x | ? | ? | 1 | 1 | 1 | 0 | 1 | 0 |

mask

| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | & |

x | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

```
if(x == 0x08)
{
    ...
}
```

```
if(x != 0)
{
    ...
}
```

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One Bit Mask patterns

- Bit 0 – 0b00000001 – 0x01
- Bit 1 – 0b00000010 – 0x02
- Bit 2 – 0b00000100 – 0x04
- Bit 3 – 0b00001000 – 0x08
- Bit 4 – 0b00010000 – 0x10
- Bit 5 – 0b00100000 – 0x20
- Bit 6 – 0b01000000 – 0x40
- Bit 7 – 0b10000000 – 0x80

What are these masks in hex?

0	0	0	0	1	0	0	1

0	1	0	1	0	1	1	0

0	0	0	0	0	0	1	1

1	1	0	0	1	0	1	0

1	0	0	0	1	0	0	0

1	1	1	0	1	1	0	0

0	0	1	0	0	1	0	0

1	0	1	0	1	0	1	1

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