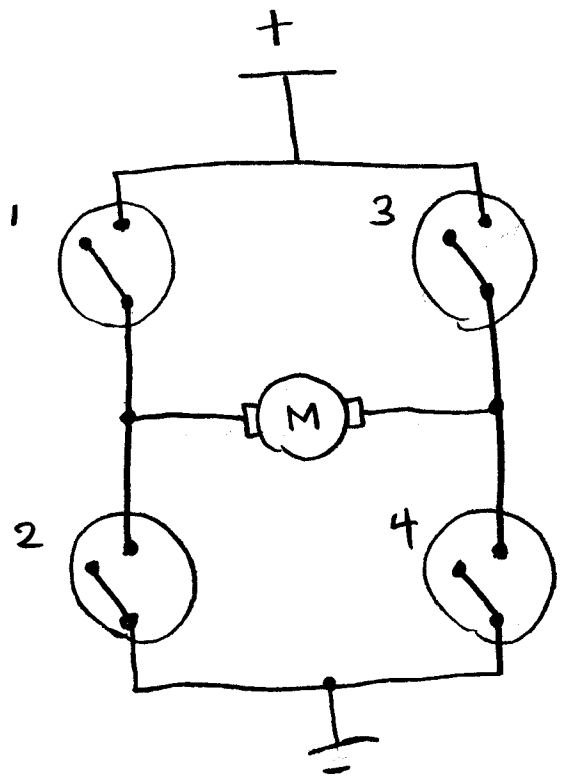
H - Bridge



1, 4 on
2, 3 off →

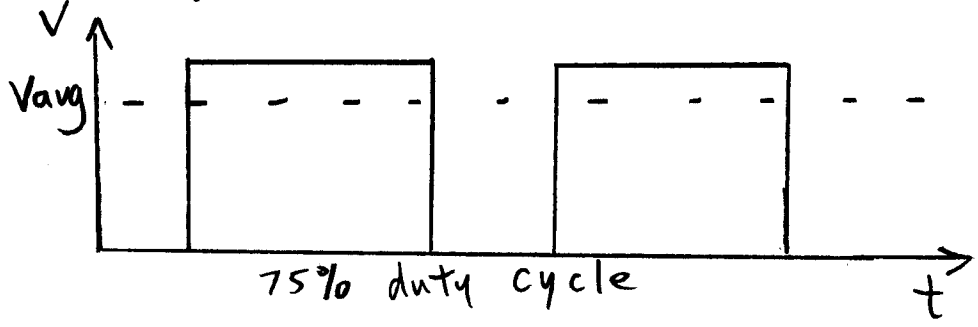
2, 3 on
1, 4 off →

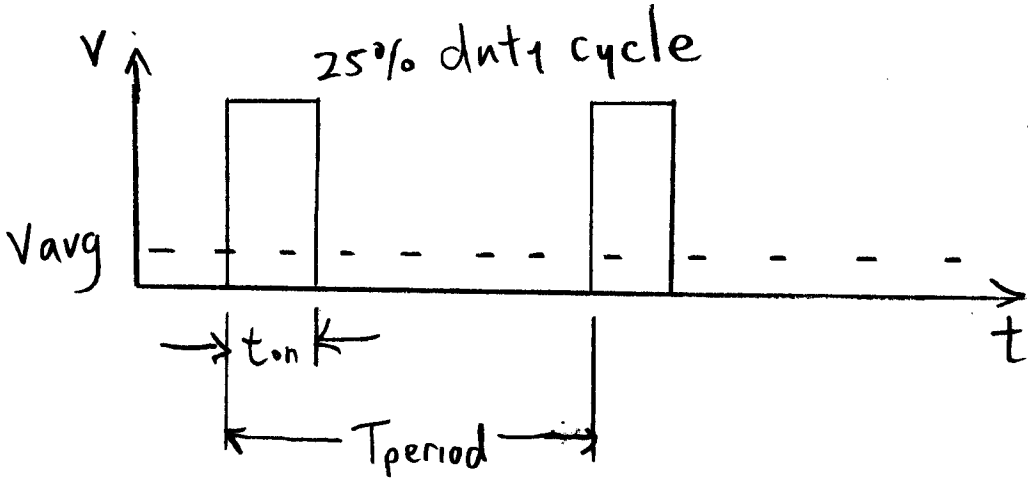
switch types

relays

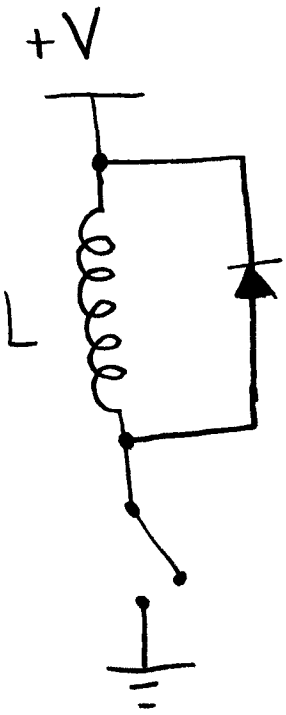
⇒ transistors

PWM input





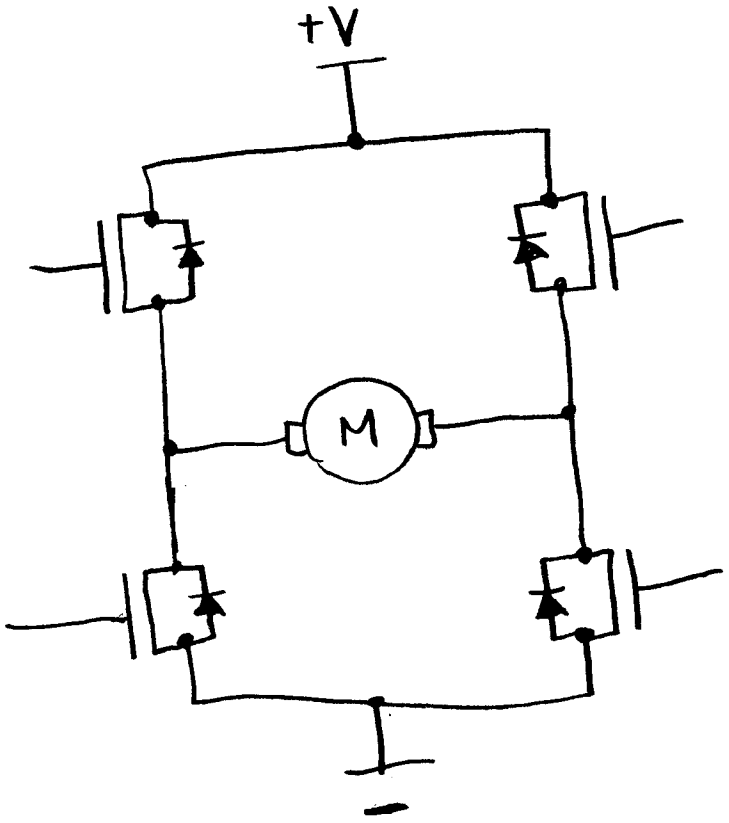
Inductive Load Switching



← flyback diode!

$$V = L\frac{dI}{dt}$$

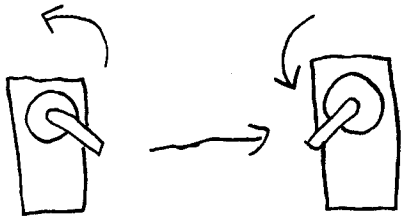
H-Bridge MOSFET implementation



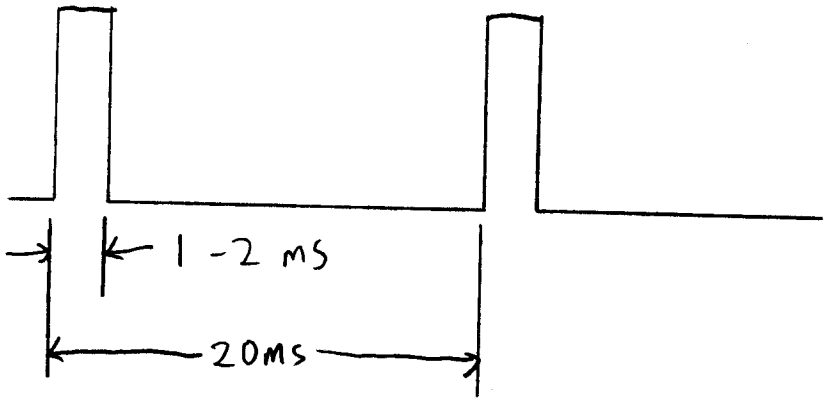
Servo (Hobby)

~ 5 V operation stall ~ 1 A

PWM control

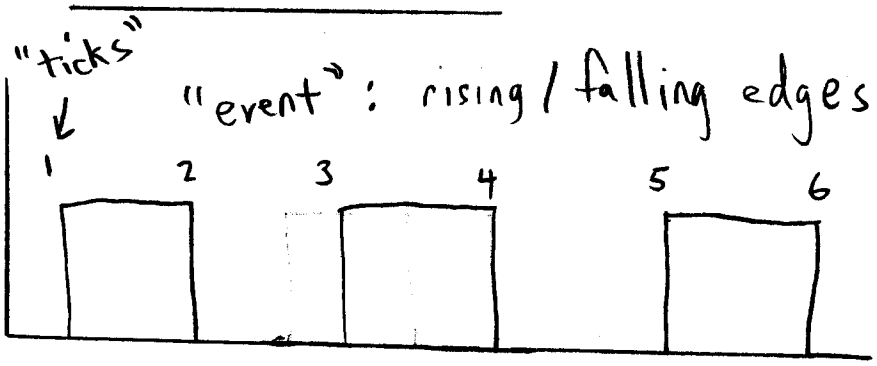
1-2 ms per 20 ms ⟹ 

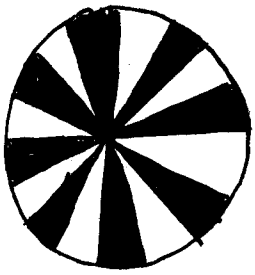
1 end → other end

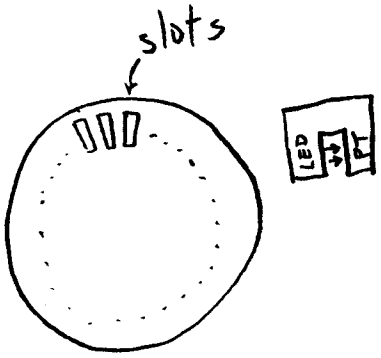


⟹ position determined by internal rotary potentiometer

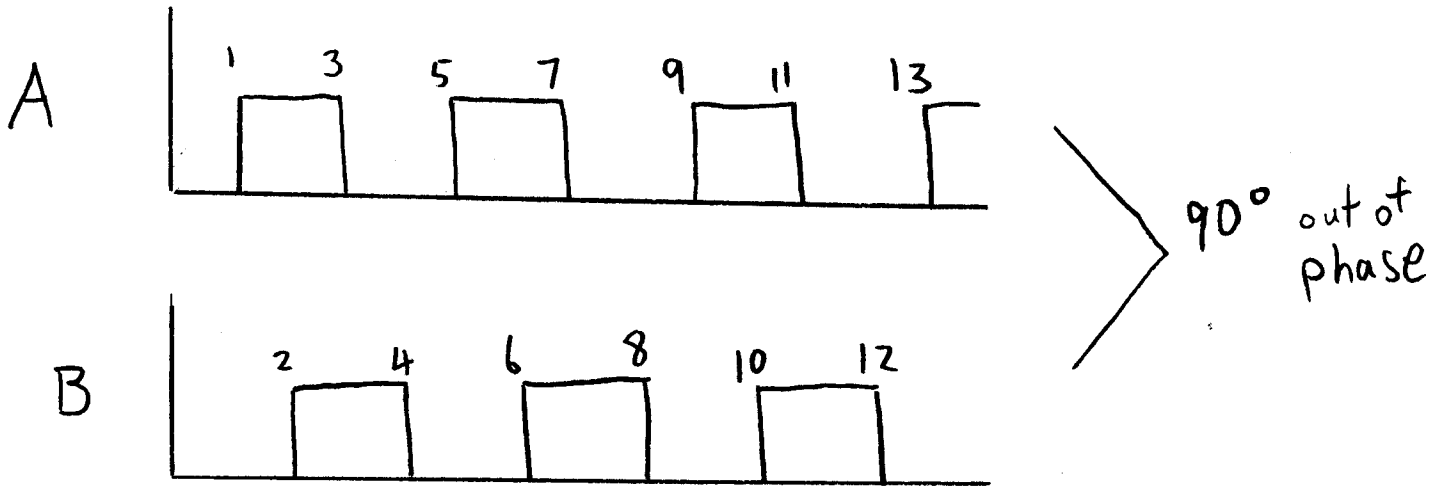
Encoders







QUADRATURE ENCODER



Forward

A	B
0	0
1	0
1	1
0	1
0	0

Backward

A	B
1	0
0	0
0	1
1	1
1	0

Encoders (Continued...)

Encoder w/ index ← channel that pulses once per revolution

ABSOLUTE ENCODER

- has coded disk
- outputs absolute angular position
- # of channels → resolution
- output via parallel or serial interface

Figure 1 Gray Code

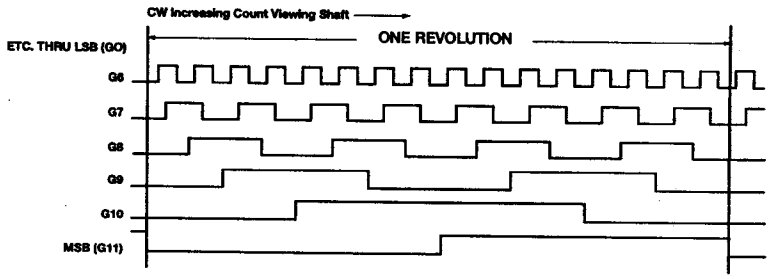
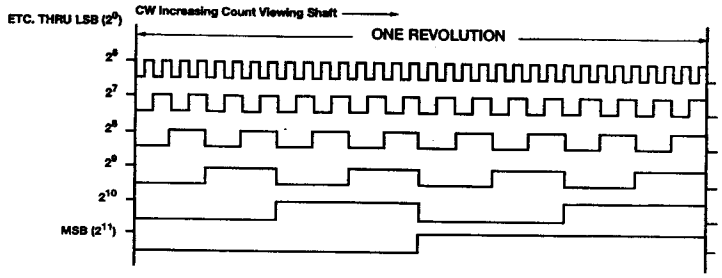


Figure 2 Natural Binary



Power Cosiderations

? Isolate Controler to its own power source

? External Drive Motor Power

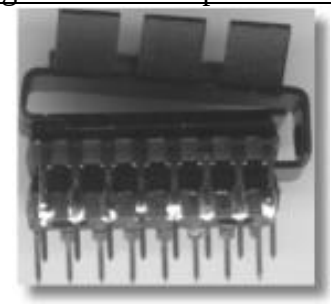
? External Servo Power

? External sensor Power

⇒ Use of 5v regulator may be required for some sensors

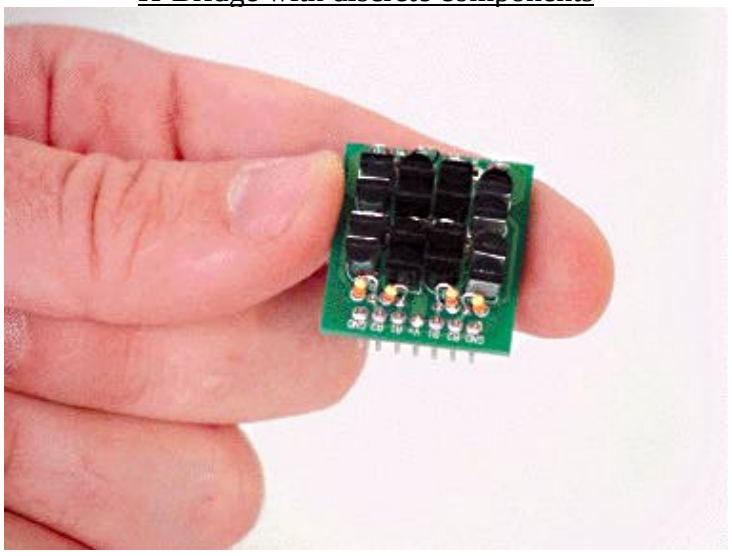
H-Bridges

1 Amp H-Bridges (on Handy Board) (right: stacked chips with heat sink)

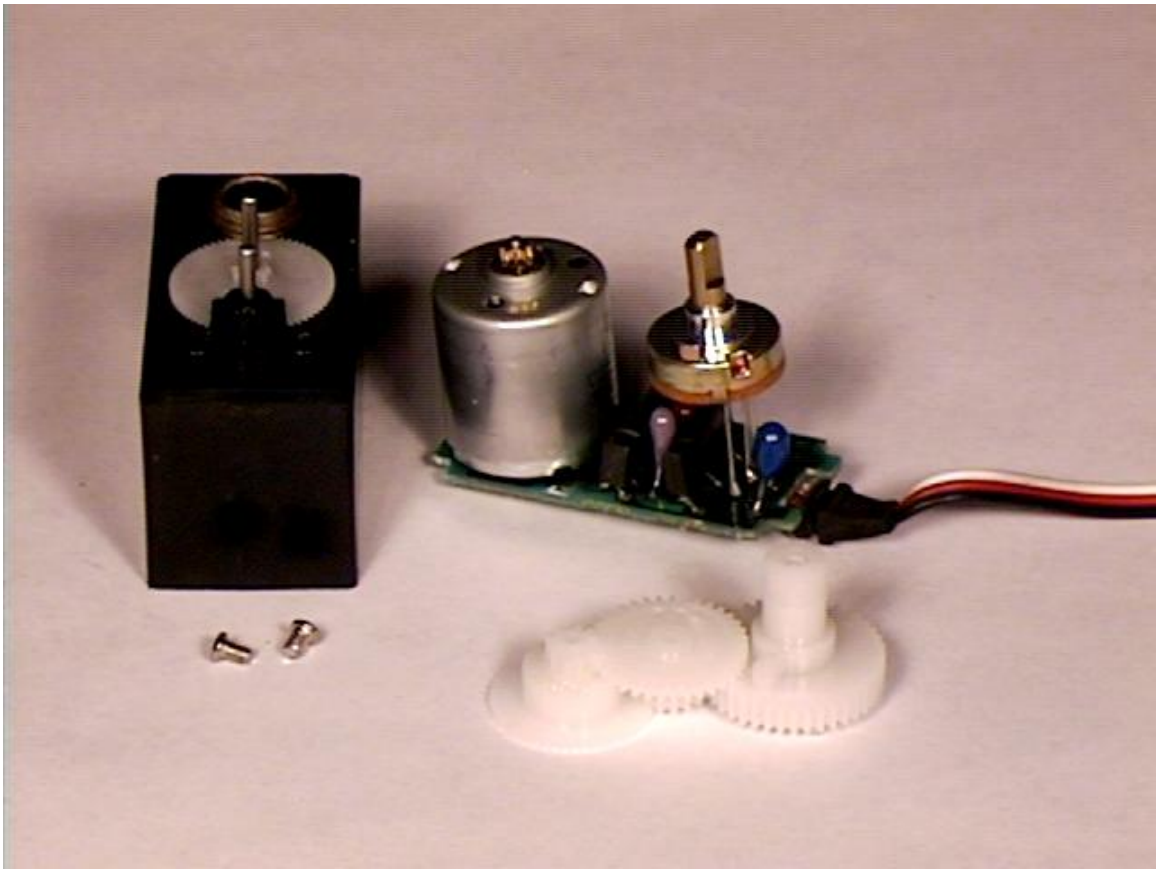


3 Amp H-Bridge

H-Bridge with discrete components



Servos



Encoders