

EECS192 Lecture 4

Feb. 9, 2016

Notes:

Check off-

- 2/12: Motor drive/stall, steering servo
- Quiz 2: power MOSFET/motor drive Tues 2/16

Topics

- Project proposal feedback
- RC servo basics
- PWM and motor drive
- Power supplies
- Boost converter

Project proposal feedback

Motor Driver

Schematic

- Estop: what to switch?
- Motor drive from battery, not voltage regulator
- Snubbing capacitors
- Drive/brake/enable/dir

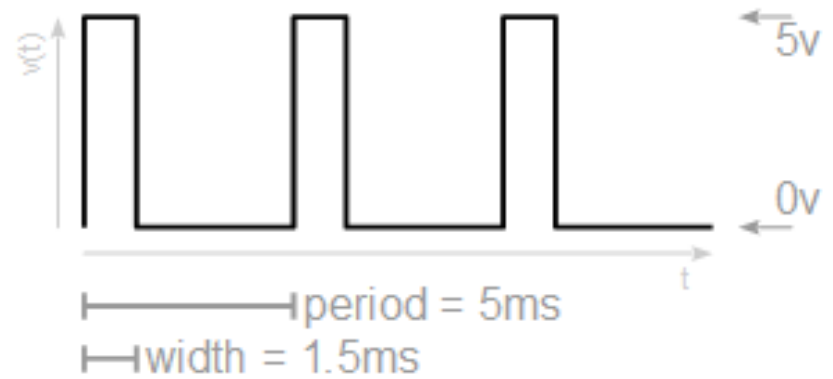
Circuit Layout

- Mounting holes
- Big wires, short distances
- QFN vs SOIC package
- Heat sinks
- Estop switch
- Signal connectors

Software

- Threads vs interrupts vs main() vs RtosTimer

PWM for Steering Servo



Gotchas:

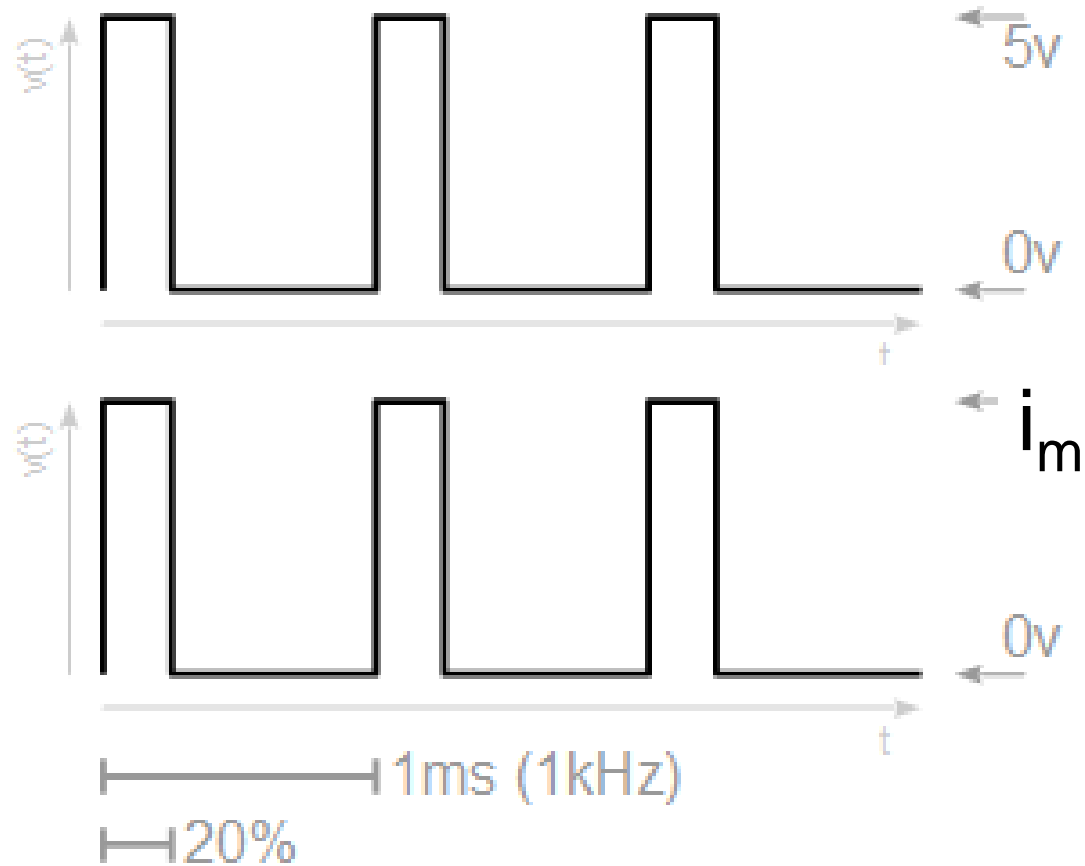
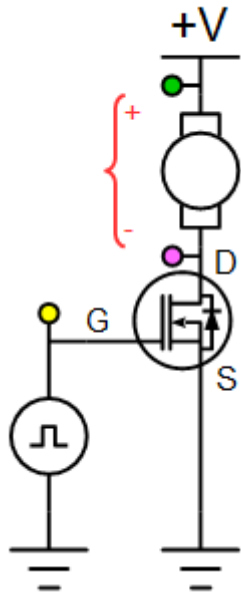
- 4.8 or 6V, (Not 7.2V!)
- max current 2A
- May be sensitive to noise on supply line
- Performance depends on voltage

PWM

<https://developer.mbed.org/handbook/PwmOut>

	PwmOut (PinName pin) Create a PwmOut connected to the specified pin.
void	write (float value) Set the output duty-cycle, specified as a percentage (float)
float	read () Return the current output duty-cycle setting, measured as a percentage (float)
void	period (float seconds) Set the PWM period, specified in seconds (float), keeping the duty cycle the same.
void	period_ms (int ms) Set the PWM period, specified in milli-seconds (int), keeping the duty cycle the same.
void	period_us (int us) Set the PWM period, specified in micro-seconds (int), keeping the duty cycle the same.
void	pulsewidth (float seconds) Set the PWM pulsewidth, specified in seconds (float), keeping the period the same.
void	pulsewidth_ms (int ms) Set the PWM pulsewidth, specified in milli-seconds (int), keeping the period the same.
void	pulsewidth_us (int us) Set the PWM pulsewidth, specified in micro-seconds (int), keeping the period the same.
PwmOut &	operator= (float value) A operator shorthand for write()
	operator float () An operator shorthand for read()

PWM for Main Motor control



$$\langle i_m \rangle = (T/T_o) i_{max}$$

Is i_{max} constant?

Power supply wiring

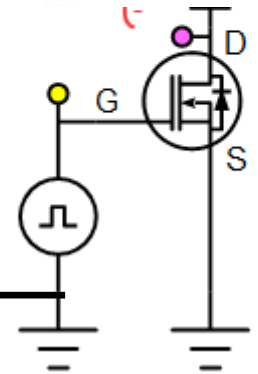
+7.2V



Voltage regulator



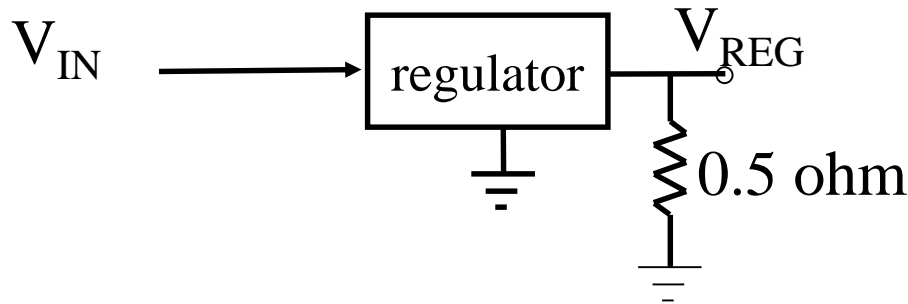
Voltage regulator



On board: what does this look like electrically (as a schematic)?

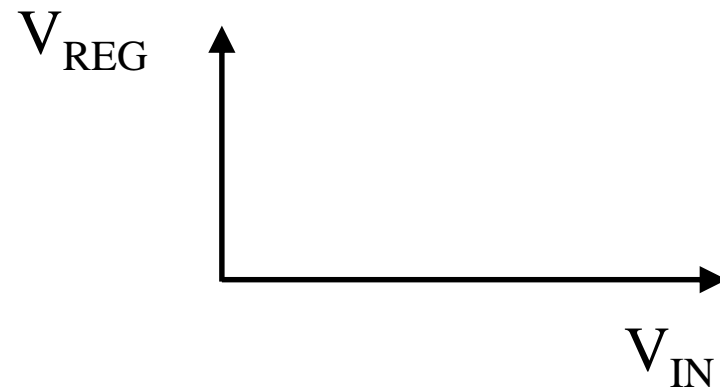
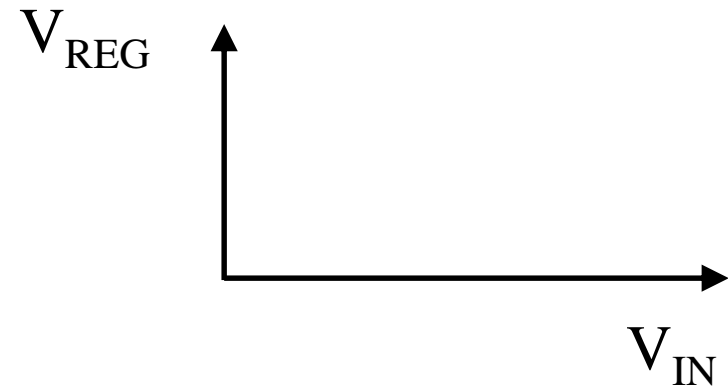
“7.2V” supply waveforms with motor PWM

- Battery model
- Waveforms on board
- Wiring to reduce voltage resistance effects of wiring

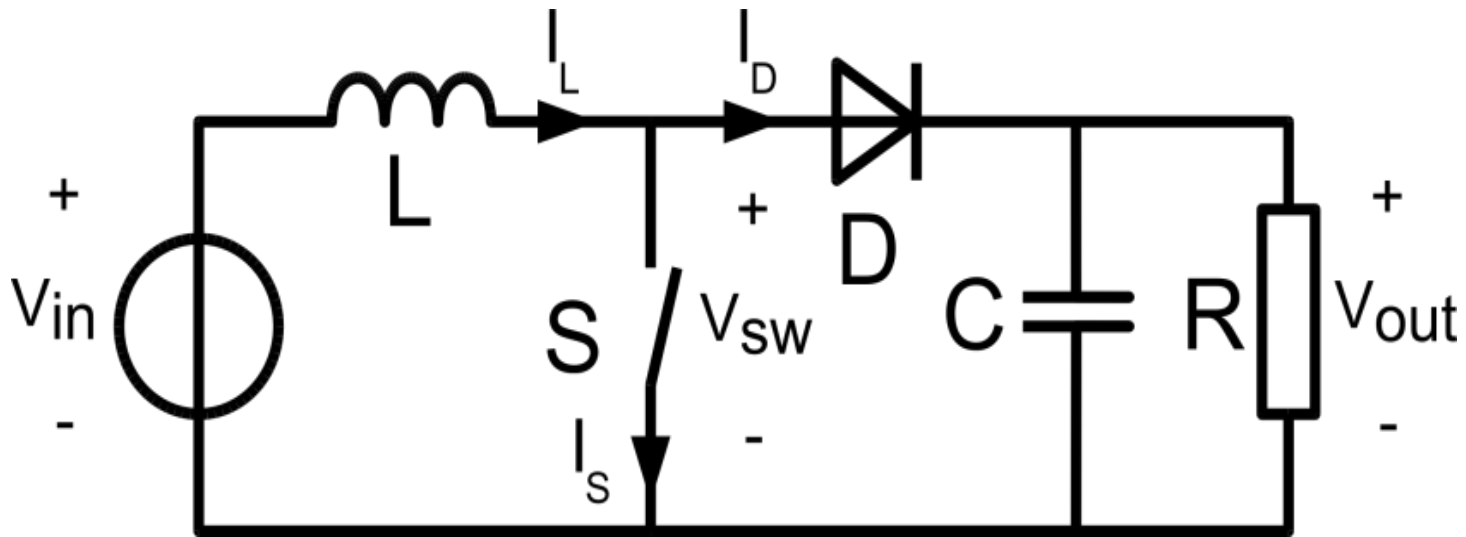


Linear Regulator $V_{IN} > V_{REG}$

Boost Converter $V_{IN} < V_{REG}$



Boost Converter

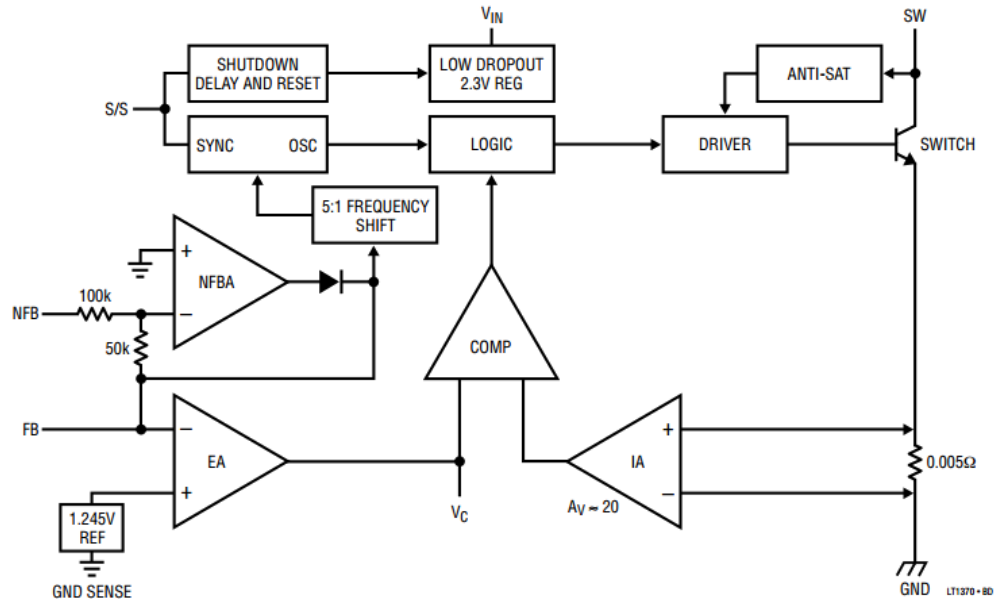


Waveforms on board
(also see boost
converter notes)

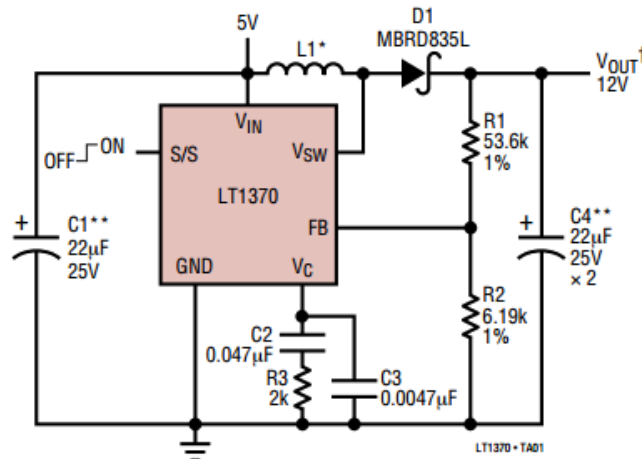
Boost Converter- LT1370

LT1370

BLOCK DIAGRAM



5V to 12V Boost Converter



LT1370 • TA01