COMPOSITION

Engineering Documentation and Notes

100 sheets / 200 pages
9.75 in x 7.5 in / 24.8cm x 19.1cm
Wide-Ruled

60 % Recycled paper
printed with soy-based inks

METRIC Handwriting Quality (20) 9/20/10
Chronological Organization (20) K.E.
Subject Productivity (20)
Graphic Examples (20)
Resource Documentation (20)

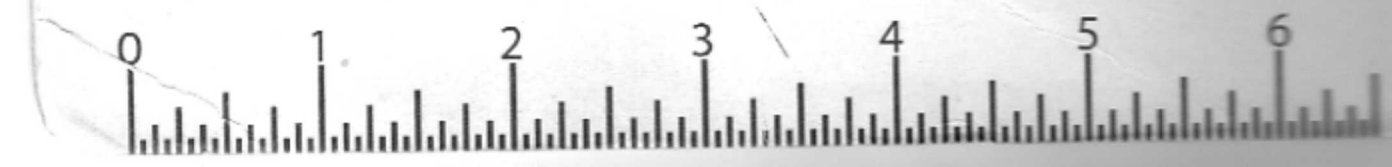
CLASS SCHEDULE

Name: Ryan Cleary School: Lakewood High School

Address: 2189 Brown Road Lakewood, Ohio 44107

PERIOD	MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
	Subject	room	Subject	room	Subject	room	Subject	room	Subject	room
1	[redacted]									
2										
3										
4										
5										
6										
7										
8										
9										

INCHES



9/14/10

- I hate that people take carts from the parking lot
- I want a car that can be powered by mind energy
- I want a motorized wagon so I can move heavy guitar amps easier
- I hate that my sound-system bike can't charge itself
- I hate that the sun glares through the wind-shield
- I hate when my mp3 gets wet and DIES
- I hate when my my cell phone gets wet and dies

9/16/10

Problem Statements:
- First person
- Talked about problem statement with interesting solutions

9/17/10

9/18/10

- I want a way to ~~amplify~~ make my trumpet louder that is portable and relatively affordable so I can be heard while playing solos

9/14/06 sketch

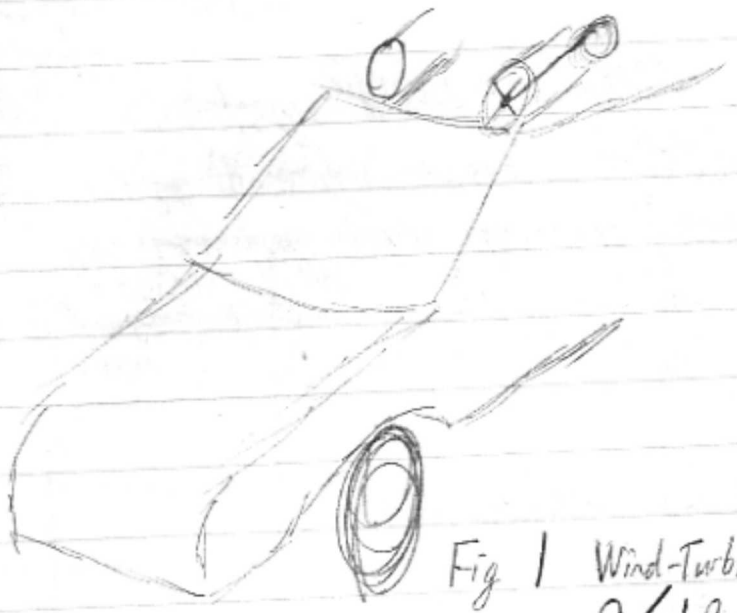


Fig 1 Wind-Turbine powered Car

9/19/10

Possible methods of amplifying a trumpet:

1. Rifle it?
2. Set up a sound system that is lightweight and portable and uses mics to pick up and amplify.

Fig 2 Trumpet Amplification system

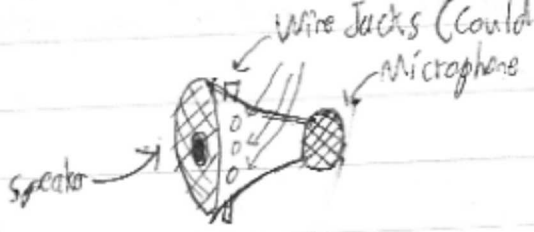


Fig 3

Rifled Tubing  Cutaway

- Researched Trumpet amplification: Nothing portable being marketed
- Researched Rifled Trumpet: No results founds only rifled mouth pieces
- Cost to buy a trumpet: Ebay - 10 - $100 if bidded properly

~~3~~ R.C.

~~2~~ ~~20~~ 10
R.C.

9/20/10

3 ~~things~~ I love:

1. Trumpet

Resources

- Trumpetherald.com
- International Trumpet Guild
- Educaters Music

See fig. 4

2. ~~Renewable Energy~~ R.C. ~~Driving~~ R.C. Renewable Energy

- Great Lakes Renewable Energy Association
- Great Lakes Renewable Energy Association
- Midwest Renewable Energy Association

see fig 5

3. Guitar

- Guitar Players Association of America
- Yamaha
- Guitar Foundation of America

see fig 6

Theory & Application of Digital Signal Processing 9/21/10

Lawrence R. Rabiner - Bernard Gold

Fig. 4

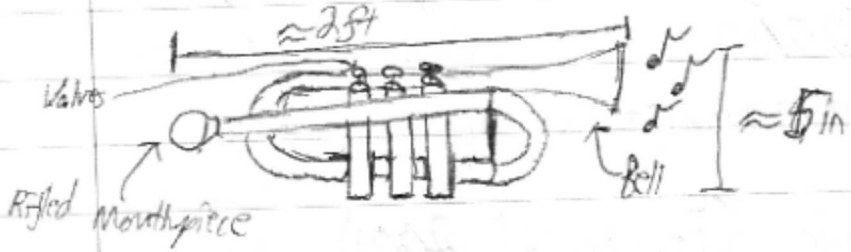


Fig. 5

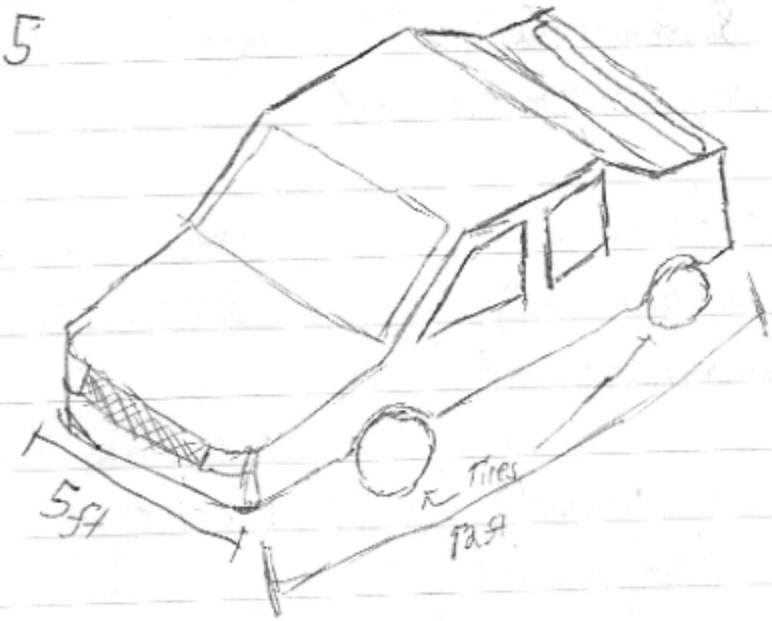


Fig. 6.

9/22/10

~~Things I hate~~ R.C. Sources
~~I hate it when~~ R.C.

- International Trumpet Guild (February 18, 2010)
  Retrieved 9/20/10
  http://www.trumpetguild.com

- Educators Music (February 25, 2009)
  Retrieved September 20, 2010
  http://www.educatorsmusic.com/

- Trumpet Herald
  Retrieved September 20, 2010
  http://www.trumpetherald.com/

- Great Lakes Renewable Energy Association
  Retrieved September 22, 2010
  http://www.glrea.org/

- American Solar Energy Society
  Retrieved September 22, 2010
  http://www.ases.org/

- Midwest Renewable Energy Association
  Retrieved September 22, 2010
  http://www.the-mrea.org/

9/22/10

- Guitar Players Association of America
  Retrieved September 22, 2010
  http://www.guitarplayers.com/

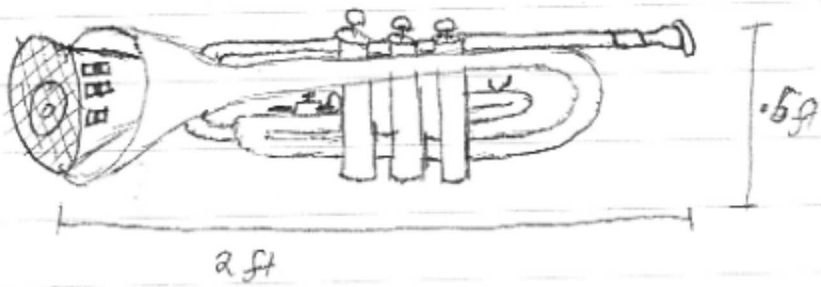
- Yamaha
  Retrieved September 22/10
  ~~http://www.guitar.pl~~ ec. http://www.yamaha.com/

- Guitar Foundation of America
  ~~http://www.guit~~ Retrieved September 29, 2010
  http://www.guitarfoundation.org/

"Don't you hate it when" Statements

-
- I hate it when my trumpet isn't loud enough when playing solos

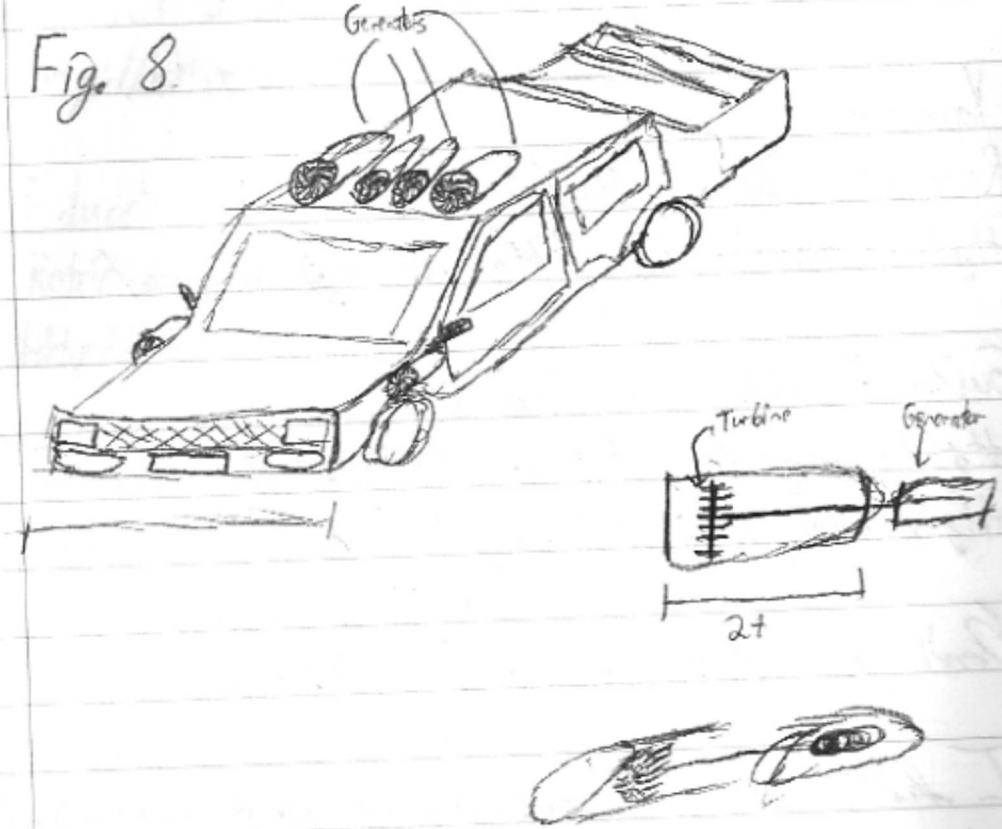
Fig. 7



9/22/10

- ~~Don't~~ ~~you~~ I hate it when I have to spend lots of money refueling the gas in my car.

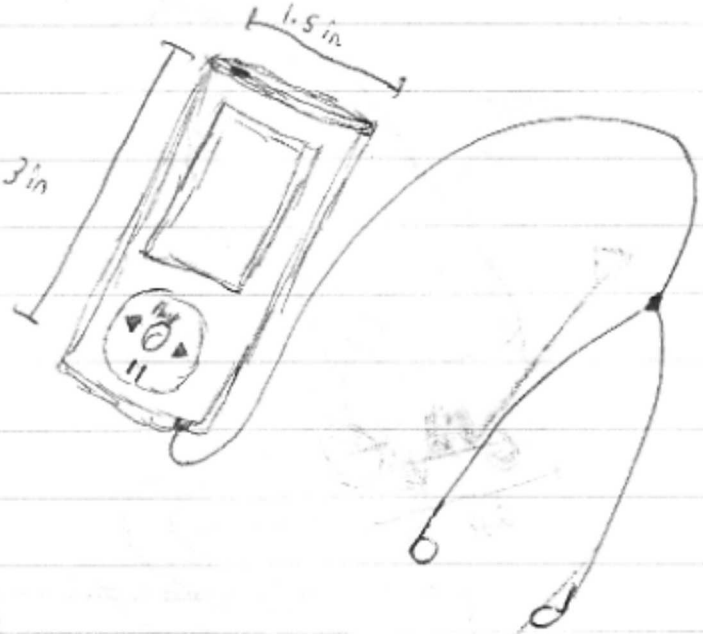
Fig. 8



9/23/10

I hate it when my ipod gets wet and then dies.

Fig 9



I hate that ~~my~~ the sun glares through my windshield

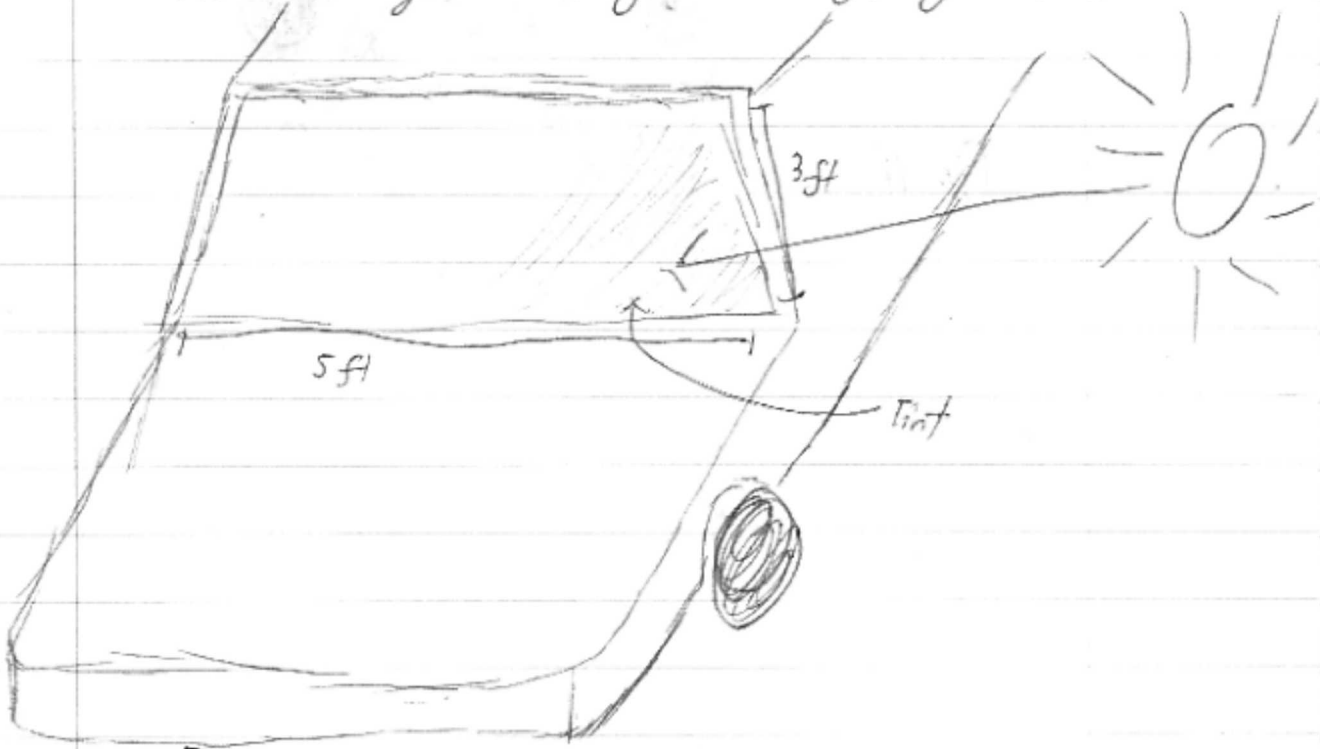


Figure 10.

9/23/10

I hate it when I have to pull heavy objects in my wagon.

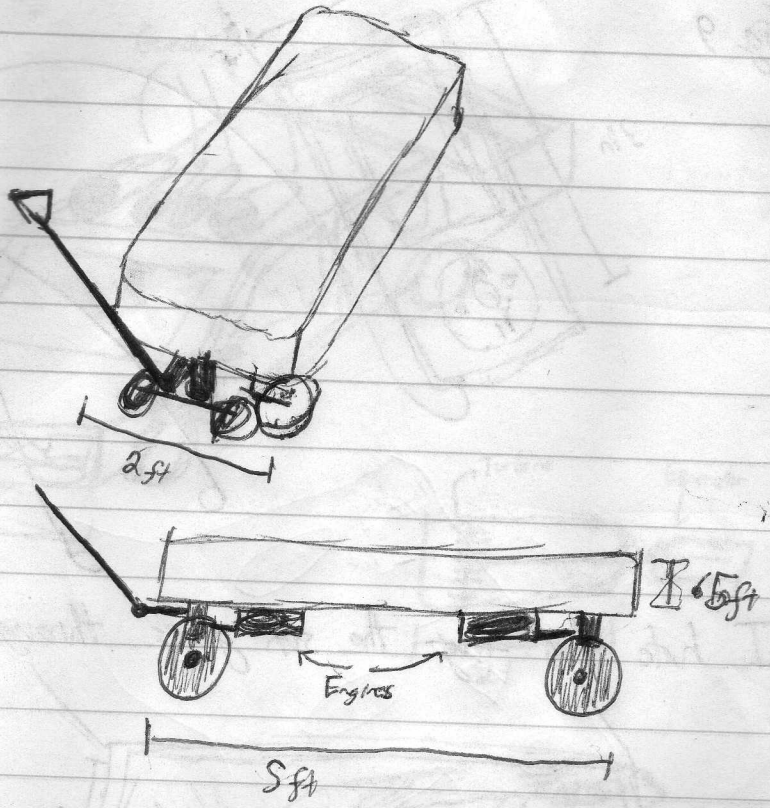


Fig. 11

9/24/10

I hate it when I want to tune my guitar but don't have a tuner handy.

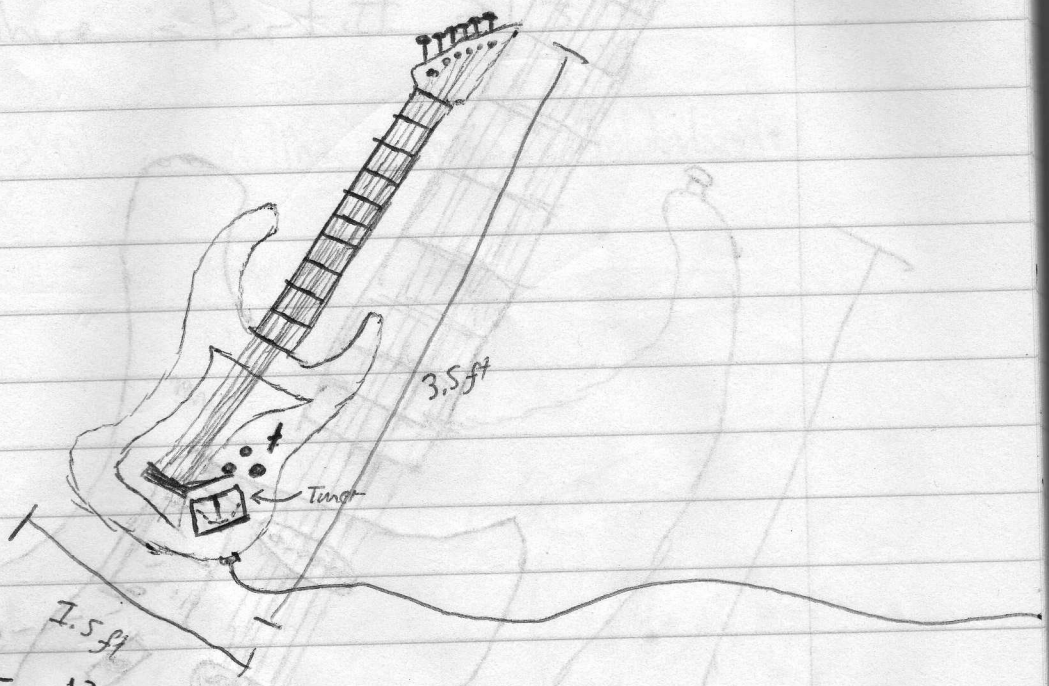


Fig. 12

9/27/10

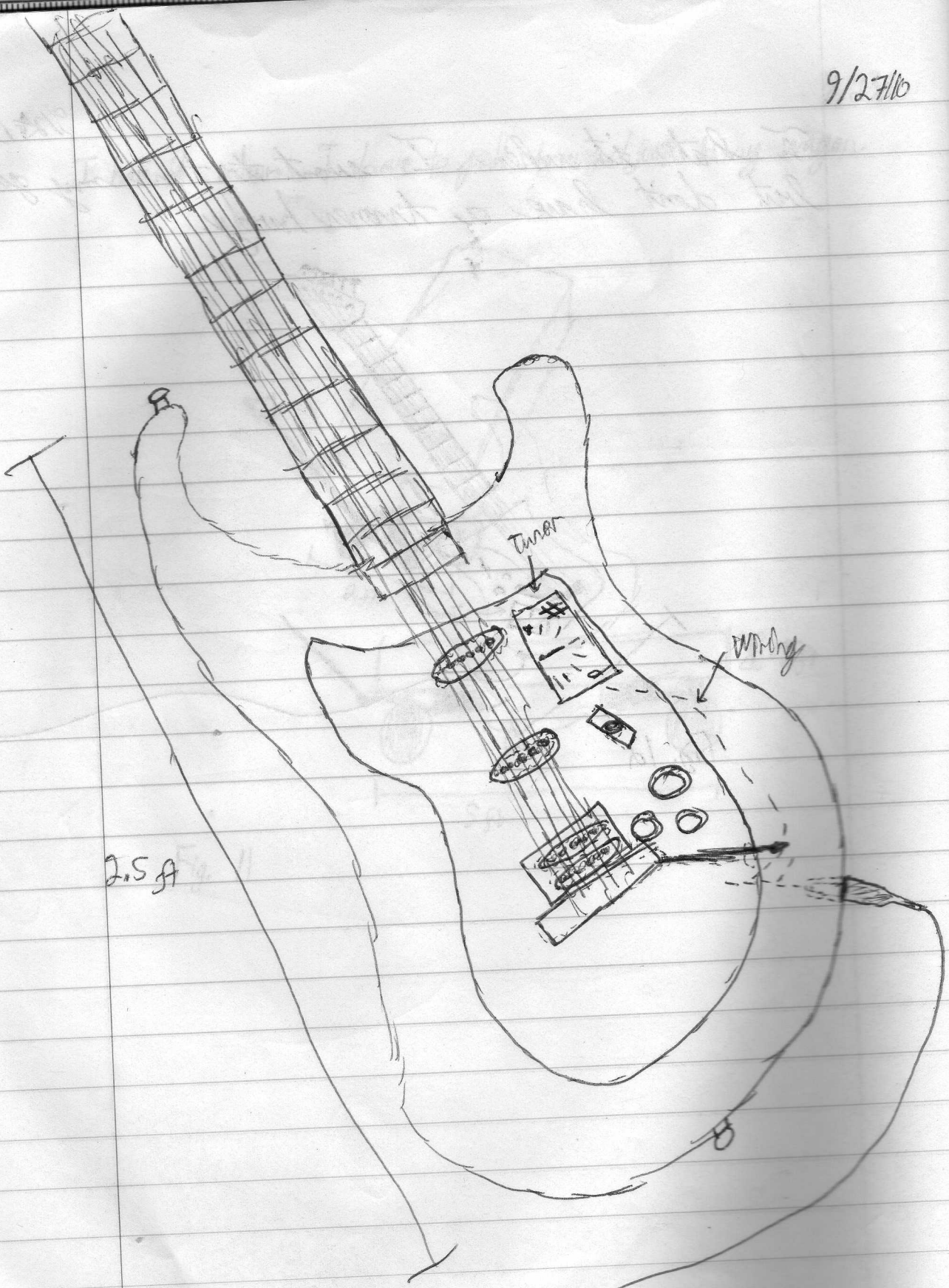
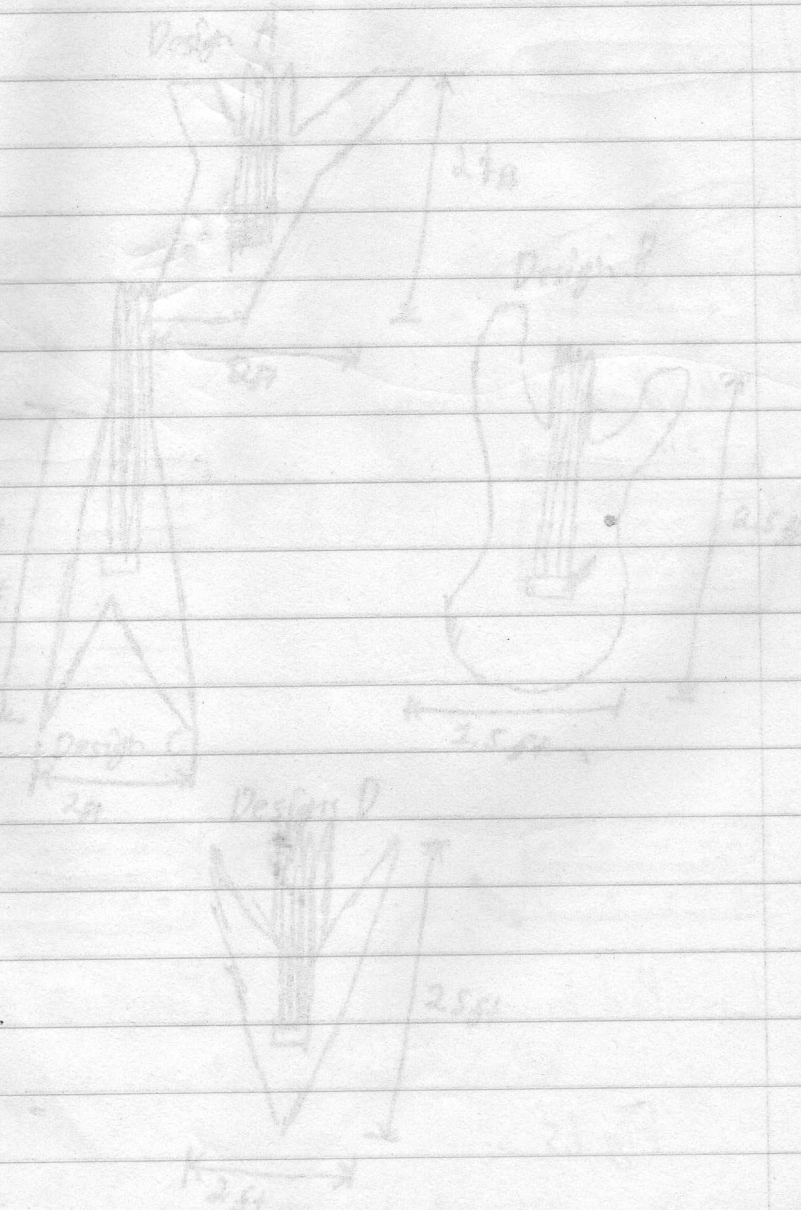


Fig. 13

9/29

9/29

EA. - Contact/should'nt your team be in your contact area?
- Arrowheads on your dimensions.
- Where is Part II 2.1.3?



10/4/10

- Recived email from Carl canceling appointment, rescheduling to to Wednsday or Thursday at 4:30

10/5/10

- Rescheduled appointment, will be on 10/5/10 with Carl

10/6/10

- Carl unavailable, Patrick there instead

Possible guitar body designs:

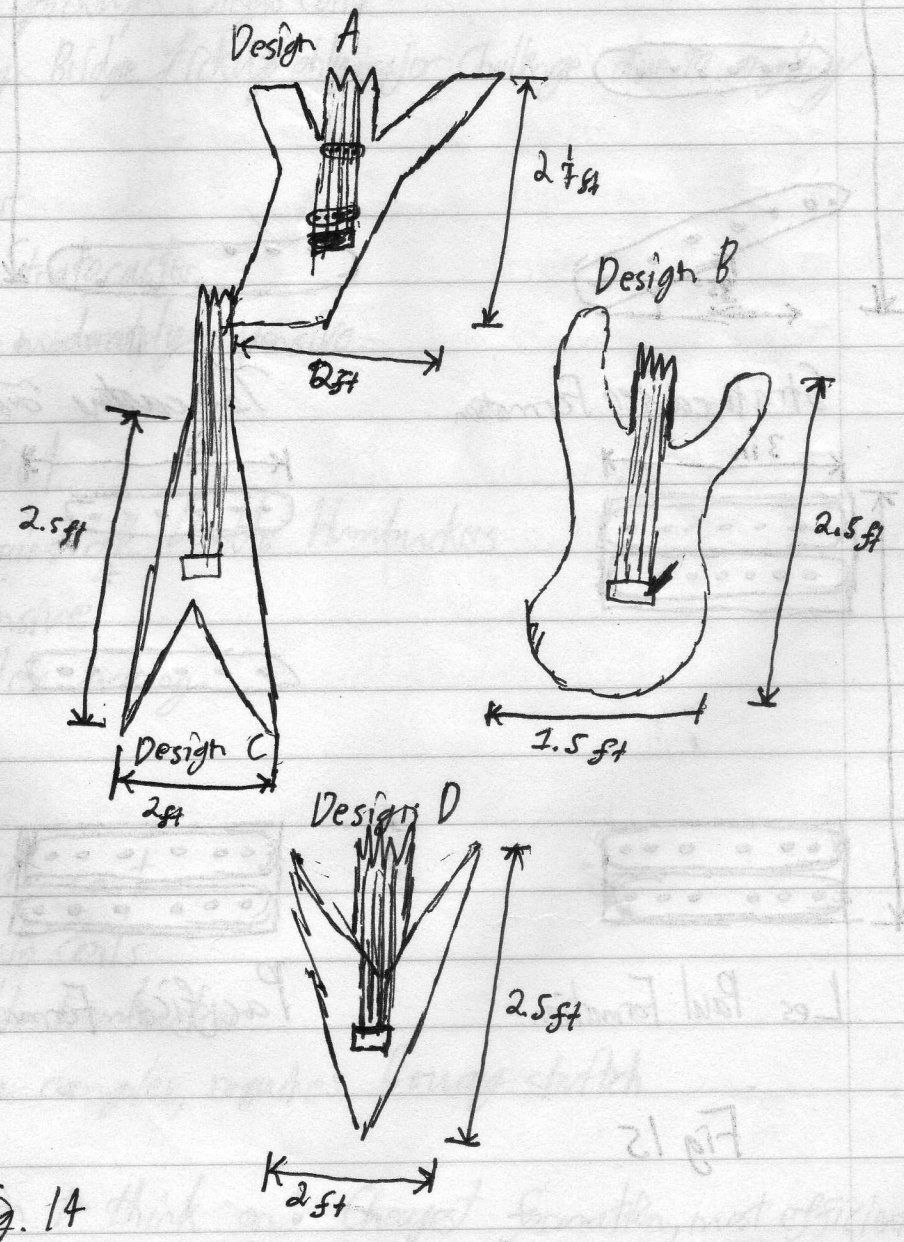
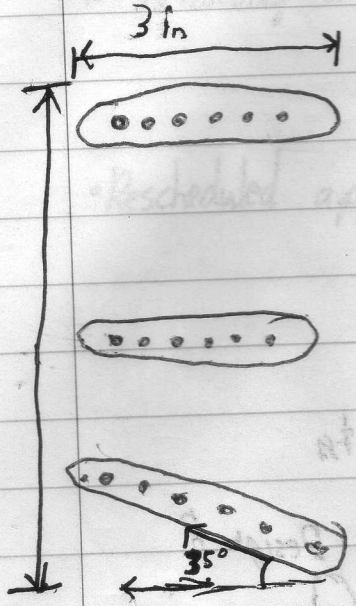


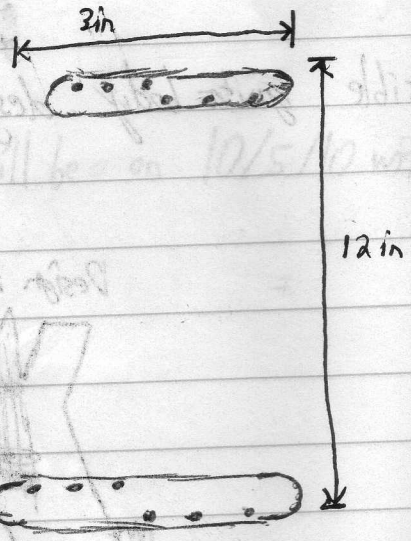
Fig. 14

10/7/90

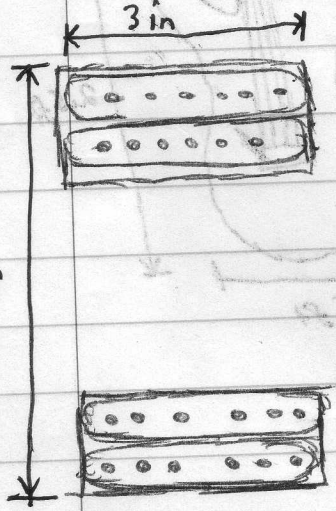
- Possible Pickups/formations:



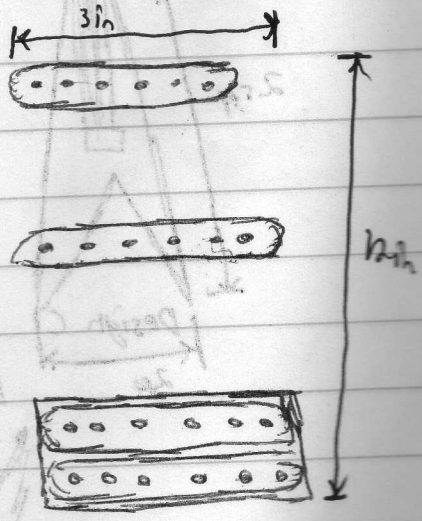
Stratocaster Formation



Telecaster formation



Les Paul Formation



Pacifica Formation

Fig 15

10/8/10

Benefits / Detriments to each design:

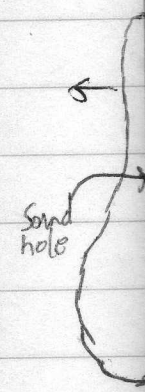
- Stratocaster
  - Lots of Diagrams on internet
  - Simple wiring, due to single-coils
  - Cheap pickups (Single Coil)
  - Inserting Bridge Pickup only major challenge due to angling
- Telecaster
  - See Stratocaster
  - Pickup moderately expensive
- Les Paul
  - 2 pairs of Double Humbuckers
  - Expensive
  - Complex wiring
- Pacifica
  - Moderate cost
  - 2 single coils
  - 1 double humbucker
  - Wiring complex, requires 5 way switch
- Question to think on: Cheapest formation, most efficient wiring, decent sound?

10/9/10

[redacted] • More research

• Obtained Contact information for Mr Rice from Mr. Maseow
- Mr. Rice is an employee at the Rock and Roll Hall of Fame as their guitar technician and Restorer

Other Contacts to Pursue:
- Educators Music Company (Lakewood)
- Cleveland Guitar
- Marrell Music and Instrument Repair
- Guitar Center
- Matthew's Uncle, Mr. Sims in Michigan
- Rettig Music
-



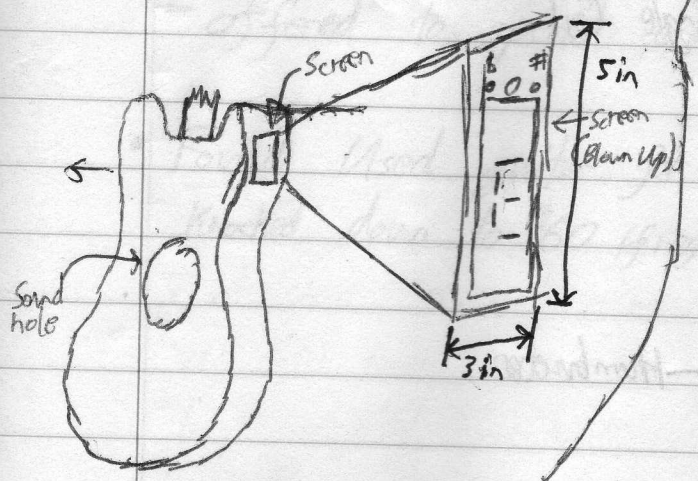
9/10

of

10/10/11

- **Research Results**

– Various tuner innovations have been done with acoustic guitars. These include;



Built in tuners on the sides

-~~Inefficient~~, due to lack of visibility

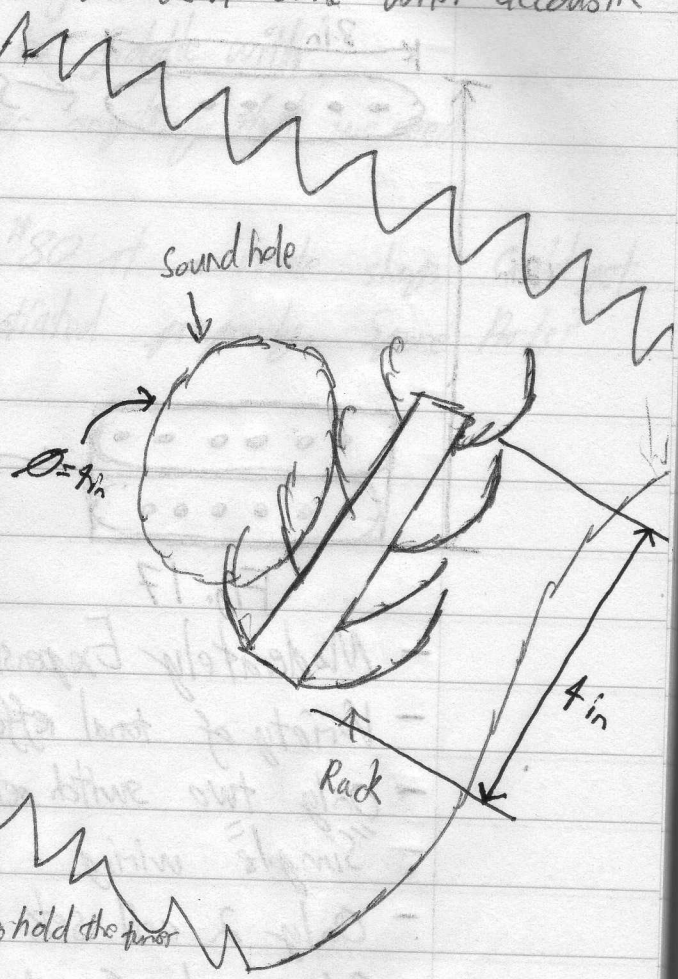


Fig. 16 -A rack to hold the tuner

– An automatic tuner attatched to the guitar that twists the machineheads

10/12

- Potential Guitar Pickup Design:

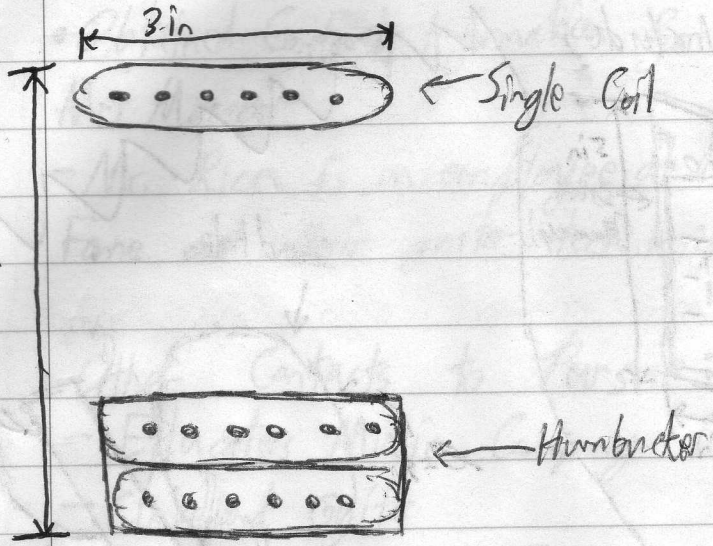


Fig. 17

- Moderately Expensive
- Variety of tonal effects
- Only two switch settings needed (3rd is optional)
- "Simple" wiring
- Only 2 coil sets to wire and contend with
- Only needs 1 single-coil, 1 humbucker (double)

10/13

- Spoke with Sharon Morell and Martol Music
  - Willing to assist with Project
  - Donated a used tuner to fiddle with
  - offered to special order anything that we need

- Found Used guitar for $80 at a resale shop. Could get knocked down to $60 if negotiated properly. Spare Parts?

10/19

Guitar Body Materials:

- Ash
- Maple
- Pine
- Basswood

Neck Materials

- Maple
- Ash
- Rosewood
- Ebony
- Pine

Evaluation:
Pine: Horrible choice, cheap but bad tonal quality, easily dented.
Ash: Good body, moderate price, okay neck
Basswood: Sturdy, but bad sound
Maple: More expensive than ash, but best tonal quality, durable for body and Neck
Rosewood: Fretboard Inlay only, expensive, unneeded
Ebony: Fretboard Inlay only, expensive, unneeded

To keep cost effective, a maple or ash body would be best with a maple neck.

10/15

Market Base:

- Need to design a Poll, questions should include:
  - Do you find it inconvenient to constantly have to plug in a cable to effectively tune your electric guitar

  - How long have you been playing the electric guitar

  - Do you typically tune with a:
    a. Pitch tuner
    b. a digital tuner with light-up display
    c. by ear
    d. other

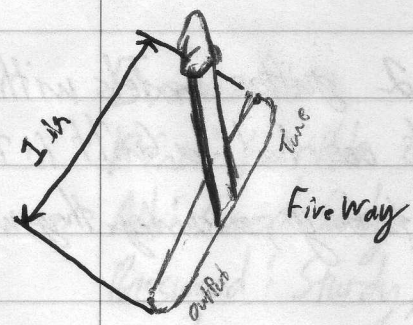
  - Were you you to be comparing 2 guitar models with identical features with the exception that one had a built in tuner, which would you be more likely to buy, assuming they were priced the same?
    a. The one with a tuner
    b. The one lacking a tuner
    c. Neither

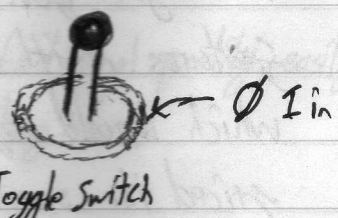
  - Do you prefer to tune your guitar while sitting or standing

10/18

- Ran a Patent search on google patents.
  - No electric guitars with built in tuners
  - Auto-tuners loosely patented
  - Few acoustic guitar patents with built in tuners, very loosely patented, lots of wiggle room

Possible switches between tuner and output





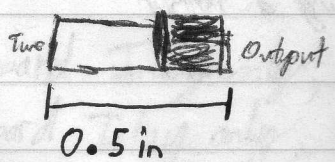


Fig. 18

10/18

Design Constraints for tuner system:

- Should run on AA batteries
- Must have a frequency range to cover all guitar pitches from C to a
- Should cost less than $15 to produce

- Margin of error: ~.5 hert?

- System delay: ~.1 s?

- Must meet federal safety guidlines

- Must be accesable for maintenence.

- Must not get in the way of other wiring

- Must be small and compact: 3 x 5 in?

10/20

- Cost of Pickups

-Single Coil: $13 - $40
1st choice: Fender Pickup, musicians friend.com.
$22.49, Free shipping, 20% coupon
or $23.52 Hot Single Coil (Amazon.com)

-Humbucker: $25 - $65
1st choice: Lace Powered By Lace Humbucker Pickup
$27.99, Free shipping, 20% coupon
-High Reviews, 5 *s

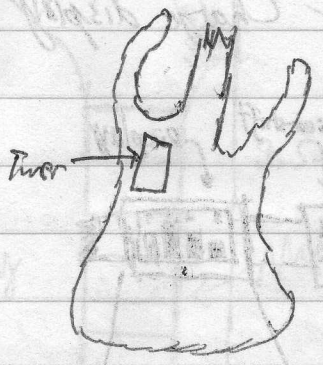
Combined Cost:
$52.48

Alternately:
$24.99 Lace Powered by Lace single coil Amazon.com

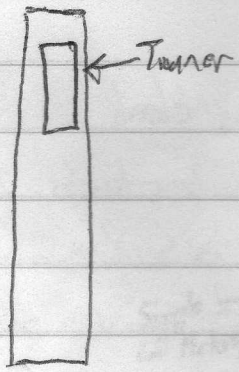
10/21

Possible tuner locations:

Right side, Front
(sitting, ~~Ideal~~, ~~sitting, okay~~)



Left side, Front
(sitting, okay, Standing, okay



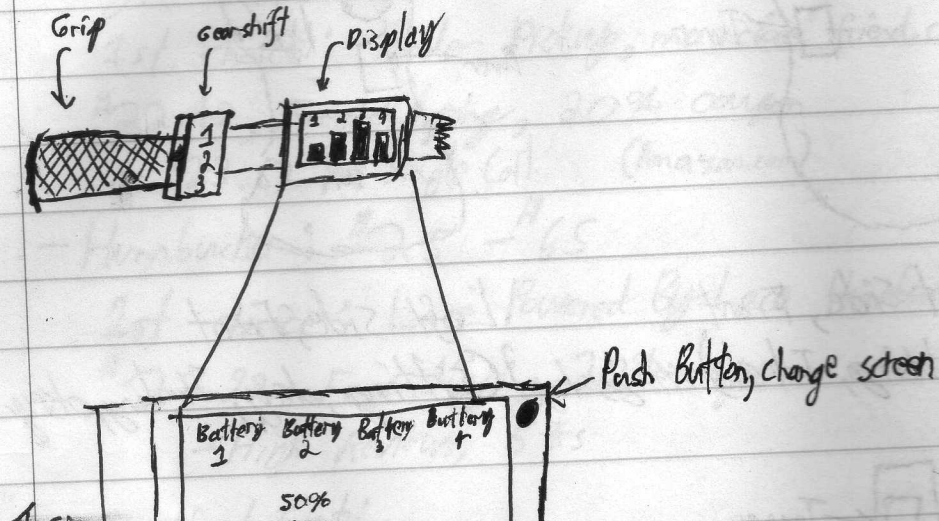
~~Right~~ Left Face
(standing, ideal)

Fig. 19

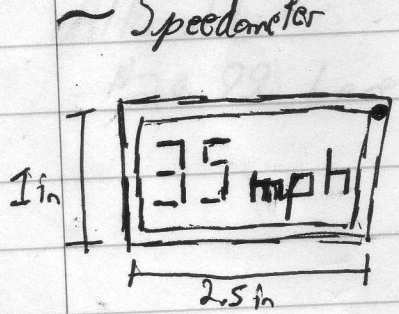
10/22

Possible e-bike innovations:

~ Battery Charge display



~ Speedometer



~ Fuel Efficiency

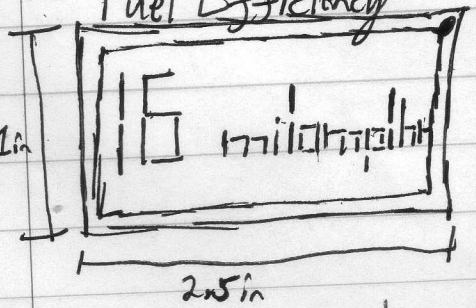


Fig 20.

• Sent an email to Karl about e-bik, awaiting reply.

10/24/10

Guitar Design A1.0

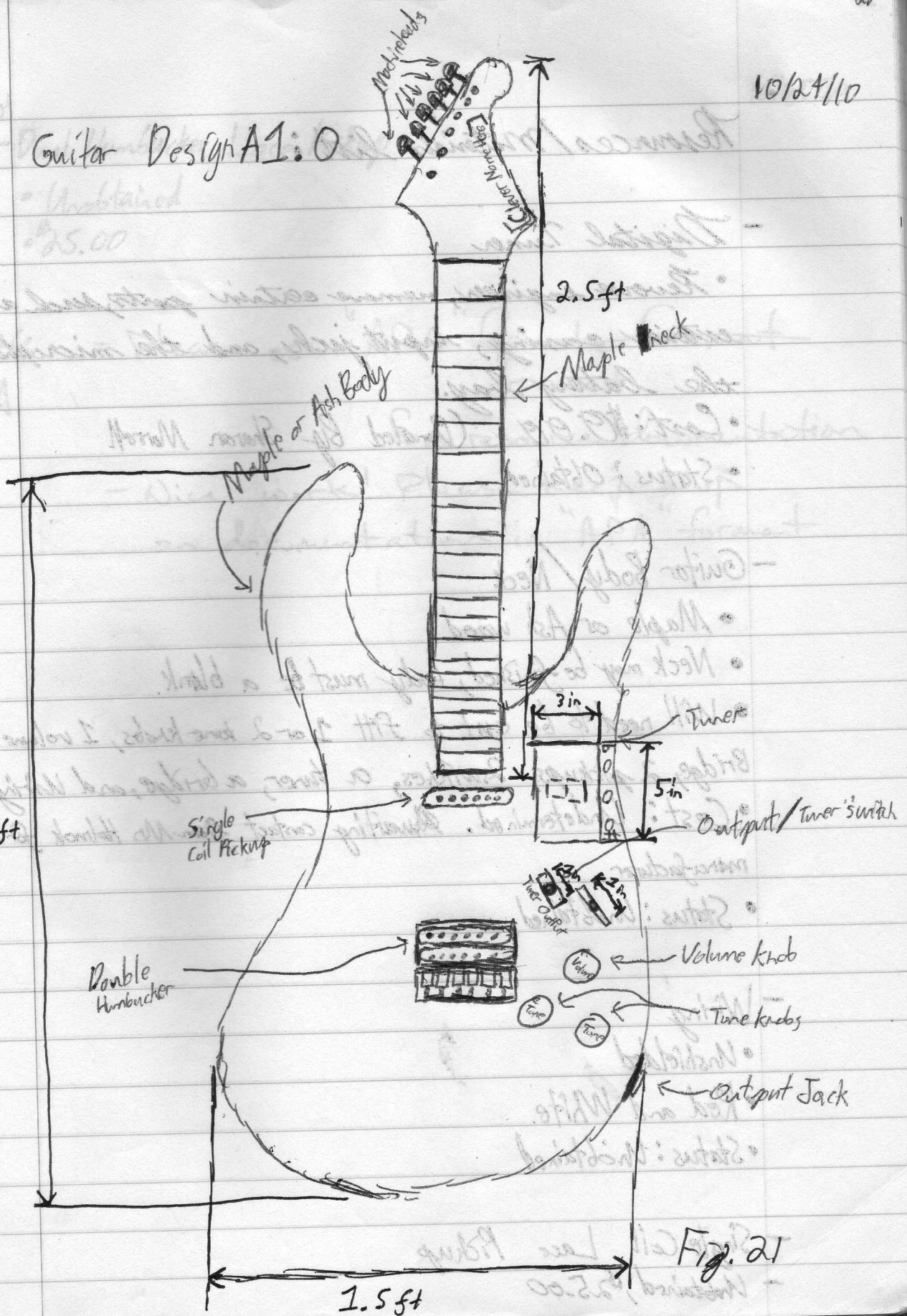


Fig. 21

10/25/10

Resources / Materials list:

- Digital Tuner
  - Reverse engineer, remove certain parts, such as exterior casing, input jack, and the microphone, possibly the battery bay.
  - Cost: $0.00 (Donated By Sharon Marroll
  - Status: Obtained

- Guitar Body / Neck
  - Maple or Ash wood
  - Neck may be finished, body must be a blank.
  - Will need to be cut to fitt 1 or 2 tone knobs, 1 volume knob, Bridge, 2 pickups, 2 switches, a tuner, a bridge, and Wiring.
  - Cost: Undetermined. Awaiting contact from Mr. Holbrook for a manufacturer
  - Status: Unobtained

- Wiring
  - Unshielded
  - Red and White
  - Status: Unobtained

- Single Coil Lace Pickup
  - Unobtained, $25.00

10/25/10

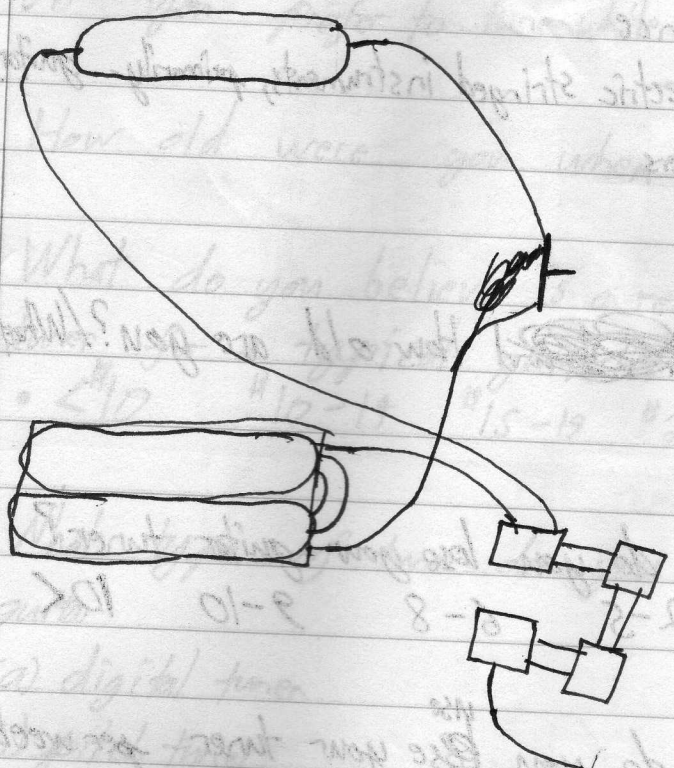
- Dual Humbucker Lace Pickup
  - Unobtained
  - $25.00

10/26 - Please use "APA" ~~formate format~~ format
E.M. - for resource documentation
- Nice work! Please keep up on documentation in "APA" format

Resources/Materials

- Digital Tuner
  - Reverse engineer, remove certain parts such as [illegible] [illegible] jacks, and [illegible] the [illegible]
  - Cost: [illegible], Provided By Sharon Merritt
  - Status: Obtained
- Guitar Body/Neck
  - Maple or Ash wood
  - Neck may be finished, body must be a blank.
  - Will need to be cut to fit 1 or 2 tone knobs, [illegible] knob, Bridge, 2 pickups, 2 switches, a tuner, a [illegible] and [illegible].
  - Cost: Undetermined. Awaiting contact from the [illegible] [illegible] manufacturer.
  - Status: Unobtained
- Wiring
  - Unshielded
  - Red and White
  - Status: Unobtained
- Single Coil Lace Pickup
  - Unobtained, $25.00

11/2/10



Circuit setup

Fig. 22.

11/3/10

- Intended audience
  - musicians (Electric stringed instruments, primarily guitar)
  - Music store owners
  - Guitar company's

☆ 1. ~~Rate between and~~ How old are you? / What is your age

☆ 2. How frequently do you lose your guitar tuner?
≤ 1 a month 2-5 6-8 9-10 10<

☆ 3. How frequently do you use your tuner per week?
1 2-5 6-10 11-15 16-20 20<

☆ 4. Do you find it a hassle to hook up wires to tune your guitar?

☆ 5. Would you be more likely to buy a guitar with a built in tuner?

☆ 6. Do you believe that having a built in tuner would make your tuning experience easier?

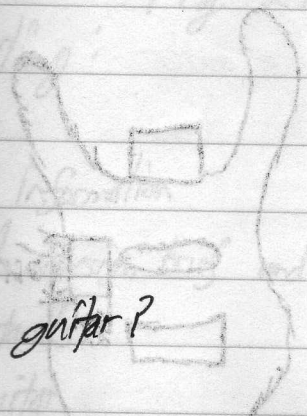
11/4/10

☆7. Do you prefer to tune while sitting or standing?

-8. How old were you when you started playing guitar?

☆9. What do you believe is a reasonable cost of a digital tuner for a typical guitarist?
• <#10 #10-14 #15-19 #20-24 #25-29 #30-34 #35≤

☆10. What type of tuner do you use to tune your electric guitar
(a) digital tuner
(b) pitch tuner
(c) by ear
(d) other



☆11. Do you play guitar?

☆12. How long have you been playing guitar?

11/5/10

- First questions, in order:
  - Age
  - Tuning questions
  - Marketing
  - Open ended questions

Guitar blank:

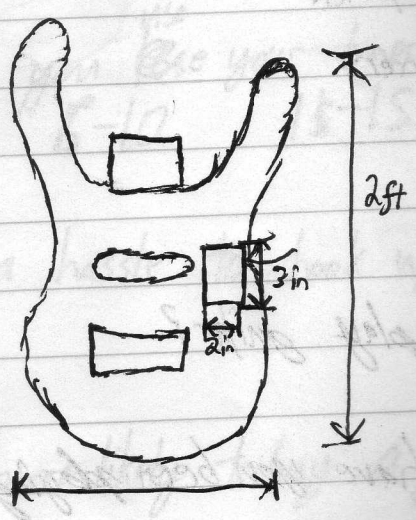


Fig. 23

11/6/10

Marketing Presentation:

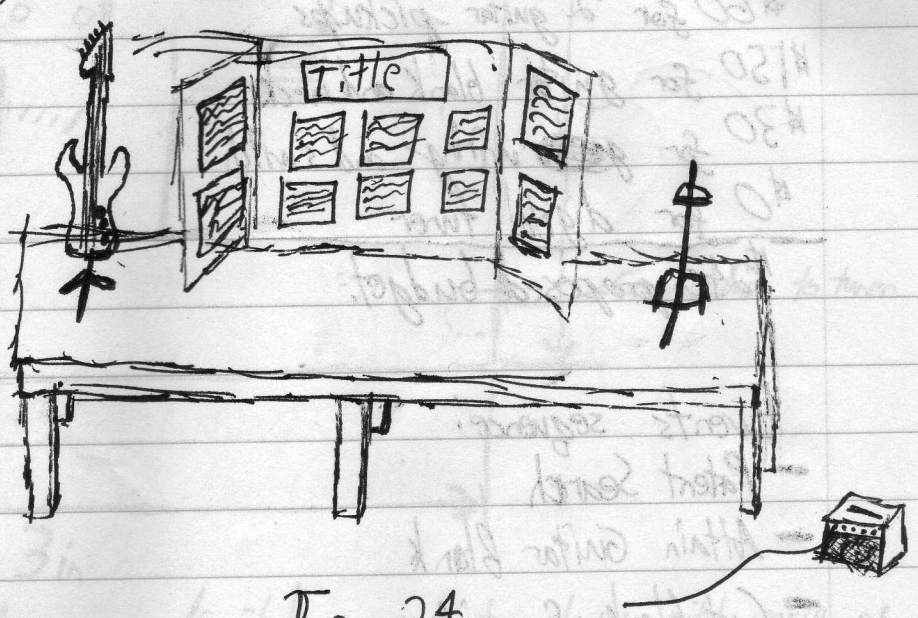


Fig. 24

- When presenting:
  - Include:
    - Board with information
    - Binder with design brief and other information
    - 3 guitar stands
    - Prototype guitar
    - Electric guitar
    - Accoustic - Electric
    - 1 or 2 amps
    - Patch Cables
    - Guitar tuners

11/6/10

Budget:

$60 for 2 guitar pickups
$150 for guitar blank and neck
$30 for wiring and switch
$0 for digital tuner

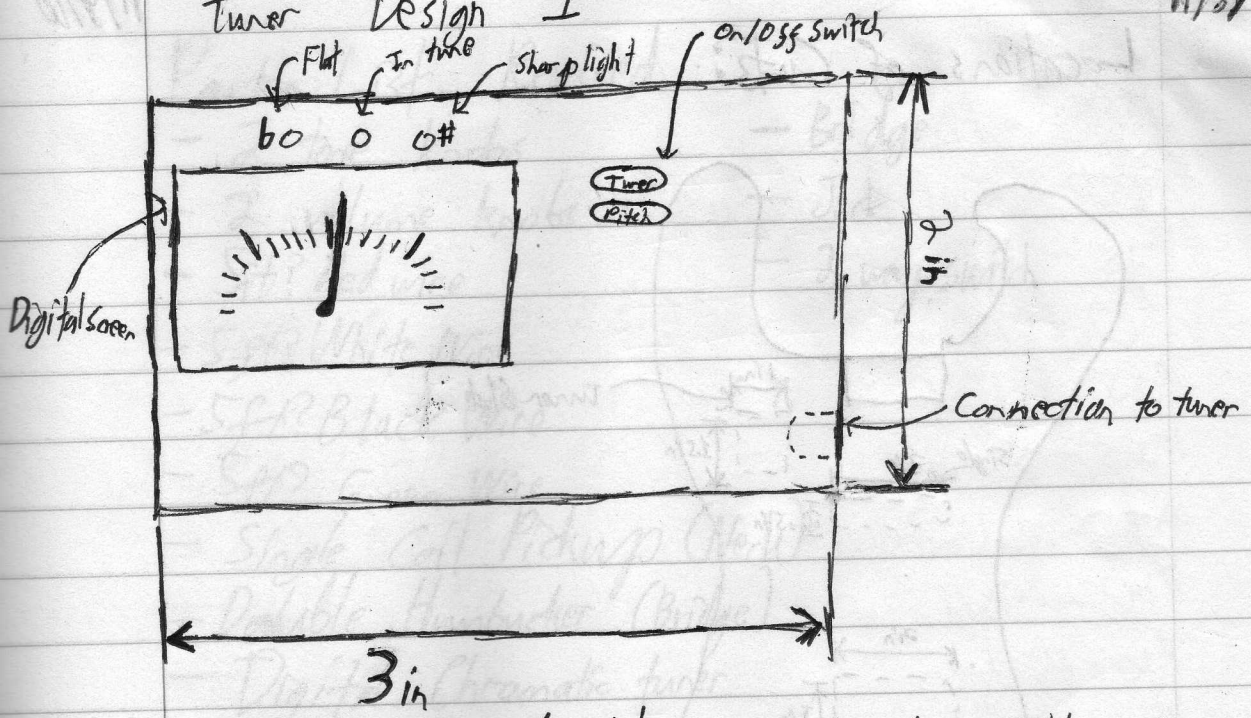
$240 proposed budget.

Events sequence:

- Patent Search
- Attain Guitar Blank
- Cut blank for wiring
- Insert Electronics into guitar
- Test electronics
- Finish Prototype.

11/8/10

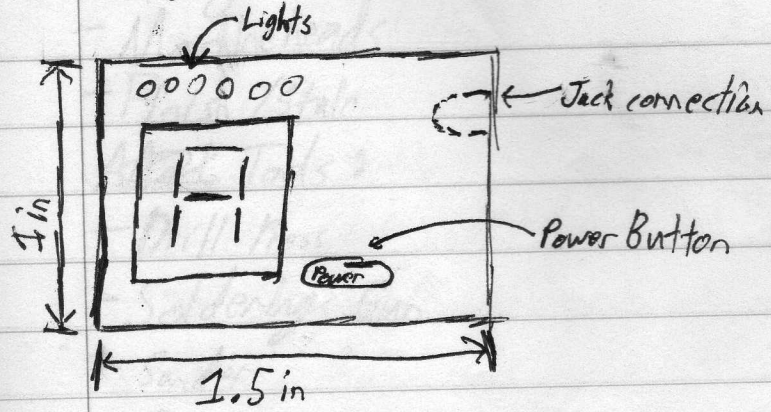
Tuner Design 1



- Contains a digital screen to show pitch variences.

- Lights at top indicate whether sharp, in tune, or flat

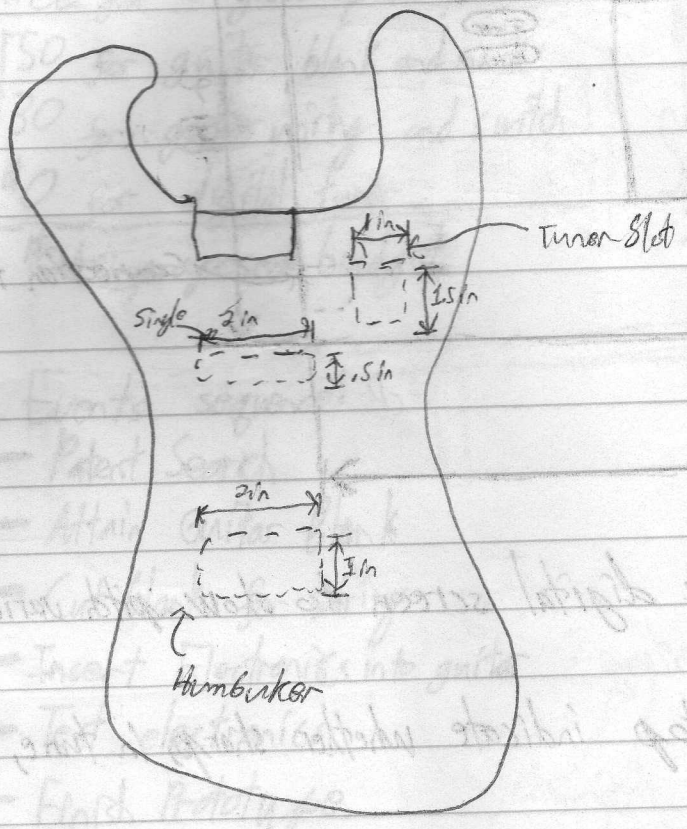
Design 2



- Smaller, more compact

11/9/10

Locations of Cuts:



- 3 main Cuts
  - Humbucker
  - Single Coil
  - Tuner Slot

Parts List Revised

- 2 tone knobs
- 2 volume knobs
- 5ft? Red wire
- 5ft? White Wire
- 5ft? Black Wire
- 5ft? Green Wire
- Single Coil Pickup (Neck)
- Double Humbucker (Bridge)
- Digital Chromatic tuner
- Guitar Neck
- Guitar Strings
- Blank Guitar Body
- Fretboard
- 3-way switch
- Machineheads
- Finish / Stain

~~Add~~ Tools:

- Drill Press
- Soldering Gun
- Sander
- Drills
- Grinder?
- Bridge
- Jack
- 2 way switch

11/11/10

Cost Estimate / Budget (Revised)

$50 - Pickups
$150 - Guitar body/neck
$25 - Wire
$0 - Tuner
$25 - Knobs
$25 - Switches
$~~75~~ 60 - Machineheads
$10 - Stain
$10 - Bridge
$15 - Jack
$50 - Slush Money

$385

Breakdown:

$150 Max Ryan

$235 Left Over

Questions: PLTW contributions?
Where can cheaper items be obtained?

Sources to Purchase: Amazon, Guitar Center, Musicians Friend,

11/12/10

Timeline:

Sequence of events?

1. ~~Material~~ Design Plan R.C.

2. ~~Material Collection~~ R.C.
   - ~~Guitar Body~~ R.C.
   - ~~Electronics~~ R.C.
   - ~~Tuner~~ R.C.

3. ~~Market Surveys~~ R.C.

Tasks:

1. Timeline/Market Survey - 2 days
2. Survey Distribution - 3 days
3. Data Collection - 2 days
4. Preliminary Sketches - 7 days
5. 3-D model CAD - 7 days
6. Get Supplies/Contacts - 2-3 weeks to collect all
7. Wiring tuner into guitar - 1-2 weeks
8. Finish Guitar Body - 1-2 Weeks

11/11/10

- Emailed Tom Singer
- Took apart electric guitar at home to look inside at the machinery

Prelim

11/15

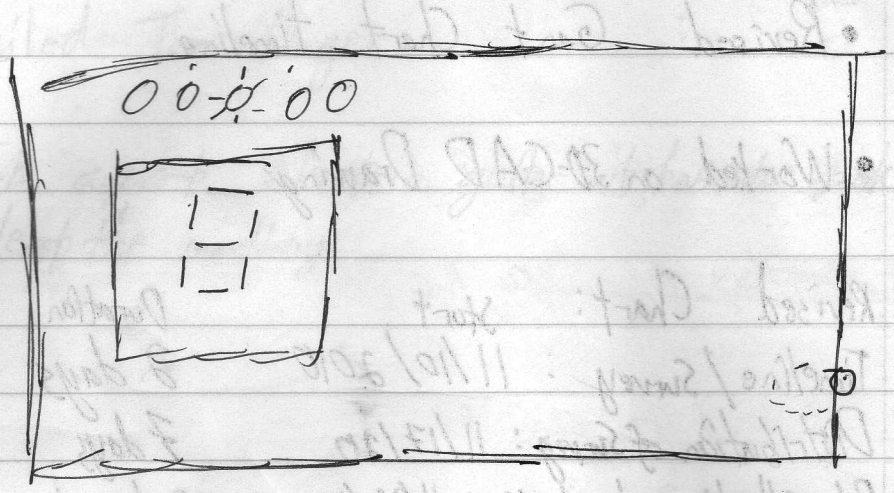
11/15/10

- Revised Gant Chart timeline
- Worked on 3D-CAD Drawing

Revised Chart:	Start	Duration	End
Timeline / Survey:	11/10/2010	2 days	11/12/10
Distribution of Survey:	11/17/10	7 days	11/24/10
Data Collection and evaluation:	11/24/10	2 days	11/26/10
Prelim sketches ~~& Model CAD~~ R.C.:	11/27/10	7 days	12/4/10
~~Get Supplies:~~ R.C.	1		
3-D CAD Model	12/5/10	15 days	12/20/10
Get Suplies	1/4/10	13 days	1/17/10
Wire tuner	1/18/10	14 days	2/1/10
Finish Body	2/2/10	21 days	2/23/10

11/15
E.M. - Resource documentation
- Can't find any in "APA" format
- Can you show me any!

11/17/10



- Life
- Current Capability (Max Sustained, Short Peak)
- Voltage
- Amp-Hours
- Weight
- Size

Inst. ~~User~~ Interface
- Accoustic
- Electric

- PPU

- User Interface

- Power Supply

1/17/10

- Patent Work around

E-Bike

- Bike Frame
- Fold Up/Fit
- Lighter/Stronger
- Customer Features
- Battery Display
- Interface ~~Tech~~

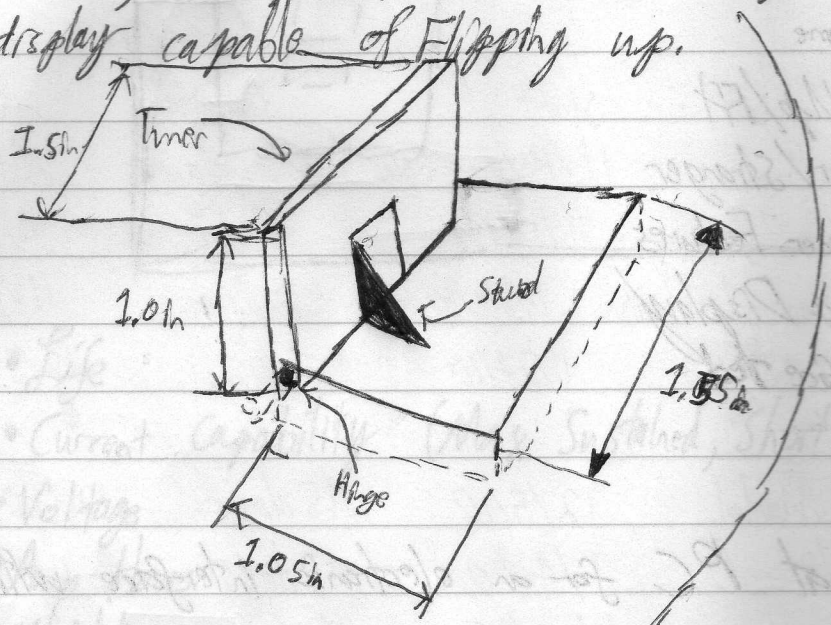
- Look at PC for an electronic interface with multi-ride
- Updated timeline

11/18/10

Possible System:

S 1

- II, PPU, UI, PS all in 1 package, have the display capable of flipping up.

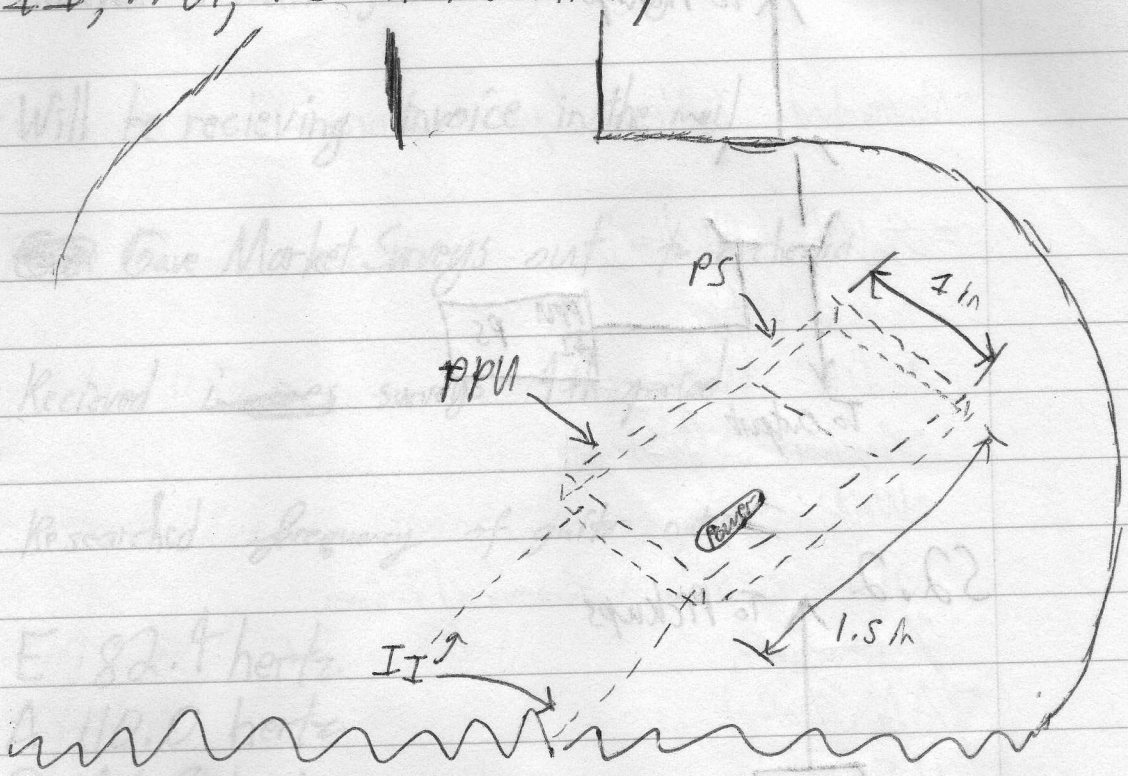


1/18/10

§2

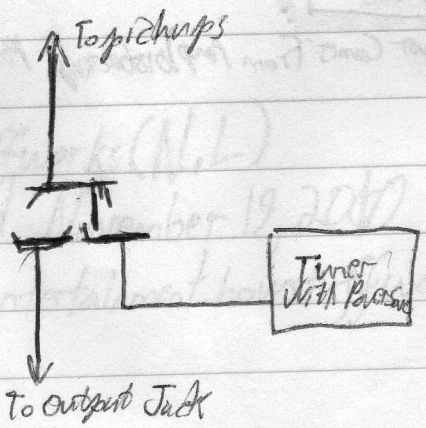
1/18/10

- II, PPU, PS in instrument, UI external



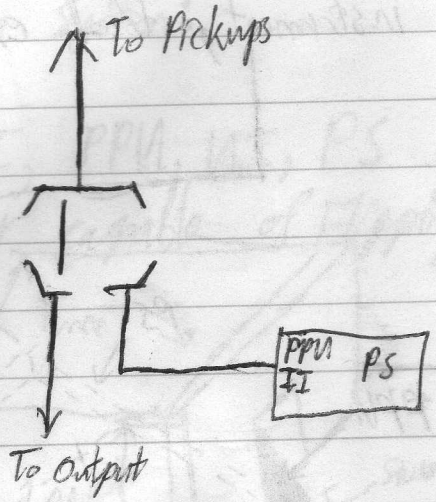
- Would have wireless User interface (Bluetooth, Laptop, etc)
- Instrument electrical systems:

§1

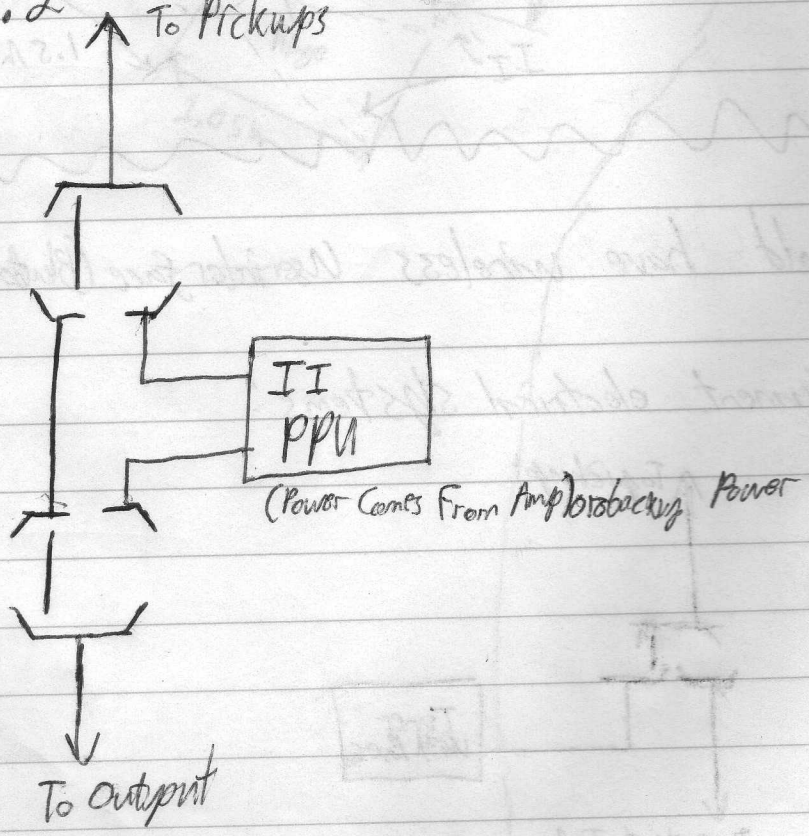


11/18/15

S2.1



S2.2



11/18/10

11/19/10

- Recieved e-mail from Thomas Singer
- Will be recieving invoice in the mail
- Gave Market Surveys out to orchestra
- Recieved surveys 4th period
- Researched frequency of guitar notes:

E 82.4 hertz
A 110.0 hertz
D 146.8 hertz
G 196.0 hertz
B 246.9 hertz
e 329.6 hertz

Source:
Howstuffworks (N.L)
Retrieved November 19, 2010
http://entertainment.howstuffworks.com/guitar3.htm

11/22/10

- Recieved #50 from Norm Ih

- Researched batteries/power sources:

- 9 Volt (Alkaline)
  - 8.6 Volts
  - Life: ~~40 hours~~
  - Amp hours: 565 mAh
  - Weight:
  - Size: 48.5mm x 26.5mm x 17.5mm
  - ~~% Capacity:~~
- AA (Alkaline)
  - 1.5 volts:
  - Life: ~~40 hours 2700 mAh~~
  - Amp hours: 2700 mAh
  - Wt.:
  - Size: 13.5mm x 50.5mm
  - ~~% Capacity:~~
- Lithium Ion:

R.C.

- Life:
- Amp hours:
- Wt:
- Size:
- % Capacity:

11/22/10

11/23/10

- Dropped surveys off at Marrelli
- Updated timeline
- Revised interview questions
  - Added Wireless tuner Question
  - Removed question about tuning position
- Still need $50 from Martin

11/25/10

- Researched computer chips for guitar processor
- Sending email to Carl asking about processor chip and programming and his suggestions
- Started Auto-Cad model.
- Email rejected by yahoo, email service temporarily down
- Interviewed Angel.

11/29/10

- Collected Market Surveys from Marrell Music
- Interviewed Ms. Marrell.
- Stopped Inventor model, due to lack of information availible on part dimensions
- Updated Timeline

58

11/30/10

String • Guitar note frequencies (Hertz)

String	1st–5th fret	1st–12th fret
6th	E 82.4	
	F 87.3	
	F# 92.5	
	G 98.0	
	G# 103.8	
5th	A 110.0	
	A# 116.5	
	B 123.5	
	C 130.8	
	C# 138.6	
4th	D 146.8	
	D# 155.6	
	E 164.8	
	F 174.6	F# 185.0
3rd	G ~~185.0~~ 196.0	G# 207.6
	A ~~196.0~~ ~~207.6~~ 220.0	
	A# ~~220.0~~ 233.1	
2nd	B ~~233.1~~ 246.9	
Middle C	C ~~246.~~ 261.6	
	C# 277.2	
~~2st~~	D 293.6	
	D# 311.1	
1st	E ~~D#~~ 329.6	
	F ~~E~~ 349.2	
	F# ~~F~~ ~~E#~~ 370.0	
	G ~~F#~~ 392.0	
	G# ~~207.6~~ 415.3	
	A ~~G#~~ 440.0	
	A# 466.1	
	B 493.8	
	C 523.2	
	C# 554.3	
	D 587.3	
	D# 622.2	
	E 659.2	

How stuff Works (N.L.)
Retrieved November 30, 2010
http://entertainment.howstuffworks.com

11/30/10

12/1/10

- Decision Matrix?
  - Find pitch frequency
  - Falls within certain range ~~=~~ certain note
  - Falls within subrange either:
    - flat
    - sharp
    - in tune

12/2/10

- ~~found out~~ R.C. found out a junk guitar is needed for the project as a first prototype
- Worked on market research data
  - finished questions 1-3
- Visited Morrell Music
  - Ms. Morrell donated an accoustic pickup
- Recieved Email from Thomas Singer:
  - Guitar parts will be sent out Monday
- Emailed Carl to see if he could meet with the group on tuesday.

12/2/10

d for

12/3/10

- Michael March was absent today, so was unable to obtain guitar 1st Period
- Worked on Market research survey questions
  - Finished analyzing data, questions 4-5
- Went to Michael Marche's house after school, attained guitar.
- Paid by Martin for contribution for good guitar.
- Guitar Fran Michael is going to need:
  - acoustic pickup
  - new strings
  - new machineheads

12/6/10

- Brought in the ~~guit~~ acoustic guitar
- Took Pictures:
  - Guitar 4 angles
  - Martin with guitar
  - Nermin With Guitar
  - Pickup
  - Pickup and guitar
  - Guitar Case.
- Finished market Research questions 6-8

12/6/10

12/8/10

- Finished analyzation of market research data.
- Picked up guitar parts from bookroom 4th period
- Package 1 weighed 8lbs
- Package 2 weighs 3lbs

  -Total Wt: 11lbs

- Brought Package to Mr. Holmoks room, A140.
- Packages do not fit in cabinet being used to hold guitars, so are placed on top.
- No time to open packages today
- Researched wiring diagram

  - Guitar Wiring Site (April 8, 2010) Retrieved December 8, 2010 http://www.1728.com/guitar.htm

12/9/10

- Opened Package 1, found:
  - Neck & Fretboard
  - Bridge and neck pickup

- Opened Package 2; found:
  - Body
  - Bag of screws, switches, knobs, etc.
  - Wiring
  - Wiring diagram
  - Soldering material

- Missing from package:
  - **Bean Plate**
  - Invoice

- Sent an email to Tom Singer asking about this

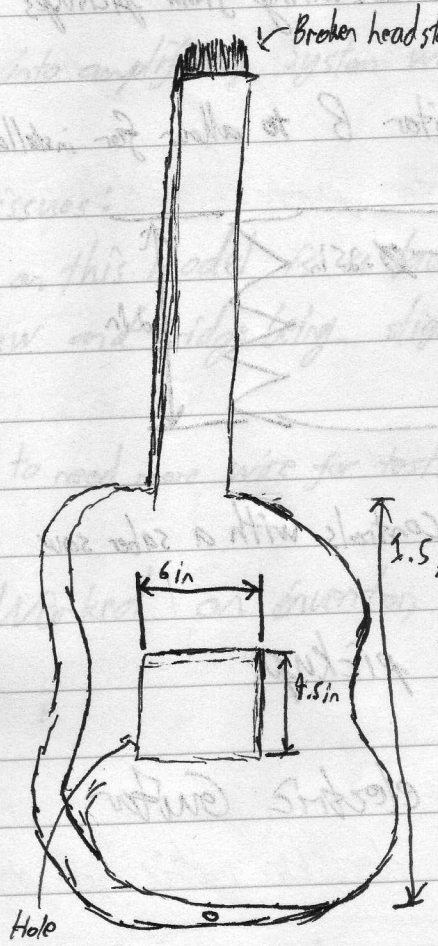
- began work on prototype A:
  - Removed strings
  - Cut hole in back of Martin's junk guitar

- Interviewed Tamyra Xielva

- Interviewed Hillary Donner

12/10/10

- Removed Pickup from Martin's Guitar

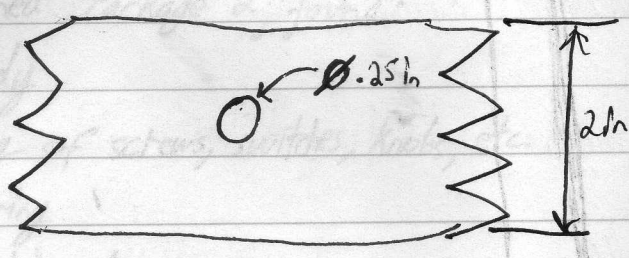


- Removed Strings from Guitar B
- Began anglyzing possible ways to place pickup in guitar B
- Interviewed John Brochr

64

12/14/10

- Possible issue with guitar body:
  - No holes for electronics/wiring from pickups
- Drilled hole in guitar B to allow for installation of the jack



- Cut hole for pickup controls with a saber saw
- began installation of pickup.
- ~~Looked~~ Brought in electric Guitar

12/14/10

12/15/10

- Finished (except for A, D, strings) conversion of ~~the~~ Prototype 1
- Plugged into amplifier, System works
- Possible issues:
  - tuning on this model is a tad finky, due to the strings being new and bridge being slightly raised
  - Going to need more wire for testing the prototype
- Nermin Worked on inventor, making the machine heads

jack

12/16/10

- sanded down Neck of guitar
- Worked on analyzing / compiling to do list:
  - Bring home guitar parts for holidays
  - Get cherry stain
  - get a computer board
  - get wireless headset
  - get wireless signal generator
  - start coming up with decision matrix for program
  - work on inventor
  - assemble guitar
- Brought home the guitar neck

1/6/10

S.M
1/3/11

~~slide 5, delete pics~~

- ~~Ms. Marrell~~
  - ~~demo~~

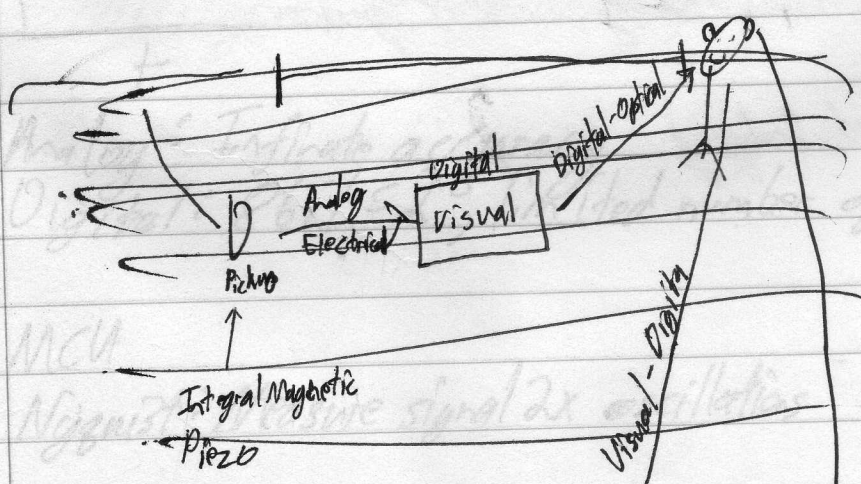
- ~~search pickups~~

- ~~Hertz~~
- ~~excess harmonics~~

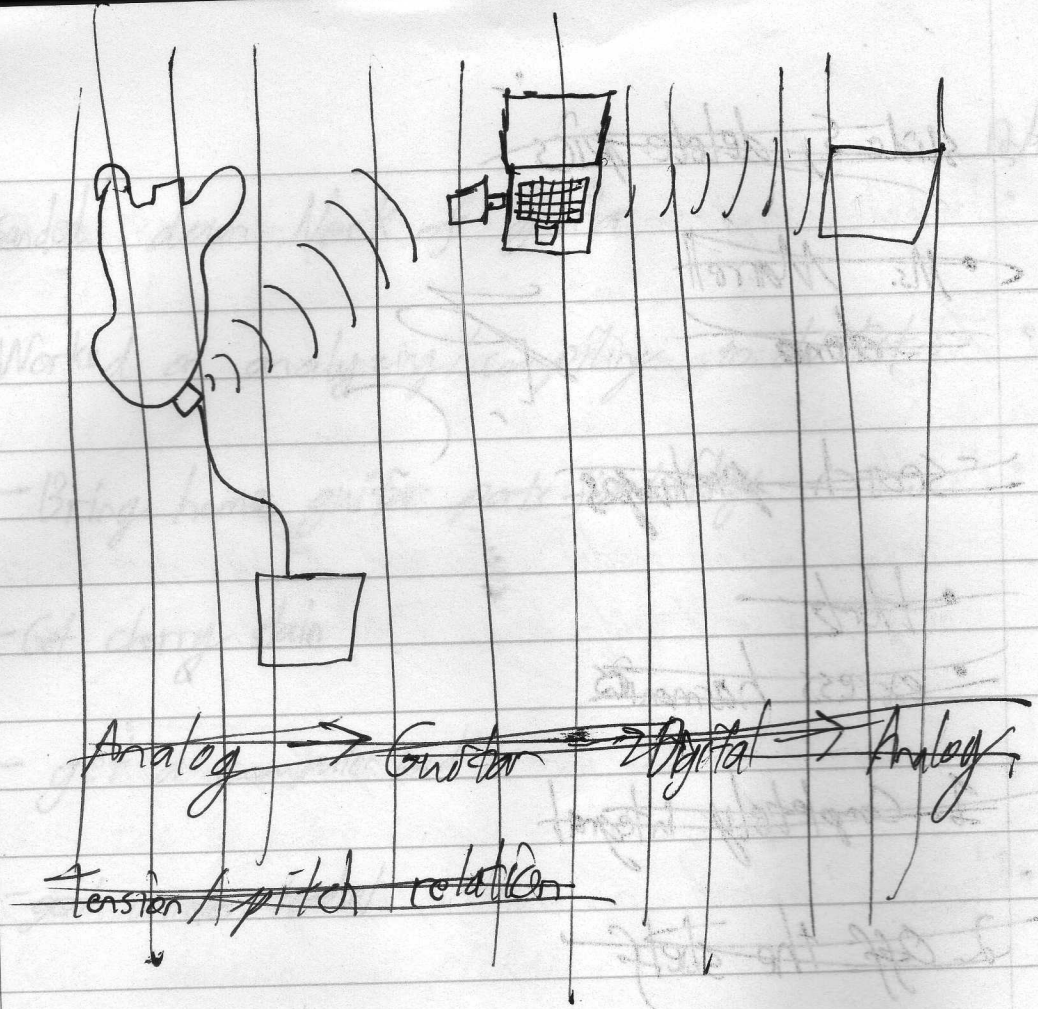
~~1. Completely integral~~

~~2. Off the shelf~~

~~3. Signal from off the shelf to wireless~~



~~* Piezo-Electric Effect *~~



R. C.

12/23/10

- Met with Carl:

Sizes of batteries:

9V: 1.45 in^3

AA: .465 in^3

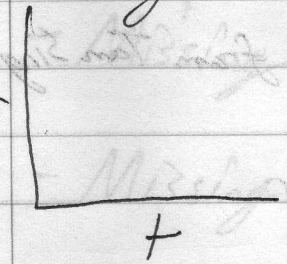
3 AA more energy than 1 9V

Capacity, Voltage

Energy / Volume = Energy Density

V-f = Farrier

- Analog vs. Digital



Analog: Infinate accuracy

Digital: 8bit = 2^8, limited number of increments

MCU

Nyquist: Measure signal 2x oscillations

1/4/10

- Did research on battery sizes / oscillations
- Pulled up pictures from oscilloscope
- took inventory of project:
  - Prototype 1 completed
  - All materials for stage 1 acquired
  - current budget: $1.75 under projections
  - Still need invoice / bean plate from Tom Singer
- Finished Sanding neck of guitar
- Sanded body

1/4/10

1/5/10

- Sanded guitar body
- Found imperfections:
  - Guitar Neck doesn't fit in slot
  - Knob holes not wide enough
  - Screw holes missing on neck
  - Scratch revealed on front after sanding
  - Missing Jack-hole
  - Missing holes for pickup wires
- All around, sanding and drilling will be required.

1/6/18

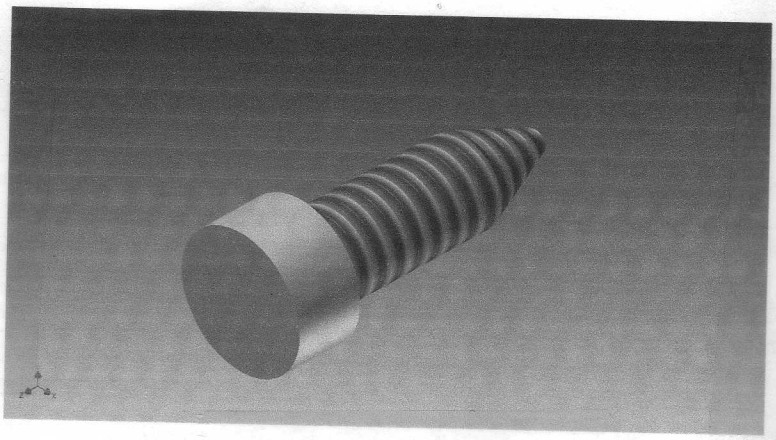
- Created / Fixed screw holes for:
  - Bridge
  - neck
  - Pickups
  - Bridge
- Made Bridge accoustic holes
- Sanded neck slot.
- Sanded Headstock

11/14

- Sanded neck slot
- Marked drill holes for:
  - Pickup wiring
  - Guitar Jack
- Sanding neck slot not going well
- Began Mid-term power point

1/11/14

- Worked on power point
- Created Pickup Screw on inventor

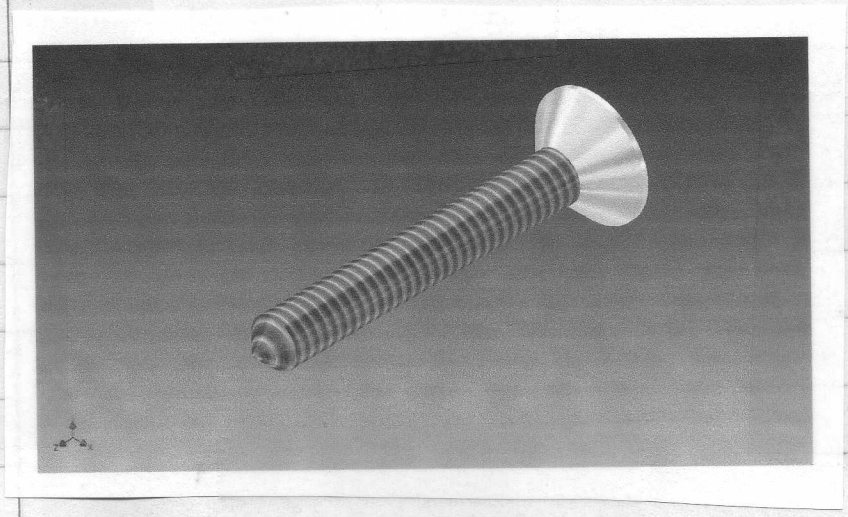


- Began Work on Bridge Screw

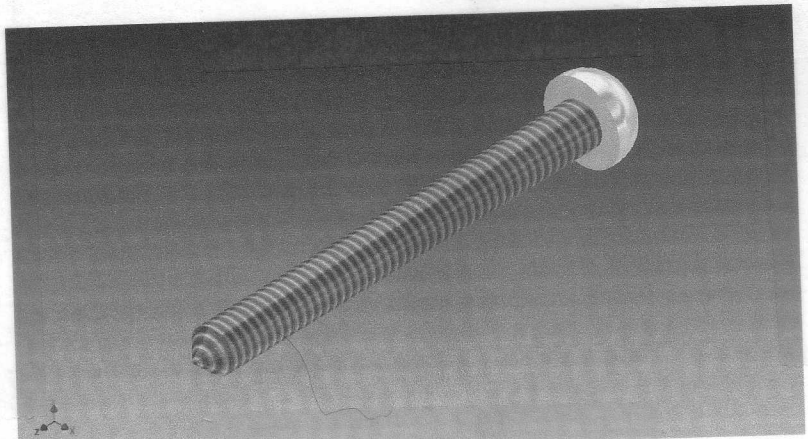
1/11/14

1/11/14

- Worked on power point
- Created Bridge Screw on Inventor

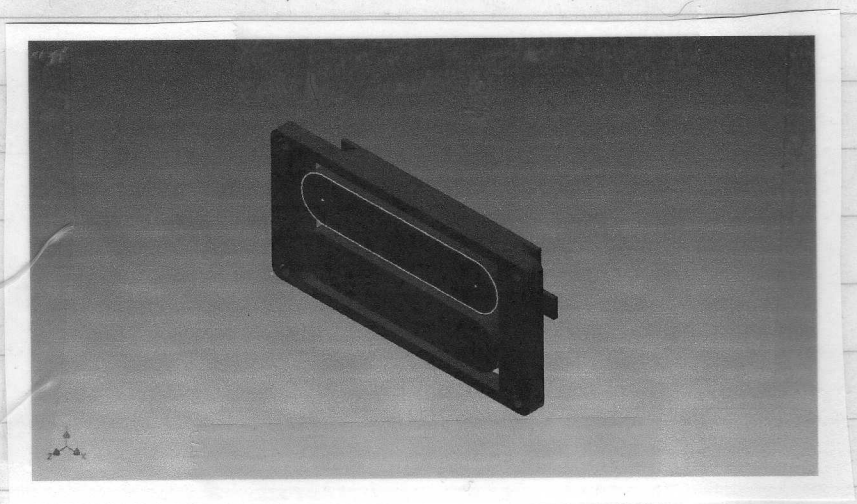


- Created Neck Screw on Inventor



1/13/11

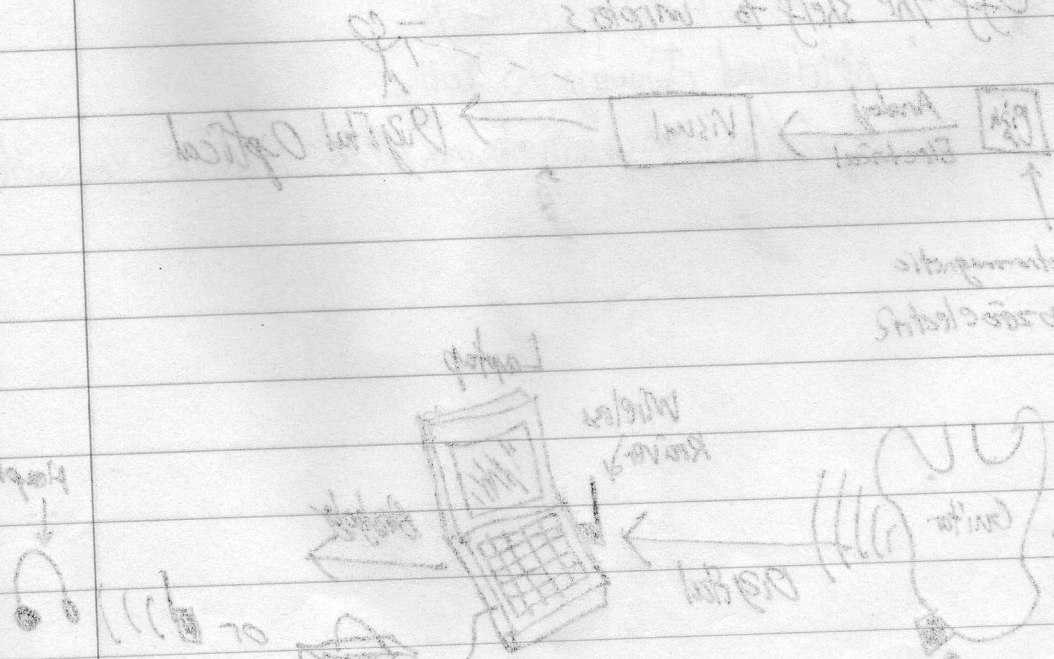
- Worked on power point for midterm
- made 3D Cad model of pickups:



1/13/11

1/14/11

- Finished power point
- Sent Power point to Carl
- Sent Pictures to Carl
- Set up meeting with Carl for Monday

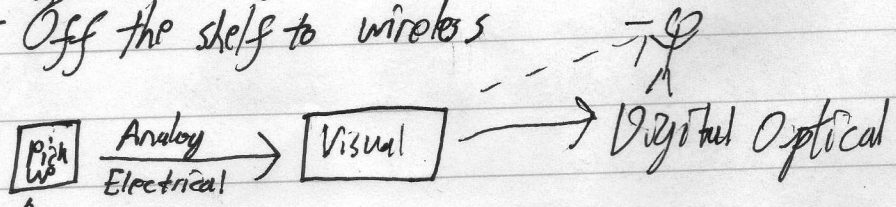


1/17/11

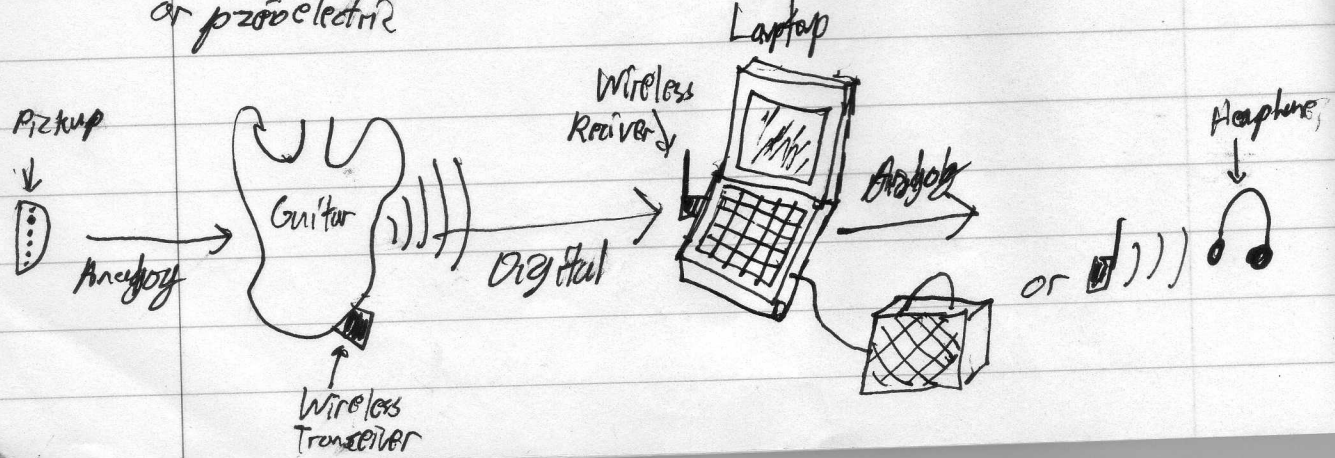
- Meeting with Carl at 1 pm
- Showed Carl the powerpoint
  - Recomendations
    - Add conclusion / budget

- Research Pickups / Wireless systems
  - herz
  - excess harmonics
  - look at costs

Options
- Completely Integral
- Off the shelf
- Off the shelf to wireless



Electromagnetic
or piezoelectric



1/24/10

17/11

- Tried Calling Nermin, MIA, Busy signal
- ~~Ke~~ke Gave Powerpoint Midterm Presentation

Headphone

1/25/11

- Tried Calling Nermin, MIA, Busy Signal
- Looked up costs of wireless recievers/transmitters
  - $49.95 at amazon
    - Amazon.com (N.L.)
      Retrieved ~~J~~ January 25, 2011
      http://www.amazon.com/nady-guitar%252Fbass-Wiress-DKW
  - $169.95
    Shure SLX1 Demo

~~http://~~ Sweetwater (N.L.)
Retrieved January 25, 2011
http://www.sweetwater.com/c896-wireless_transmitters

1/26/11

- Tried Calling Nemth, MIA, recieved busy signal

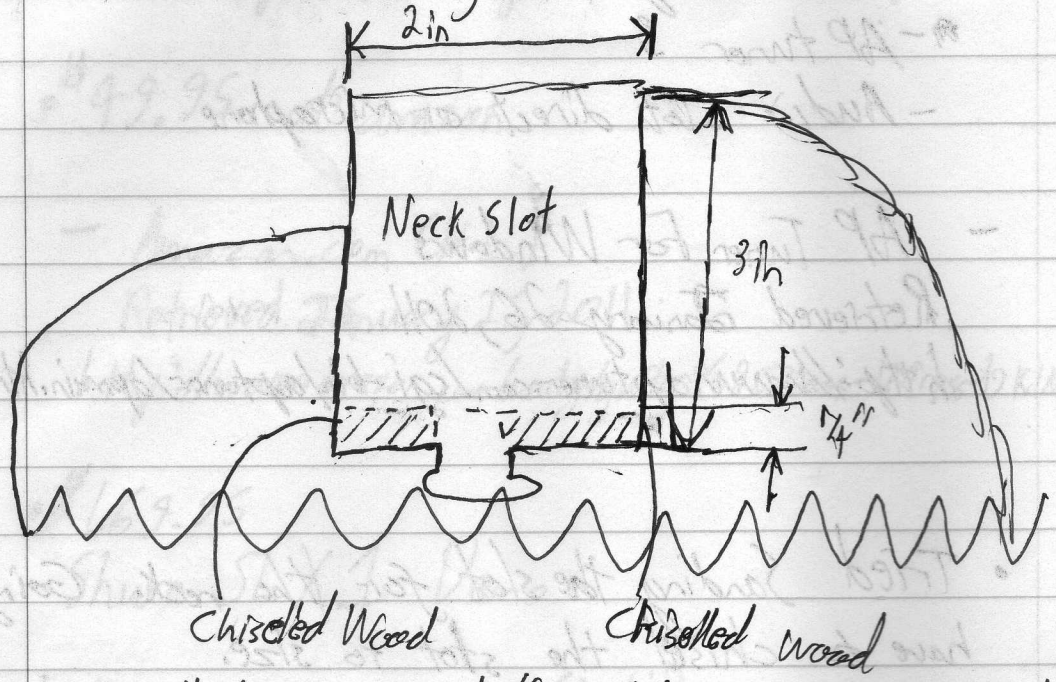
- Found Freeware guitar tuner
  - AP tuner 3
  - Audio Slot direct or microphone

- AP Tuner For Windows
  Retrieved January 26, 2011
  http://www.aptuner.com/cgi-bin/aptuner/aprnin.htm/

- Tried Sanding the slot for the neck. Going to have to chisel the slot to size.

1/27/11

- Tried Calling Nermin, MIA, recieved busy signal
- Chisselled out slot for ~~headstock~~ R.C. neck

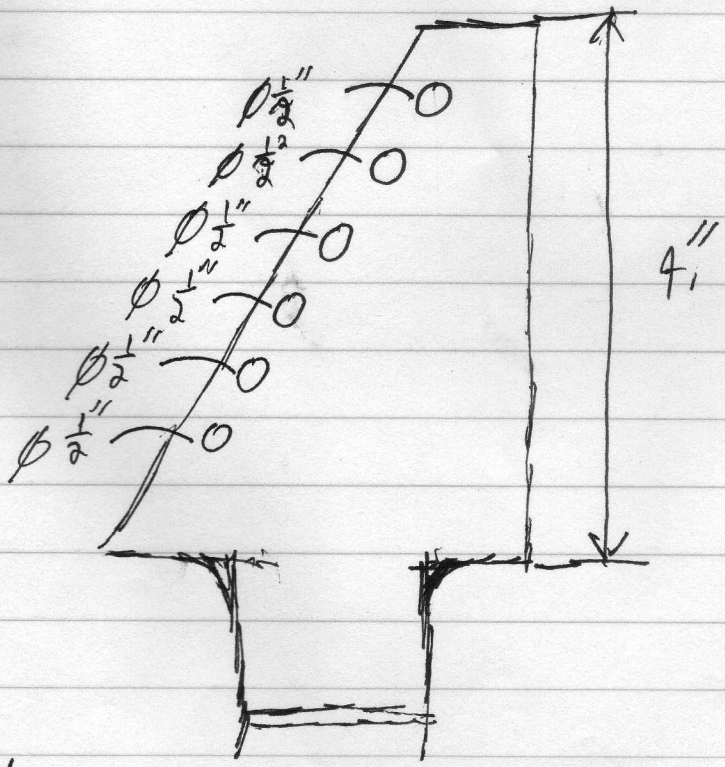


- Chiselled around 1/8" to 1/4" of wood so neck would fit.
- Sanded slot to answer fit
- Sanded body to answer ~~headstock~~ R.C. maximum time efficiency

1/27/11

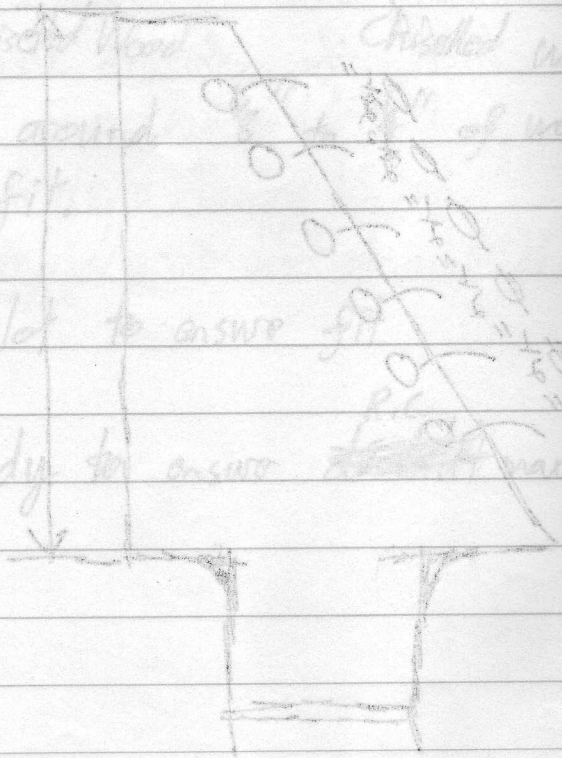
1/28/11

- Called Carl, set up meeting on tuesday at 4:30 pm.
- Called Nermin, MIA, mother answered phone at ≈8:15
  - Nermin would be back home "later that day"
  - Passed on info on mentor meeting to Nermins Mom
- Martin and I finished sanding holes for guitar tuning knobs on headstock



Saturday 1/29/11

- Sent Tom Singer an email Asking about absence of Invoice & bean plate



Sunday 1/30/11

- Recieved email from Tan Singer, bean plate will be sent out this week, had been an issue with coops

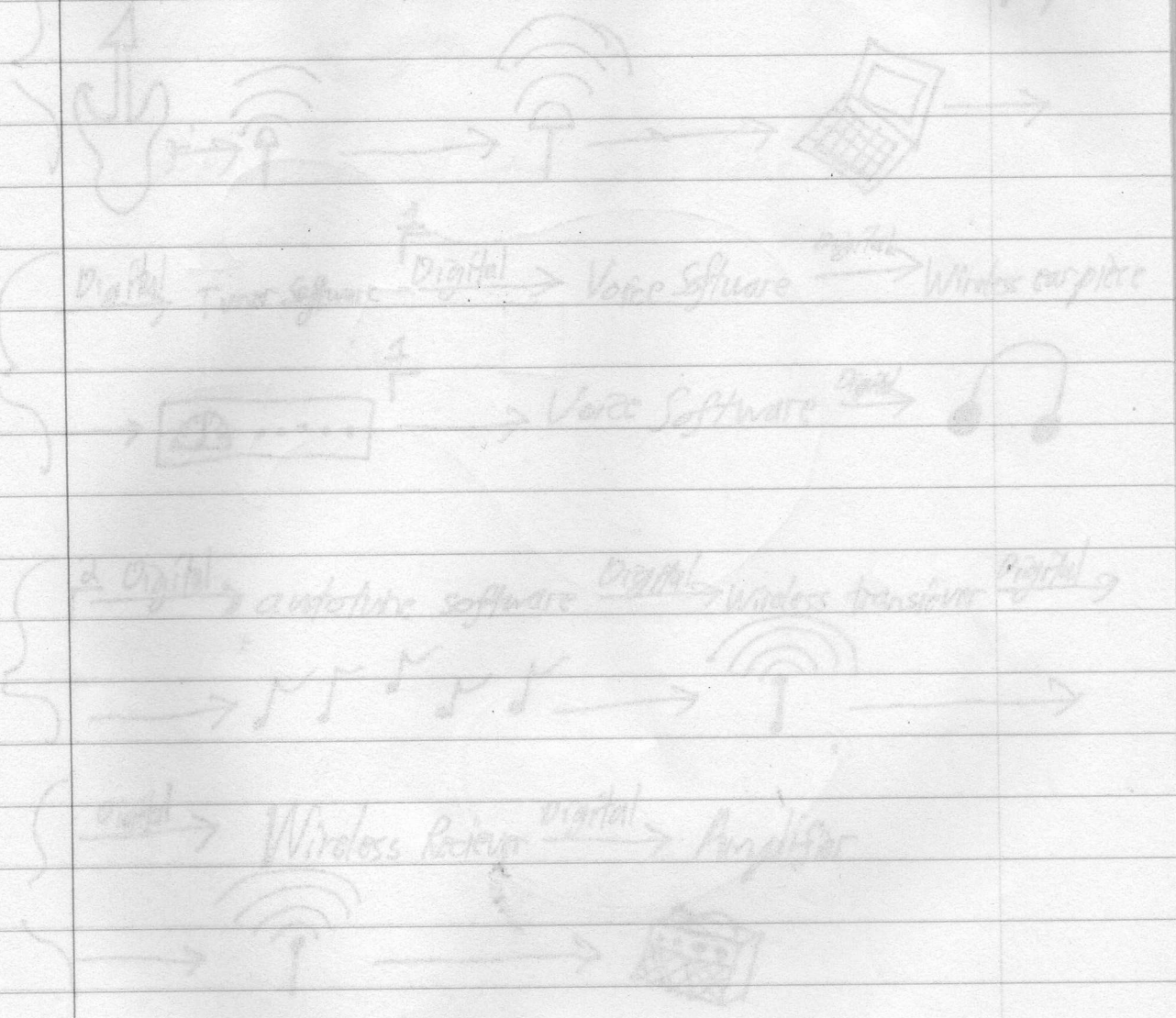
1/31/11

- Meeting topics:

  - Freeware program to use
  - Methods to create wireless transmitters/recievers
  - Internal wiring slots of guitar
  - Talk about the programming methods
  - Discuss frequency ranges

2/3/11

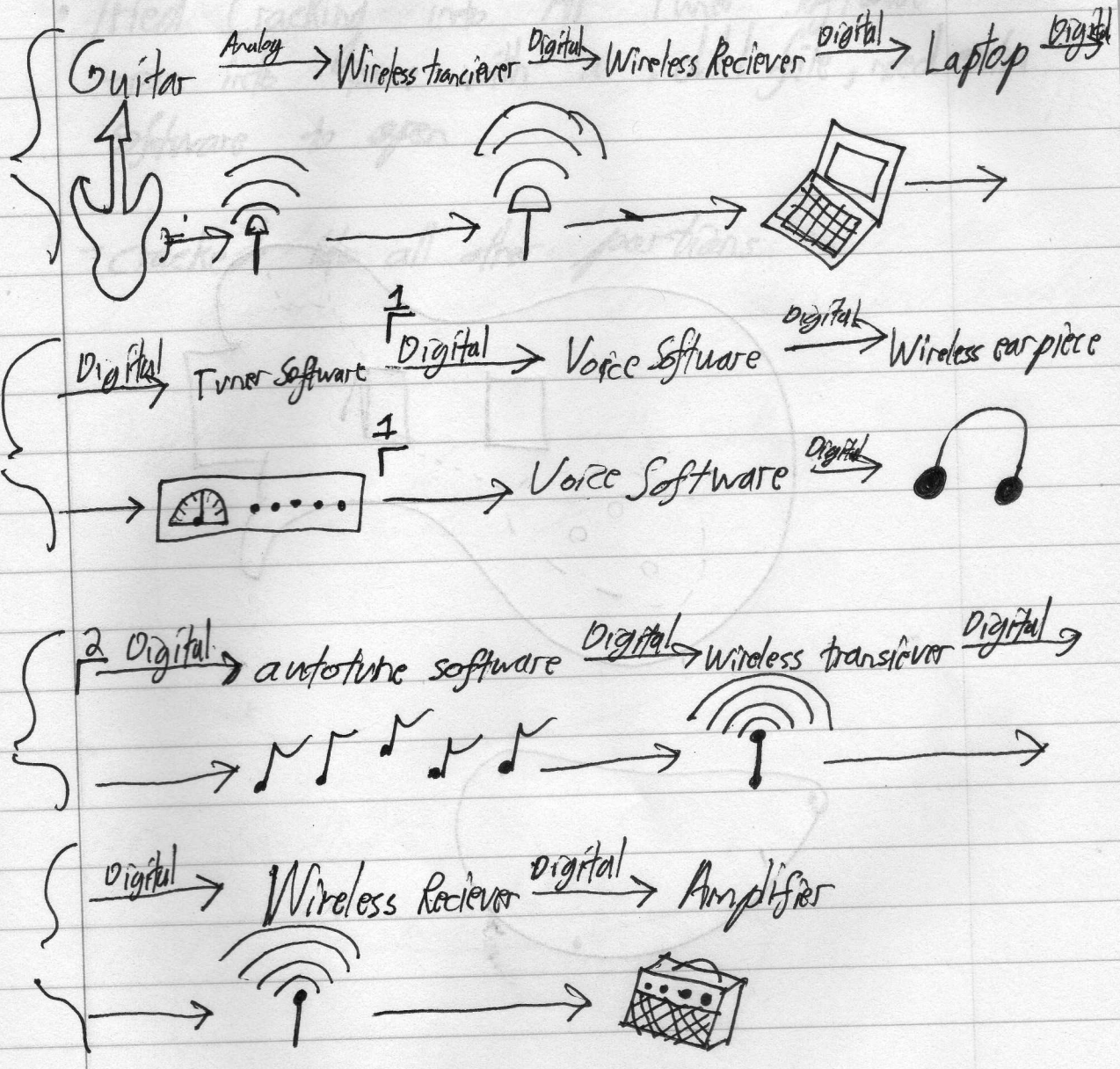
- Sent emails to Carl, rescheduled for friday



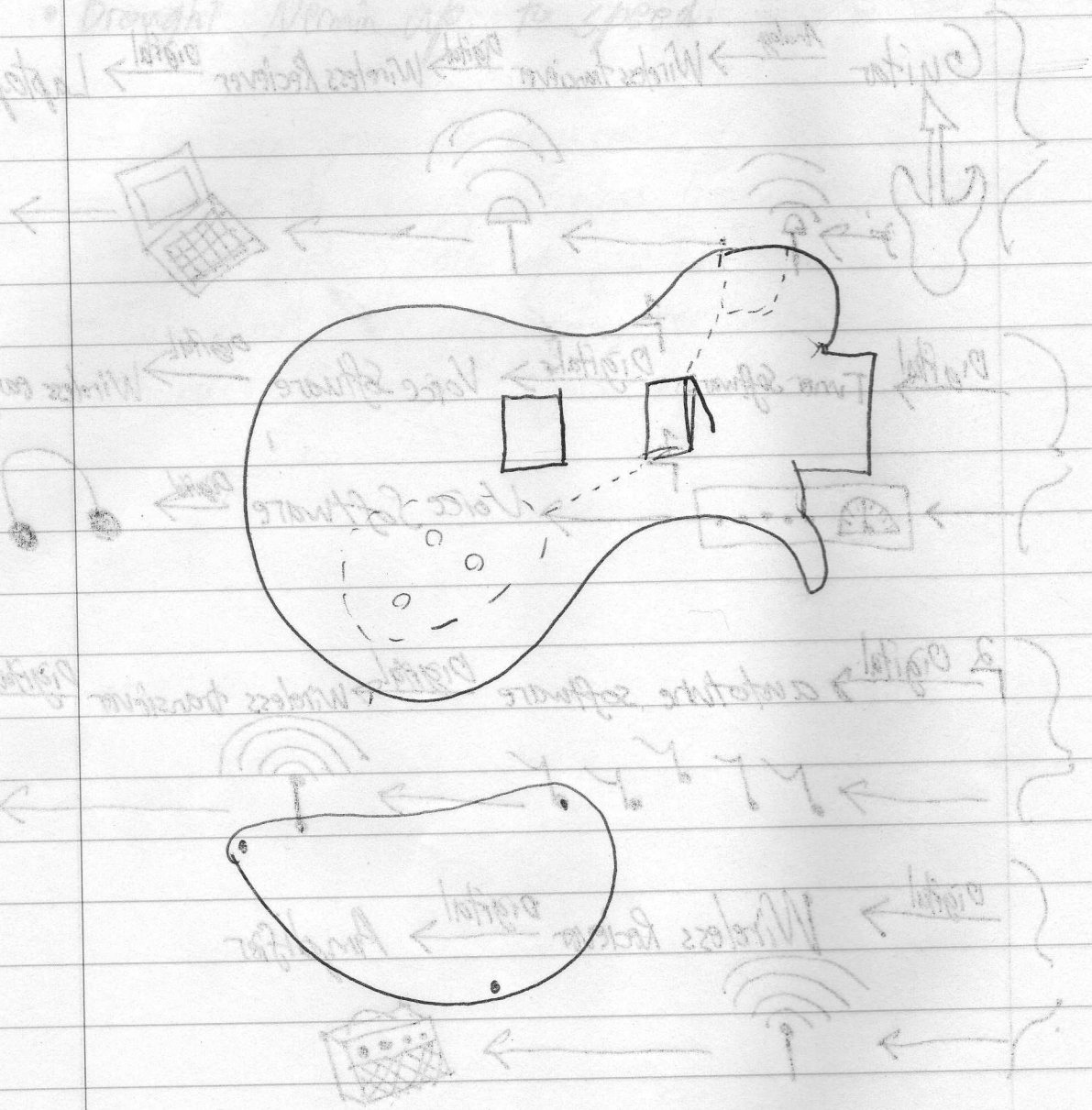
2/4/11

- Brought Nemin up to speed.

2/5/11


Guitar
Analog
Wireless tranciever
Digital
Wireless Reciever
Digital
Laptop
Digital
Digital
Tuner Software
1
Digital
Voice Software
Digital
Wireless earpiece
1
Voice Software
Digital
2 Digital
autotune software
Digital
Wireless transciver
Digital
Digital
Wireless Reciever
Digital
Amplifier

2/5/11



2/5/11

2/7/11

- Tried Cracking into AP Tuner Software
  - ran into issue with a .dll file, need extra software to open
  - cracked into all other portions.

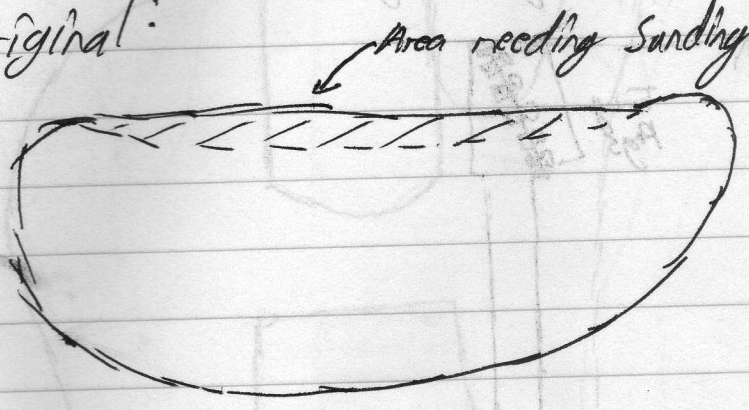
- PJ 84 Looks good
- Graphics nice. need more hand drawn

2/9/11

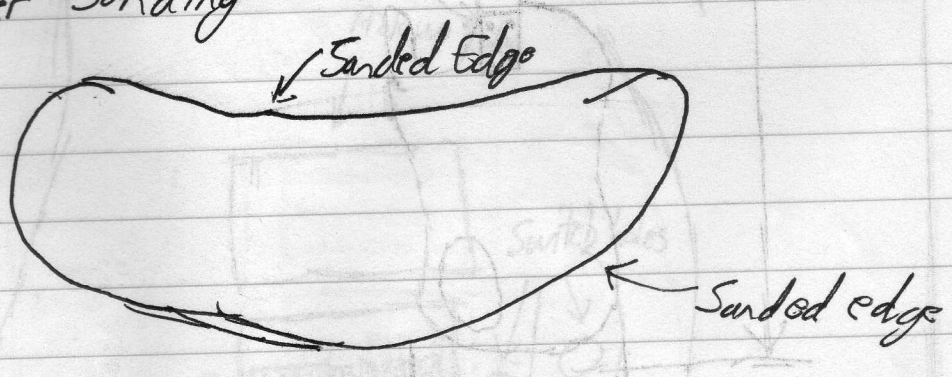
- Recieved Bean plate in the mail from Tom Singer

- Spent day sanding down so it cradld fit in guitar body.

Original:

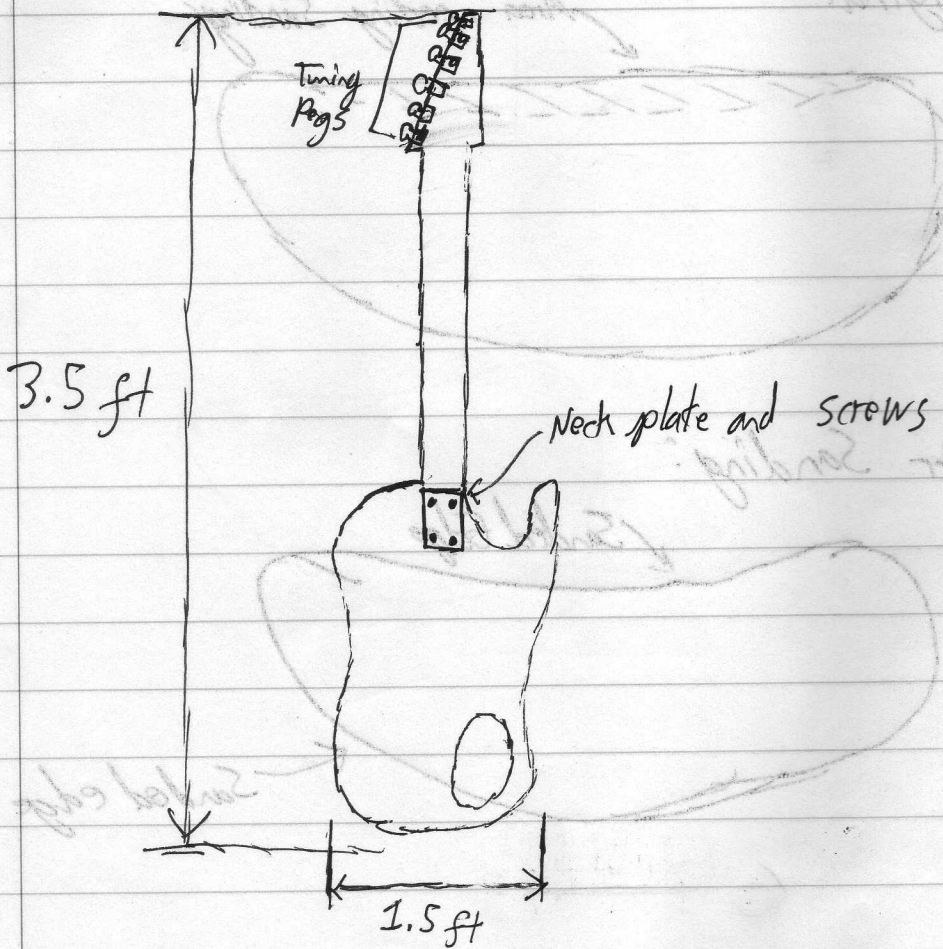


After Sanding:



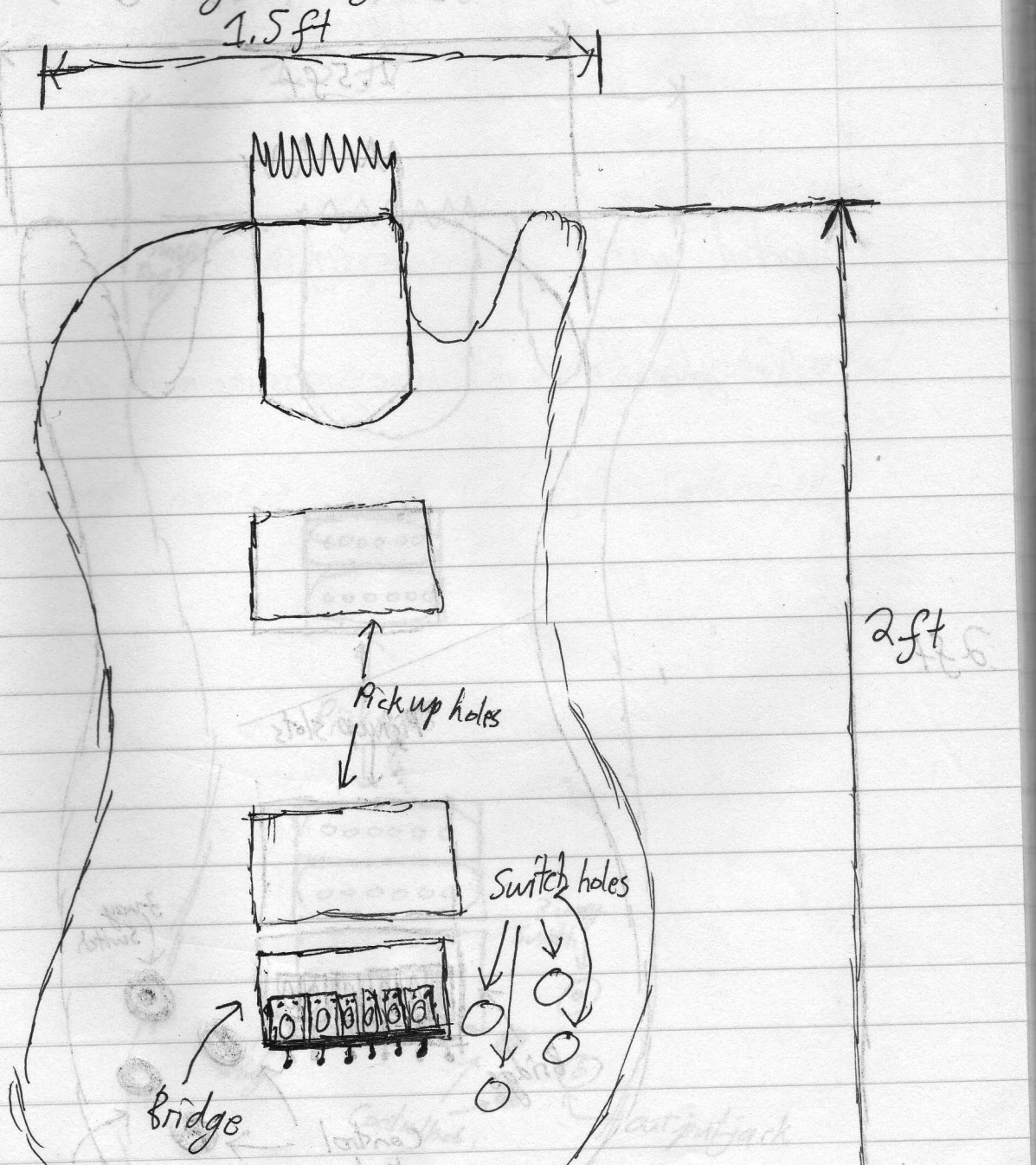
2/10/11

- Nermin Worked on CAD models
- began putting guitar together
  - attatched neck to body
  - attatche tuning pegs to neck



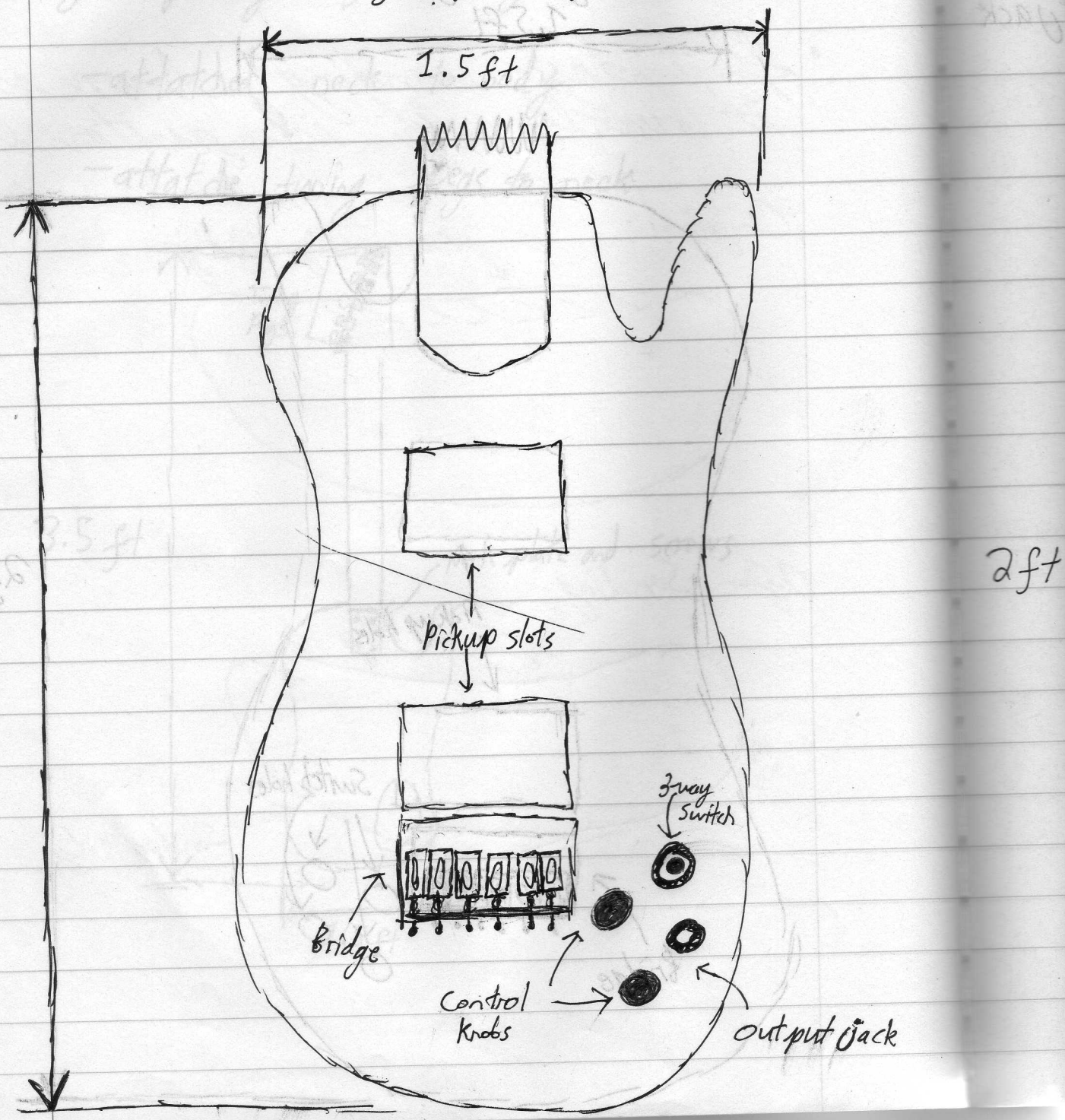
2/11/11

- Nermin worked on CAD models
- added bridge to guitar



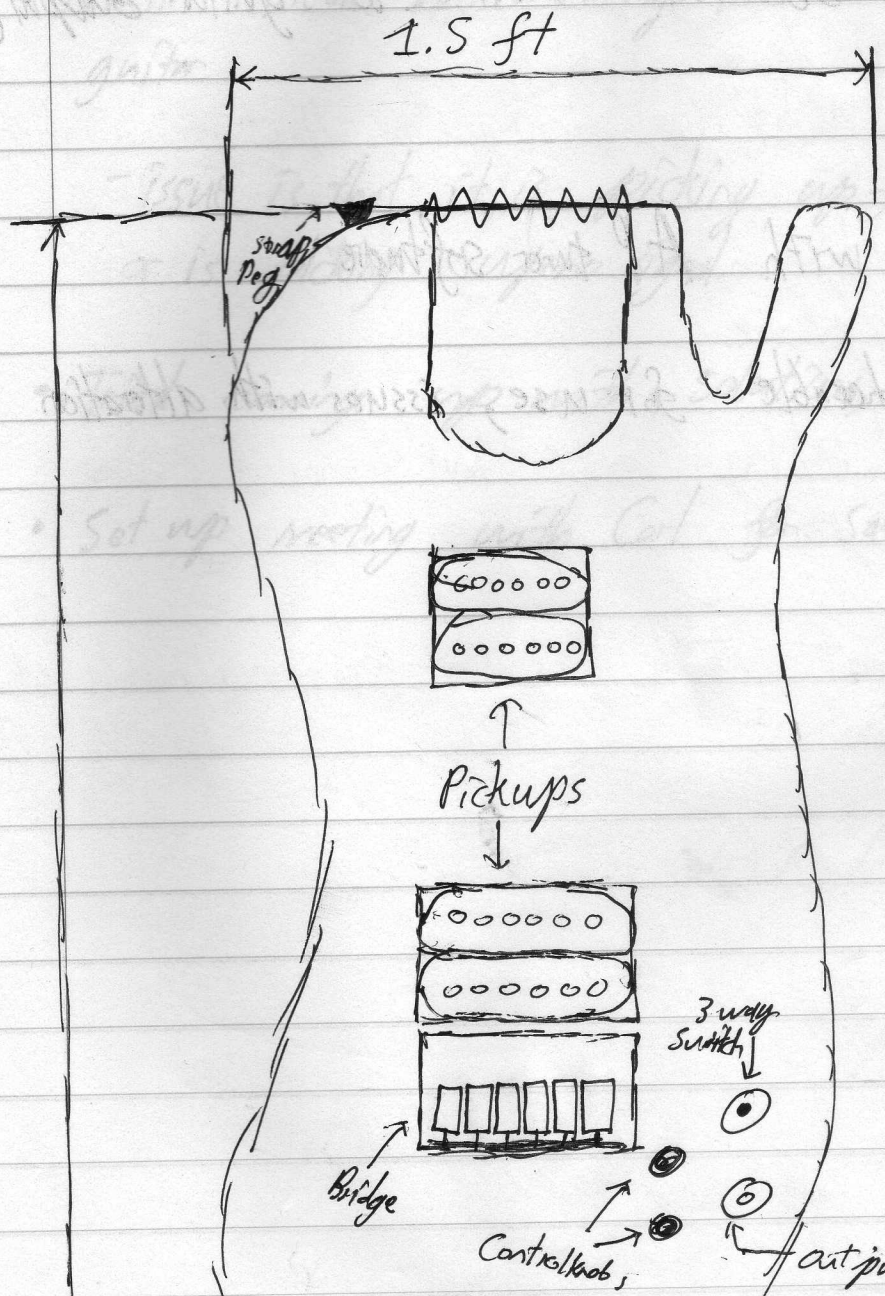
2/11/11

- Nermin worked on CAD models
- Added knobs to guitar, output jack, 3-way switch



2/11/11

- Nermin Worked on CAD models
- Added Pickups, Strap pegs, to guitar



2/17/11

- Norman Worked on CAD models
- Martin Soldered tuner to guitar output jack
- Worked with AP tuner software
  - Not shareable for use, issues with alteration