

# Stand/Enclosure Assembly Design

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P09007

# Stand Assembly Review Schedule

- Expectations
- Project Planning elements
  - Customer needs
  - Engineering Specifications
  - BOM
- Visualizations
  - 3D models, Mock-up
- Design gap discussion
- Review of other parts

# Review Expectations

- Customer feedback
  - Overall design
  - All needs met
- Finalize part selection
- Overall feedback with design gaps
  - Post height adjusting
  - Attaching mount plate to posts
  - Tray location & potential other feature

# Customer Needs

| Customer Need # | Importance | Description                                                         | Comments/Status                                                       |
|-----------------|------------|---------------------------------------------------------------------|-----------------------------------------------------------------------|
|                 |            | <b>Enclosure</b>                                                    |                                                                       |
| CN1             |            | Safely house electrical components (cannot blow up)                 | ES1,ES5                                                               |
| CN2             |            | Provide mounting space for LCD                                      | ES4                                                                   |
| CN3             |            | Provide secure mounting for Ipod                                    | ES4                                                                   |
| CN4             |            | Easy access for repairs (or specification testing)                  | ES2,ES3                                                               |
| CN5             |            | Tilting degree of freedom                                           | ES7,ES8                                                               |
| CN6             |            | Secure holding for other items                                      | All purpose tray in selection (with velcro straps for securing items) |
|                 |            | <b>Functionality</b>                                                |                                                                       |
| CN7             |            | Provide permanent charging mechanism for Ipod                       | Has ipod dock, cord will be permanently attached                      |
| CN8             |            | Offer user way to tap into voltage if he does not use Ipod          | ES14                                                                  |
| CN9             |            | Ensure internal protection from standard external gym hazards       | ES1                                                                   |
| CN10            |            | Simple adjustability for different users                            | ES7,ES8,ES9,ES11                                                      |
|                 |            | <b>Stand</b>                                                        |                                                                       |
| CN11            |            | Needs two posts to reduce swaying and increase stability            | ES13                                                                  |
| CN12            |            | Ability to raise and lower stand height for enclosure adjustability | ES6,ES11                                                              |
| CN13            |            | Safely support mounting plate/enclosure assembly                    | ES10                                                                  |

# Engineering Specifications

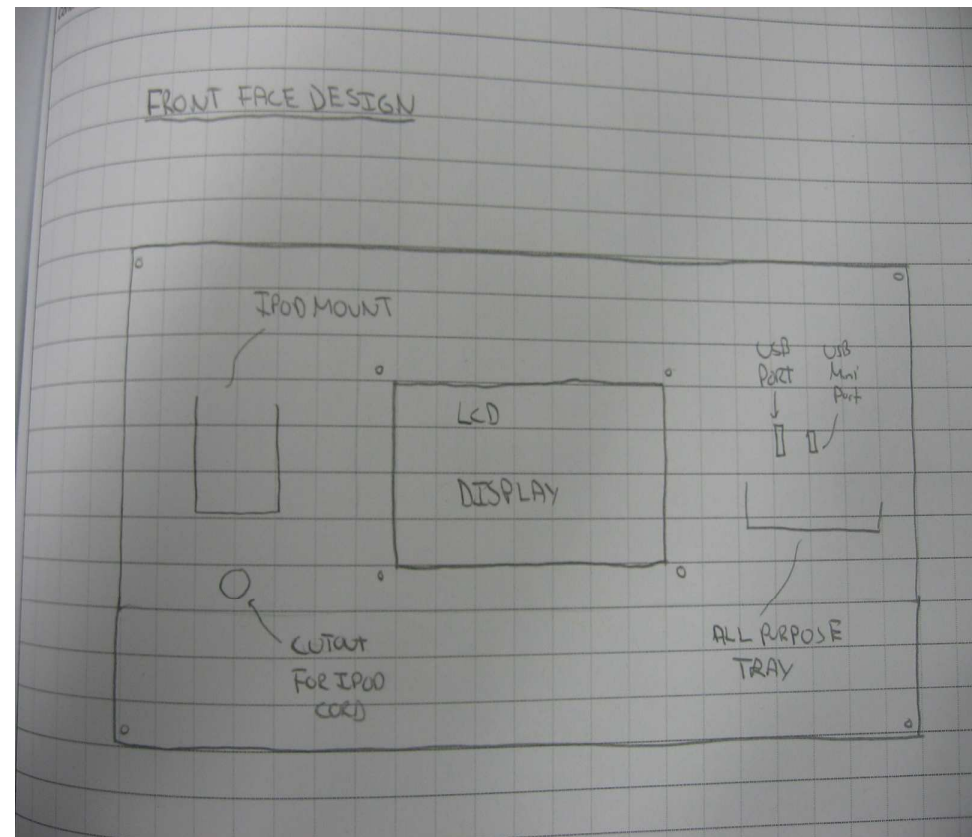
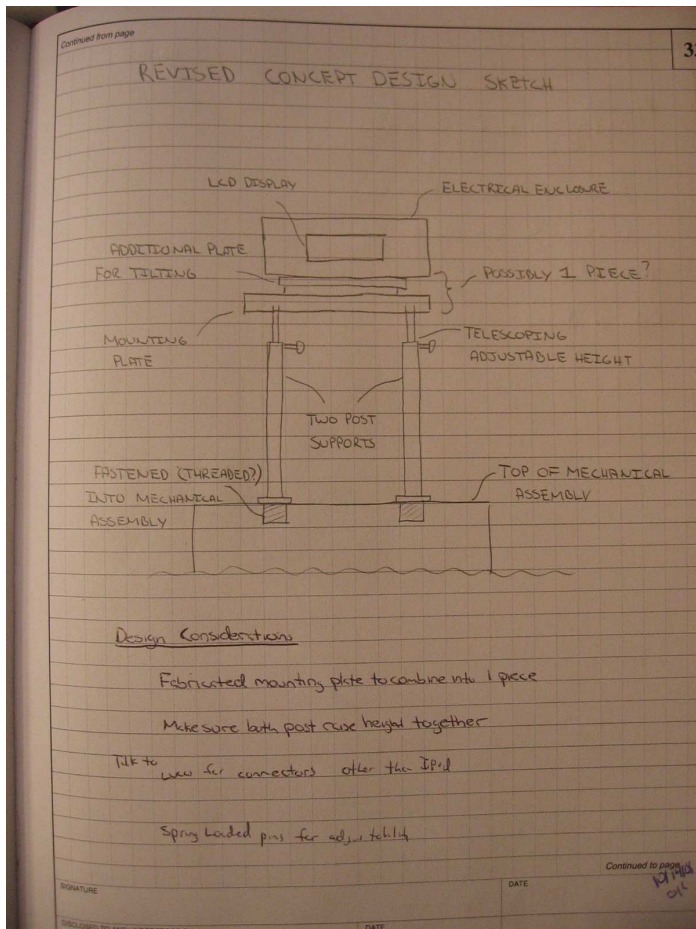
| Engr. Spec. #        | Importance | Source      | Specification (description)                        | Unit of Measure                  | Marginal Value | Ideal Value | Comments/Status                                                                                                           |
|----------------------|------------|-------------|----------------------------------------------------|----------------------------------|----------------|-------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Enclosure</b>     |            |             |                                                    |                                  |                |             |                                                                                                                           |
| ES1                  |            | CN1,CN9     | Protection from gym environment                    | NEMA Rating                      | 4              | 4X          | Enclosure selected has NEMA rating 4X                                                                                     |
| ES2                  |            | CN4         | Ease of access for repair                          | # operations to open             | 3              | 1           | Current Status: 1 operation, 1 tool required                                                                              |
| ES3                  |            |             |                                                    | # tools required to open         | 1              | 0           |                                                                                                                           |
| ES4                  |            | CN2,CN3,CN6 | Mounting area on front face                        | in^2                             | 84             | 112         | Current Status: Front face is approx 112.5 in^2                                                                           |
| ES5                  |            | CN1         | Depth available for mounting electrical components | in                               | 3              | 5           | Current Status: Enclosure has 5.1" depth,4.5" depth with back panel                                                       |
| ES6                  |            | CN5, CN12   | Adjustability for different users                  | # Degress of Freedom             | 2              | 3           | Current Status:Mounting plate can be raised with stand adjustment, has tilting ability, rotation not required by customer |
| ES7                  |            | CN10        | Ease of adjustability (tilting, for height see ES) | # operations required            | 3              | 1           | Current Status: 1 operation, 0 tools                                                                                      |
| ES8                  |            |             |                                                    | # tools required                 | 1              | 0           |                                                                                                                           |
| <b>Stand</b>         |            |             |                                                    |                                  |                |             |                                                                                                                           |
| ES9                  |            | CN10        | Height range                                       | f t                              |                | 2.5-3.5     | Current Status: Post height ranges from about 2.75ft-5ft                                                                  |
| ES10                 |            | CN13        | Supported weight                                   | lbs                              | 35             | 50          | Current Status: Mount plate has 45lb capacity, posts have much greater capacity                                           |
| ES11                 |            | CN10,CN12   | Ease of height adjustment                          | # operations required            |                |             | Design in discussion at review                                                                                            |
| ES12                 |            |             |                                                    | # tools required                 | 1              | 0           | Currently 0 tools required                                                                                                |
| ES13                 |            | CN11        | Stability                                          | # posts                          |                | 2           | Currently 2 posts                                                                                                         |
| <b>Functionality</b> |            |             |                                                    |                                  |                |             |                                                                                                                           |
| ES14                 |            | CN8         | Voltage access for non-ipod users                  | # input jacks for other chargers |                | 2           | Aside from permanent Ipod charging, currently offers 1 USB and 1 USB Mini to tap into voltage                             |



# Risk Assessment

| <b>Risk Item</b>                  | <b>Level</b> | <b>Owner</b> | <b>Status and/or Contingency Plans</b>                                                                                                                   | <b>Decision Date</b> |
|-----------------------------------|--------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Lead Time of Ordered Parts        | Med          | Group        | Will keep number of ordered parts down, possibly create some simple parts in-house. Get final concept nailed down to begin ordering as soon as possible. | 10/17/2008           |
| Compatibility of Commercial Items | Med-High     | Matt Sennett | Don't rely on online sources. Inspect physical parts to be sure of desired functionality and ability to be modified as needed.                           | 10/17/2008           |
| Limited Budget                    | High         | Matt Sennett | Balance commercial parts and fabricated parts to keep cost down. Find inexpensive parts while maintaining part quality.                                  | 10/17/2008           |

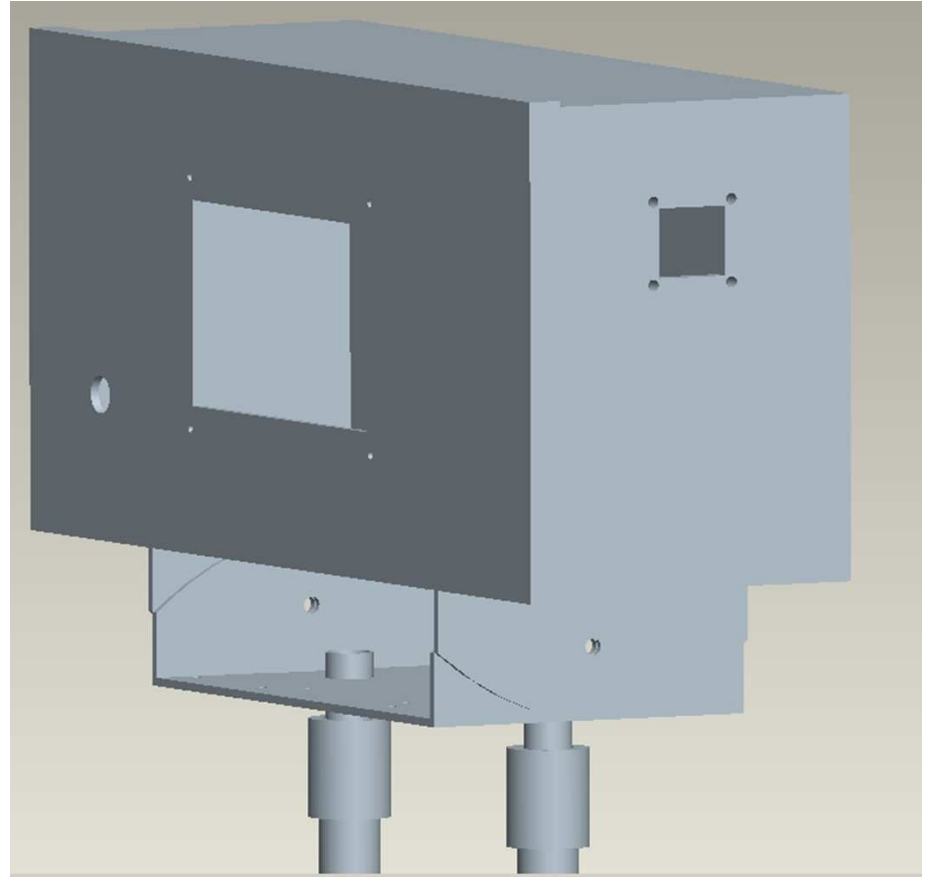
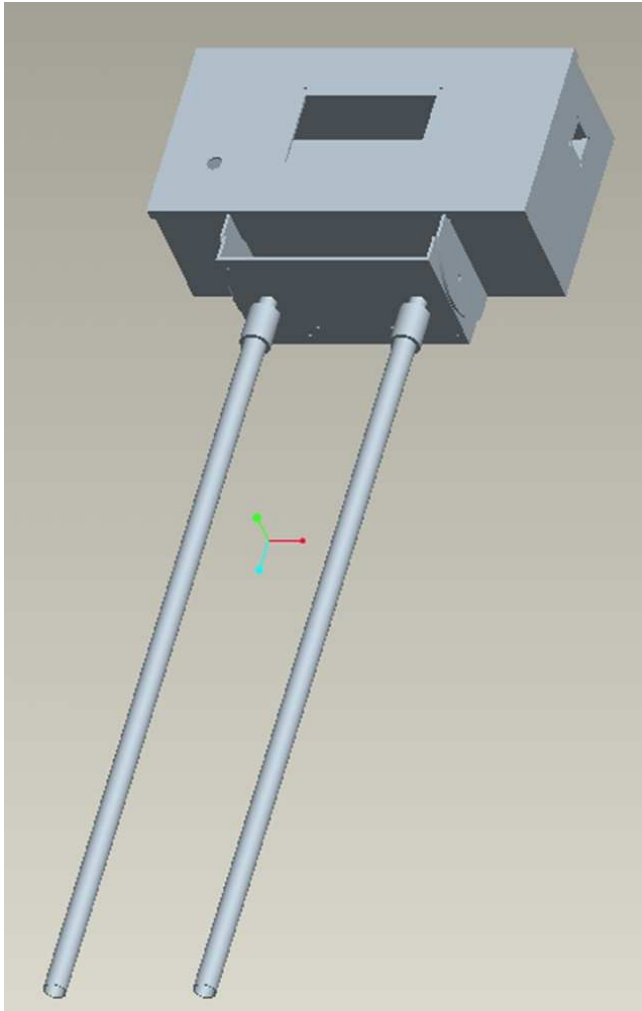
# Concept Sketches



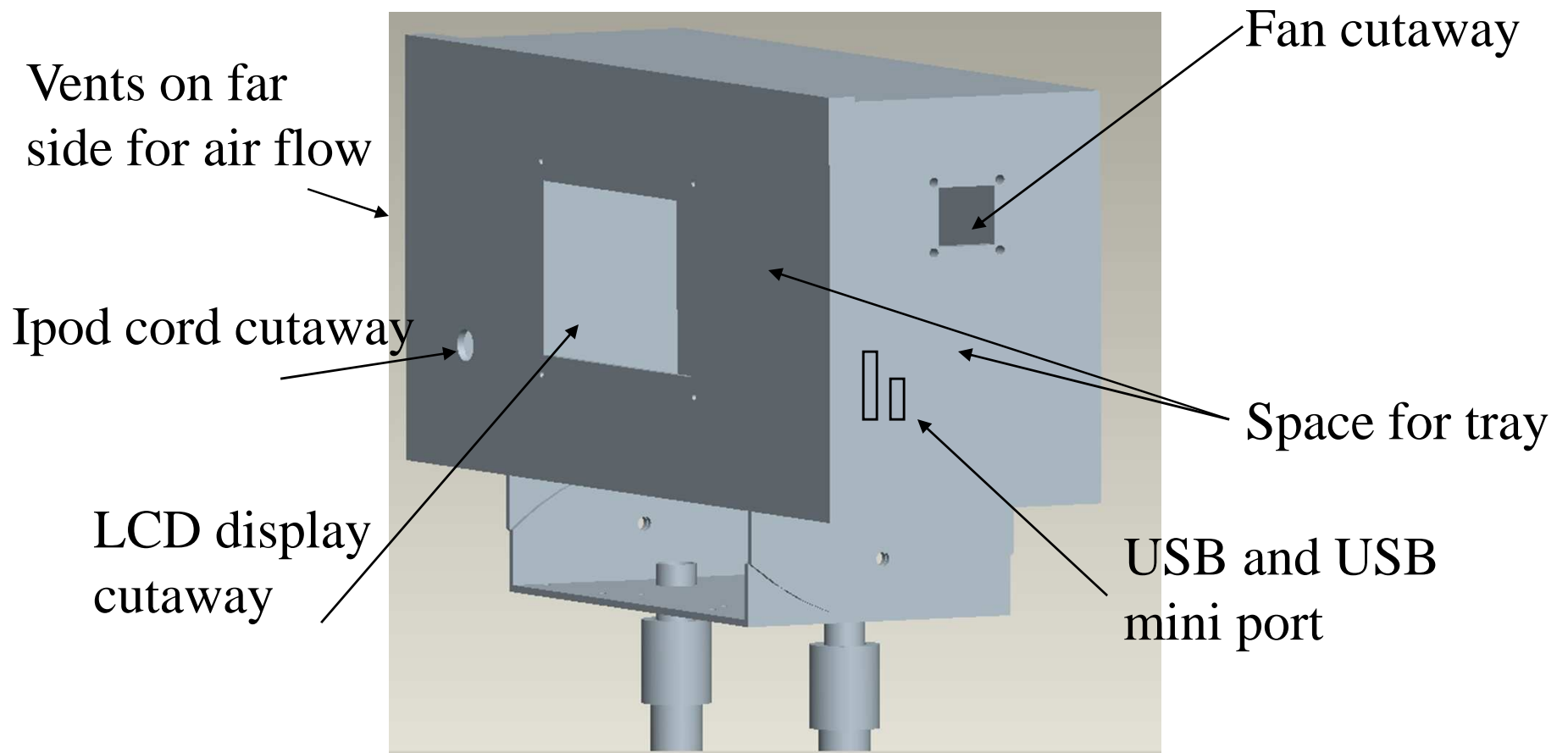
Note: USB ports moved to side per customer request



# 3D Models



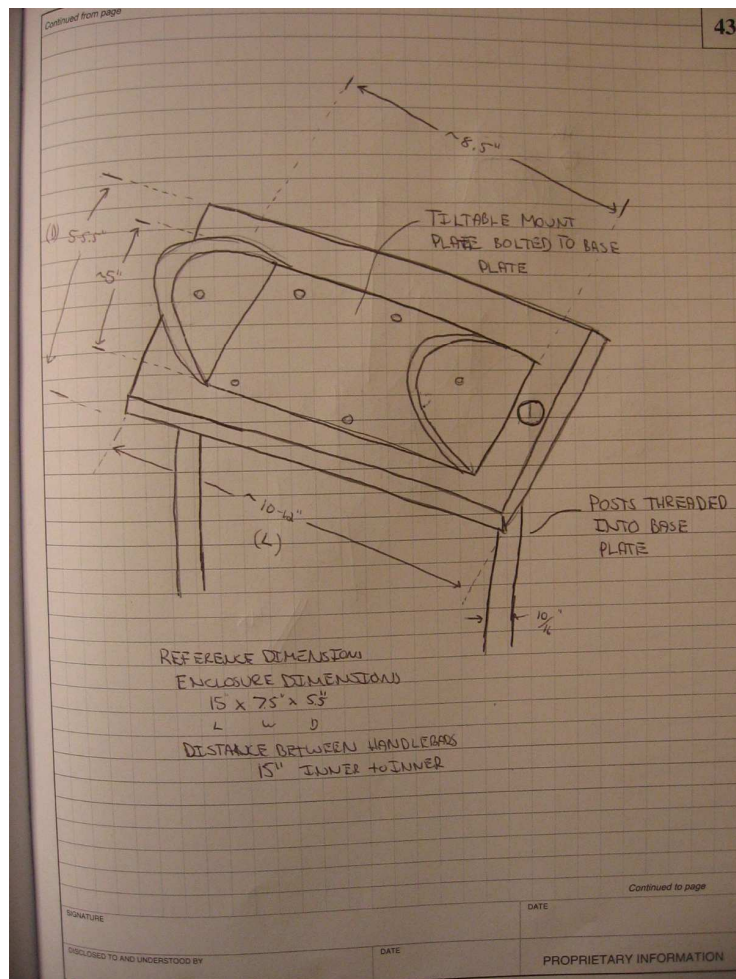
# Enclosure with Modifications



# Enclosure Considerations

- With USB ports on side (per customer request to avoid sweating/spitting etc), tray on side?
- Any other feature for space to right of LCD display?

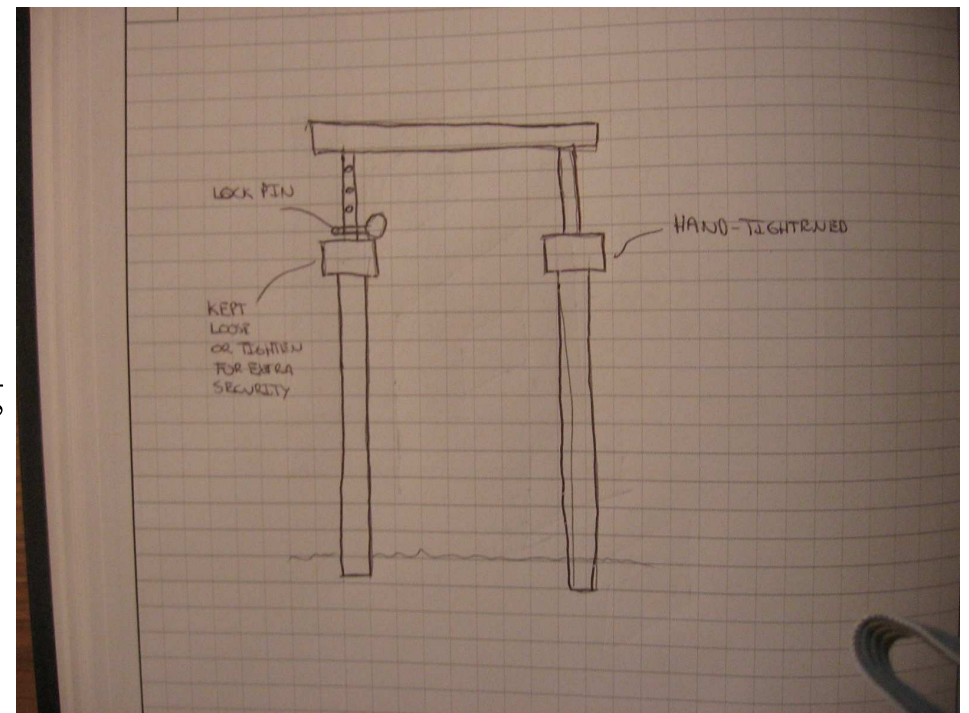
# Mount Plate Attachment



- Attach commercial plate directly to post as in 3d model, or use fabricated base plate as shown
- Base plate advantages
  - More connection points
  - Threaded holes for posts
  - Thicker material than commercial plate


# Post Adjustments

- Design Challenge
  - Ease of adjustment (possibly with bike in use)
  - 1-handed adjusting?
  - Ensure one side does not crash down while loosening or tightening the other
- Possible solutions
  - Locking pin on 1 or both shafts
  - Everything hand-tightening



# Enclosure Selection

**With Lift-Off Cover**



Enclosures have a polyurethane gasket, four 3/16" dia. mounting holes, and corrosion-resistant polyamide cover screws, unless noted. Back panel is steel. Working depth (area available for component mounting) is approximately 0.5" less than overall depth. Opening size is approximately 0.5" less than overall height and width.

**To Order:** Please specify opaque gray or transparent cover, unless noted.

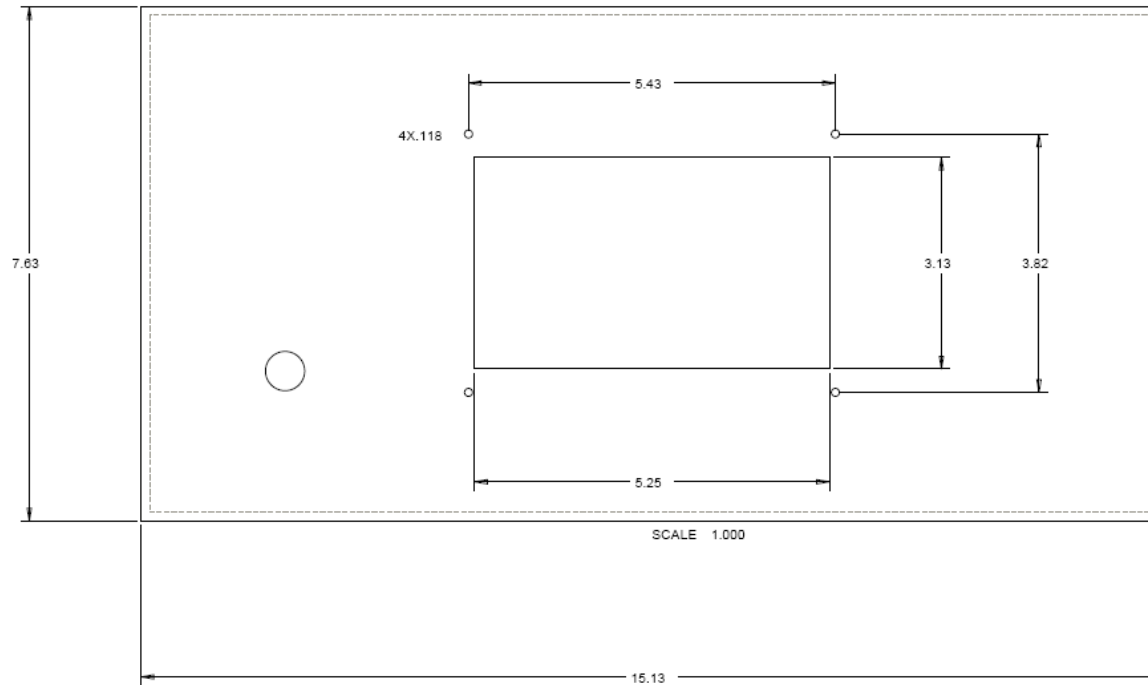
| Overall Size,<br>Ht. x Wd. x Dp. | Enclosures |           | Panels        |                 |
|----------------------------------|------------|-----------|---------------|-----------------|
|                                  | Each       | Ht. x Wd. | Each          | Each            |
| <b>Style 1</b>                   |            |           |               |                 |
| 2" x 2" x 1.6"                   | 69945K91   | \$15.51   | 1" x 1.7"     | 69945K94 \$2.07 |
| 2" x 2.6" x 1.8"                 | 69945K92   | 18.21     | 1" x 2.2"     | 69945K95 2.35   |
| 3.1" x 3.2" x 2.6"               | 69945K93   | 28.04     | 2.2" x 2.7"   | 69945K96 2.64   |
| 3.1" x 3.2" x 3.7"               | 69945K11   | 29.12     | 2.2" x 2.7"   | 69945K96 2.64   |
| 3.8" x 2.5" x 1.6"               | 69945K2    | 20.82     |               |                 |
| 3.9" x 3.9" x 1.4"               | 69945K3    | 16.63     | 3.1" x 2.5"   | 69945K114 2.53  |
| 3.9" x 3.9" x 3"                 | 69945K4    | 18.35     | 3.1" x 2.5"   | 69945K114 2.53  |
| 5.1" x 3.1" x 1.4"               | 69945K5    | 18.05     | 3.8" x 1.8"   | 69945K21 2.18   |
| 5.1" x 3.1" x 3"                 | 69945K107  | 19.70     | 3.8" x 1.8"   | 69945K21 2.18   |
| 5.1" x 5.1" x 1.4"               | 69945K6    | 21.58     | 3.8" x 3.8"   | 69945K22 2.69   |
| 5.1" x 5.1" x 3"                 | 69945K108  | 24.05     | 3.8" x 3.8"   | 69945K22 2.69   |
| 6.7" x 3.1" x 3.3"               | 69945K87   | 35.07     | 5.5" x 2.1"   | 69945K111 3.77  |
| 7.1" x 5.1" x 1.4"               | 69945K7    | 26.02     | 5.8" x 3.8"   | 69945K23 3.20   |
| 7.1" x 5.1" x 3"                 | 69945K8    | 26.96     | 5.8" x 3.8"   | 69945K23 3.20   |
| 7.1" x 7.1" x 2.4"               | 69945K9    | 33.98     | 5.8" x 5.8"   | 69945K24 3.77   |
| 9.1" x 3.1" x 3.3"               | 69945K119  | 39.69     | 7.8" x 2.1"   | 69945K112 5.63  |
| 9.1" x 5.5" x 3.7"               | 69945K89   | 50.44     | 7.2" x 3.7"   | 69945K113 10.10 |
| 9.1" x 5.5" x 4.9"               | 69945K59   | 54.96     | 7.2" x 3.7"   | 69945K113 10.10 |
| <b>Style 2</b>                   |            |           |               |                 |
| 5.1" x 3.1" x 4.9"               | 69945K126  | \$20.78   | 3.8" x 1.8"   | 69945K21 \$2.18 |
| 5.1" x 5.1" x 4.9"               | 69945K127  | 24.89     | 3.8" x 3.8"   | 69945K22 2.69   |
| 7.1" x 5.1" x 3.9"               | 69945K109  | 28.74     | 5.8" x 3.8"   | 69945K23 3.20   |
| 7.1" x 5.1" x 5.9"               | 69945K128  | 31.72     | 5.8" x 3.8"   | 69945K23 3.20   |
| 7.1" x 7.1" x 3.9"               | 69945K115  | 36.12     | 5.8" x 5.8"   | 69945K24 3.77   |
| 7.1" x 7.1" x 5.9"               | 69945K129  | 42.07     | 5.8" x 5.8"   | 69945K24 3.77   |
| <b>Style 3</b>                   |            |           |               |                 |
| 7.4" x 7.4" x 5.1"               | 69945K116  | 55.88     | 5.8" x 5.8"   | 69945K53 4.14   |
| 7.4" x 7.4" x 7.1"               | 69945K131  | 62.70     | 5.8" x 5.8"   | 69945K53 4.14   |
| 10.9" x 7.4" x 5.1"              | 69945K121  | 70.74     | 9.3" x 5.8"   | 69945K54 6.32   |
| 10.9" x 7.4" x 7.1"              | 69945K132  | 74.49     | 9.3" x 5.8"   | 69945K54 6.32   |
| 10.9" x 10.9" x 5.1"             | 69945K122  | 81.39     | 9.3" x 9.3"   | 69945K56 9.38   |
| 10.9" x 10.9" x 7.1"             | 69945K133  | 86.67     | 9.3" x 9.3"   | 69945K56 9.38   |
| 14.9" x 7.4" x 5.1"              | 69945K123  | 78.96     | 13.3" x 5.8"  | 69945K55 8.10   |
| 14.9" x 7.4" x 7.1"              | 69945K134  | 88.81     | 13.3" x 5.8"  | 69945K55 8.10   |
| 14.9" x 10.9" x 5.1"             | 69945K124  | 93.98     | 13.3" x 9.3"  | 69945K57 11.94  |
| 14.9" x 10.9" x 7.1"             | 69945K135  | 99.74     | 13.3" x 9.3"  | 69945K57 11.94  |
| 22" x 10.9" x 5.1"               | 69945K125  | 126.28    | 20.3" x 9.3"  | 69945K58 29.94  |
| 22" x 14.9" x 7.1"               | 69945K136  | 170.98    | 20.3" x 13.3" | 69945K98 33.41  |

- Approx 15x7.5x5"
- Screw-off cover for easy maintenance
- Suitable mounting space on front face and sides.
- Easily modifiable for component cutaways (LCD, fan, Ipod cord, etc.)

# Front Face Modifications

## Detailed Drawing

ENCLOSURE COVER WITH MODIFICATIONS  
NOTE: ALL DIMENSIONS IN INCHES



# Mounting Plate Selection

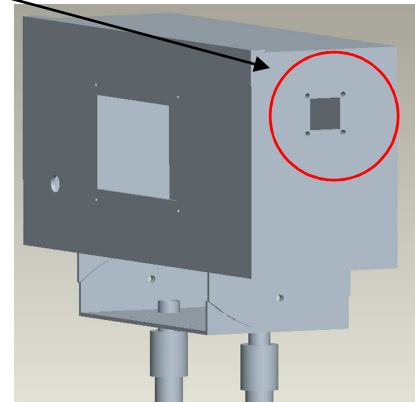
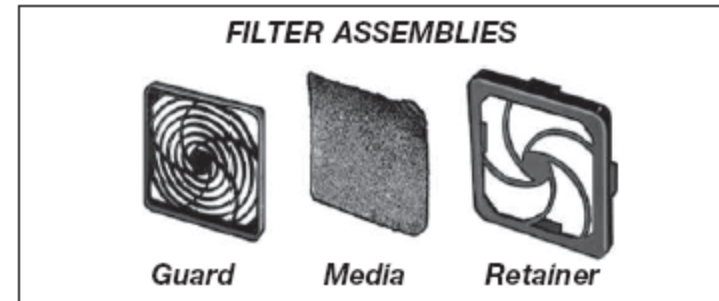
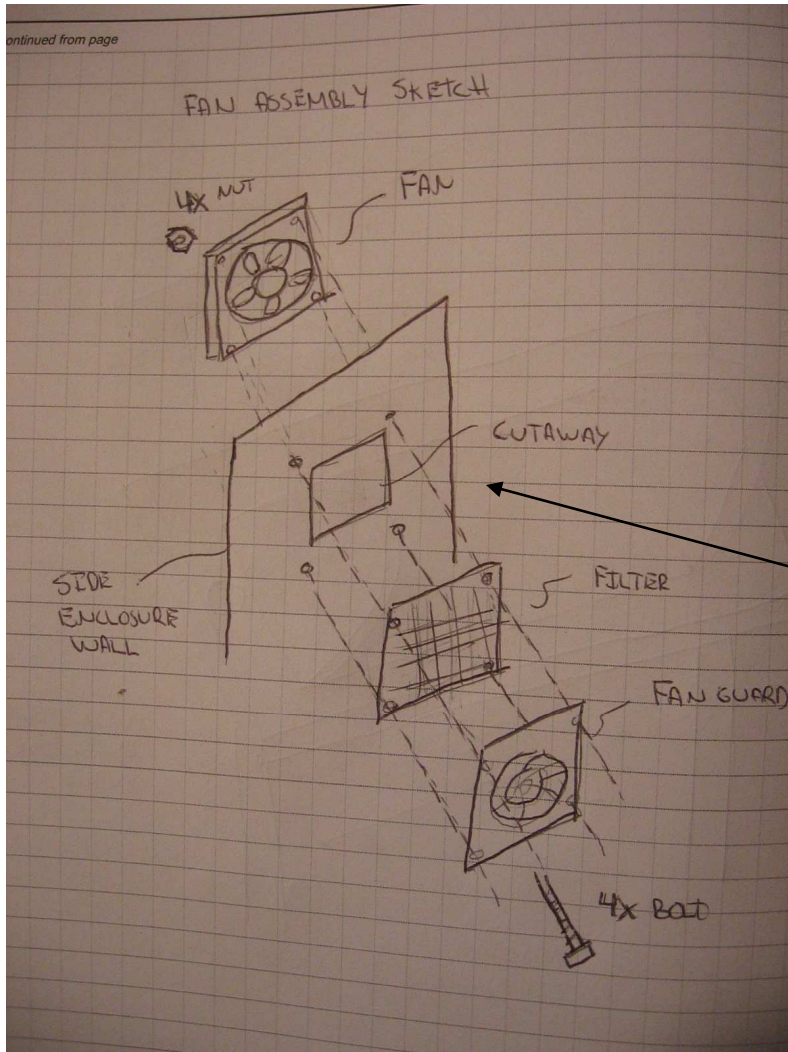


Chief: Universal Tilting  
Wall Mount

- Mounted on posts with flat side vertically upward.
- Enclosure mounted on flat face.
- Allows for tilting DOF
- Replace screw with thumb screw for tool-less adjusting



# Fan Assembly



Square Fan

# Ipod Dock



- Sold by Apple: fits almost every type of Apple Ipod/Iphone
- Can be used with included adjustable arm or can just be mounted directly onto enclosure

# Status and Future Work

- Tray selection or design (2-4 hrs)
- Finalize part selection per design review feedback
- Order parts next week
  - Lead time coincides with finals/break
- Begin prototyping