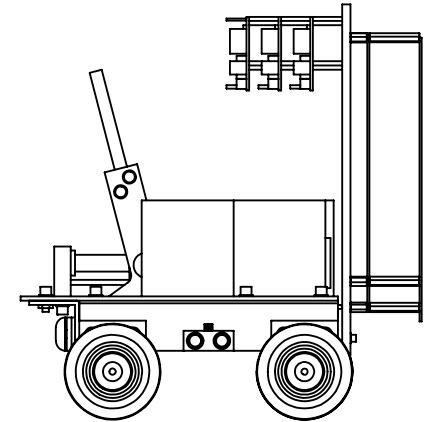
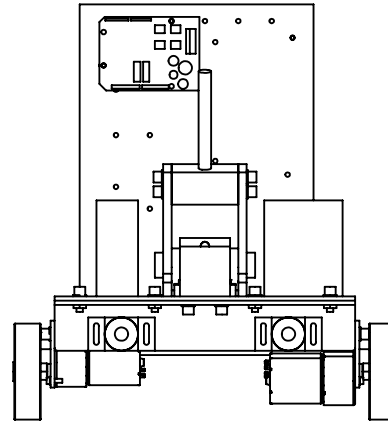
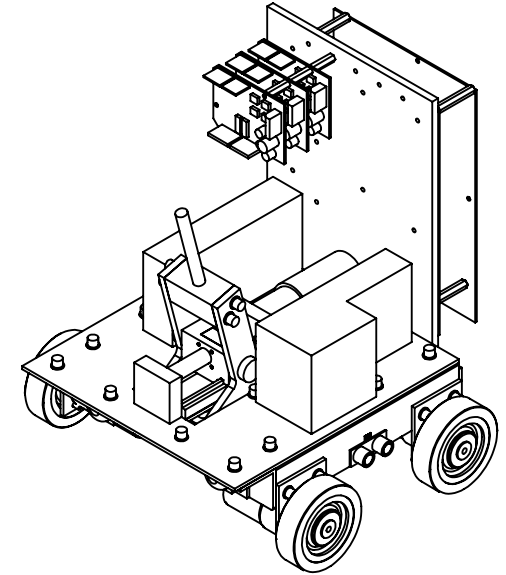
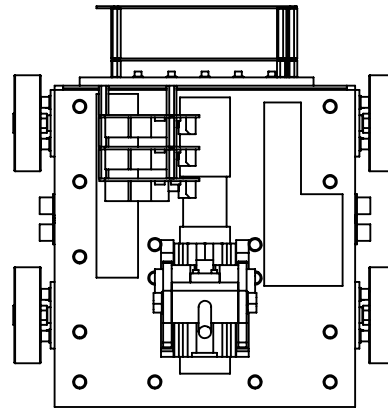


| ITEM NO. | PART NUMBER                       | DESCRIPTION                     | QTY. |
|----------|-----------------------------------|---------------------------------|------|
| 1        | 1                                 | VEHICLE SUPPORT STRUCTURE       | 1    |
| 2        | 2-ELECTRONICS AND CONTROLS SYSTEM | ELECTRONICS AND CONTROLS SYSTEM | 1    |
| 3        | 3-VEHICLE DRIVE SYSTEM            | VEHICLE DRIVE SYSTEM            | 1    |
| 4        | 4-PAYLOAD DELIVERY SYSTEM         | PAYLOAD DELIVERY SYSTEM         | 1    |
| 5        | 5-VEHICLE SENSOR ARRAY            | VEHICLE SENSOR ARRAY            | 1    |
| 6        | Lead Disk weight 5.75lb           | LEAD DISC, 5.75LBS, 6" DIAMETER | 3    |
| 7        | #10-0.5L                          | #10-24 SOCKET CAP SCREW, 0.5" L | 20   |
| 8        | #6-.5L                            | #6-32 SOCKET CAP SCREW          | 5    |
| 9        | #6-NUT                            | #6 HEX NUT                      | 5    |
| 10       | #10 WASHER                        | #10 FLAT WASHER                 | 20   |
| 11       | #6 WASHER                         | #6 FLAT WASHER                  | 5    |



**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

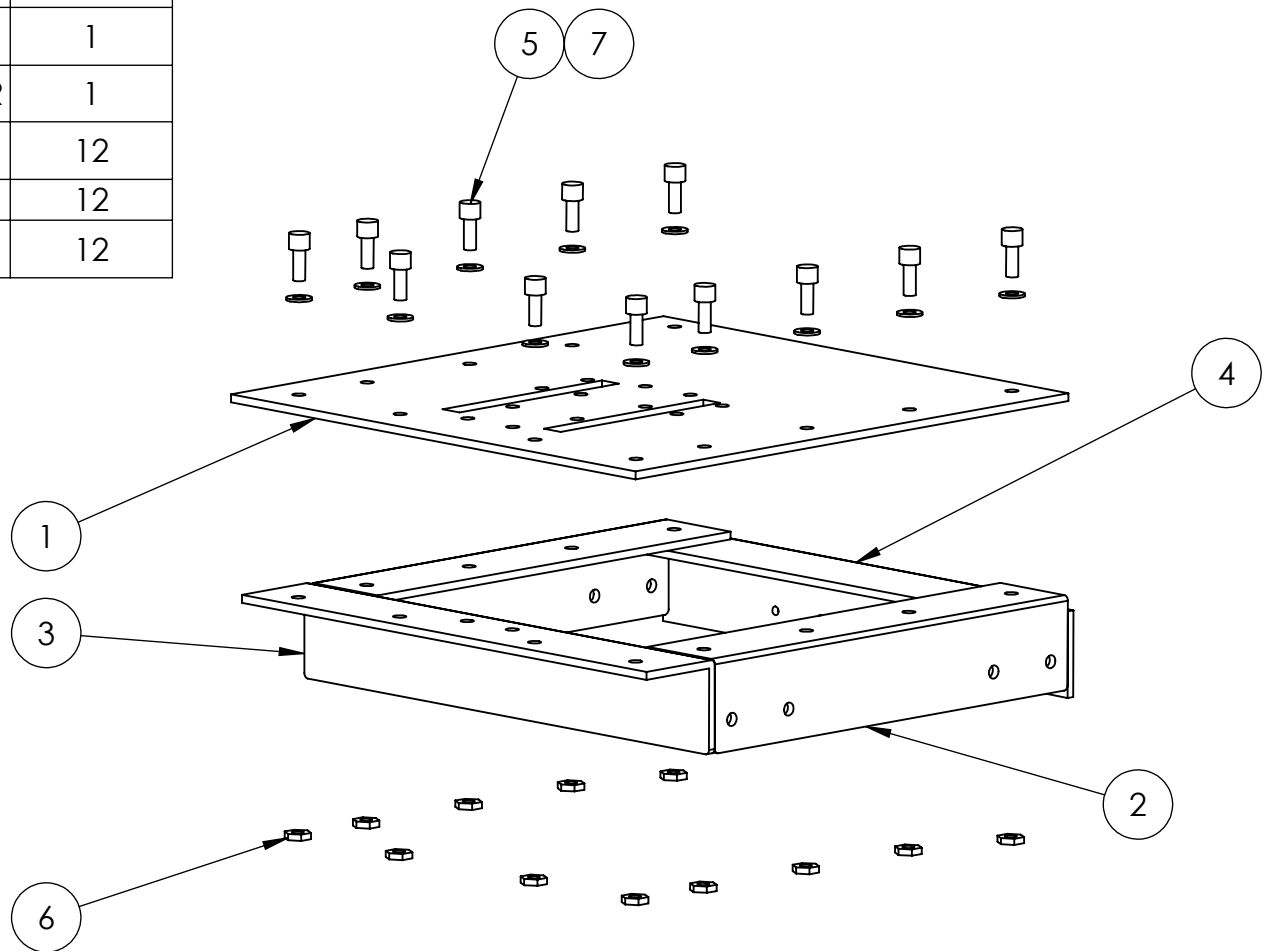
|           |         |   |           |      |
|-----------|---------|---|-----------|------|
|           |         | UNLESS OTHERWISE SPECIFIED:   | NAME      | DATE |
|           |         | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±<br>THREE PLACE DECIMAL ± | DRAWN     |      |
|           |         | INTERPRET GEOMETRIC TOLERANCING PER:  | CHECKED   |      |
|           |         | MATERIAL  | ENG APPR. |      |
|           |         | FINISH  | MFG APPR. |      |
| NEXT ASSY | USED ON |   | Q.A.      |      |
|           |         | APPLICATION   | COMMENTS: |      |
|           |         | DO NOT SCALE DRAWING  |           |      |

TITLE:  
**PANTHRA\_REV A**

SIZE DWG. NO. REV  
**A** PANTHRA\_REV A

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

| ITEM NO. | PART NUMBER | DESCRIPTION                     | QTY. |
|----------|-------------|---------------------------------|------|
| 1        | 1-001       | CHASSIS                         | 1    |
| 2        | 1-002       | L-CHANNEL SUPPORT, SIDE         | 2    |
| 3        | 1-003       | L-CHANNEL SUPPORT, FRONT        | 1    |
| 4        | 1-004       | L-CHANNEL SUPPORT, REAR         | 1    |
| 5        | #10-0.5L    | #10-24 SOCKET CAP SCREW, 0.5" L | 12   |
| 6        | #10-NUT     | #10 HEXNUT                      | 12   |
| 7        | #10 WASHER  | #10 FLAT WASHER                 | 12   |



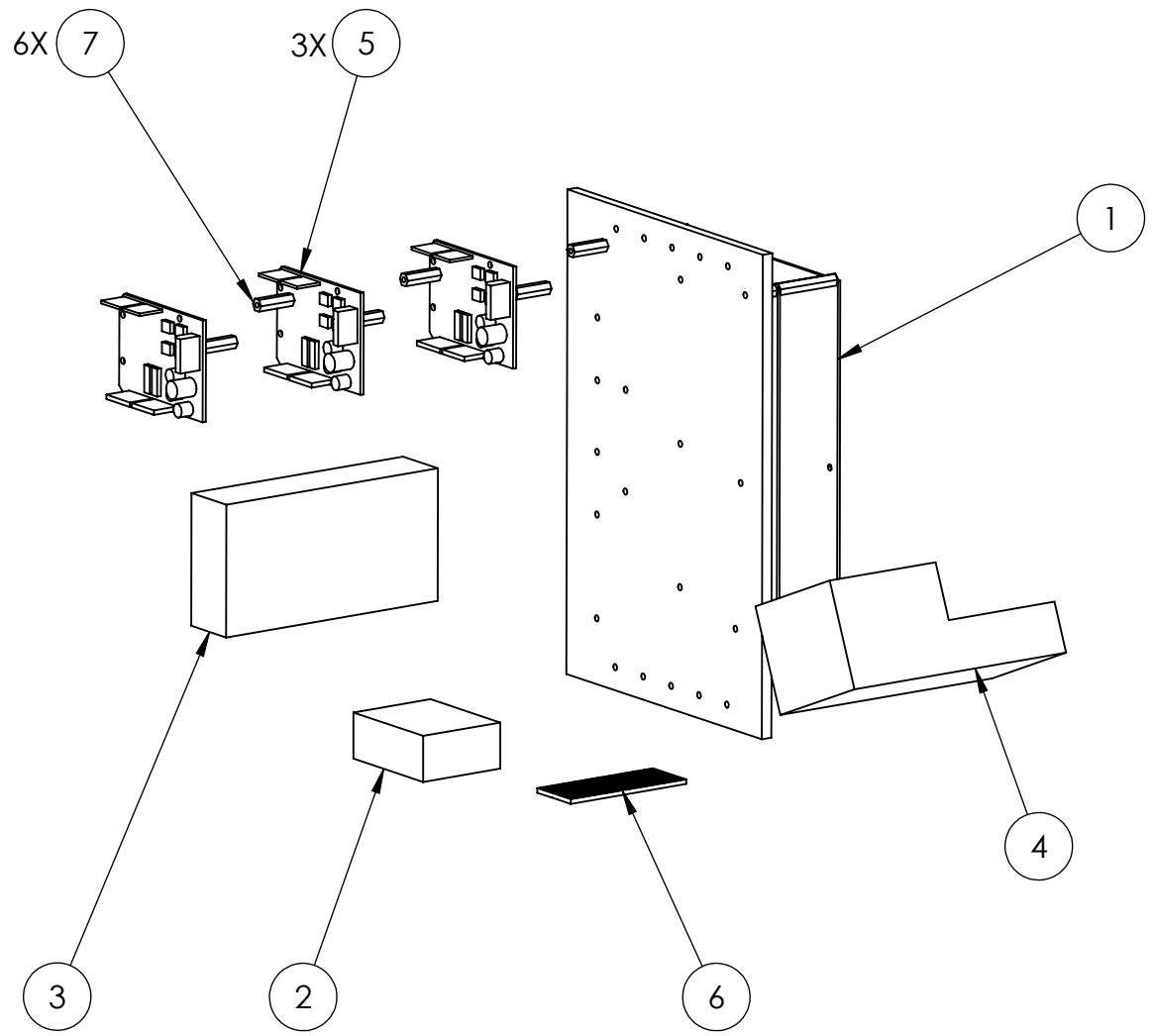
|  |  | UNLESS OTHERWISE SPECIFIED:   | NAME      | DATE | TITLE:<br><b>VEHICLE SUPPORT<br/>STRUCTURE (VSS)</b> |
|--|--|---|-----------|------|--|
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±<br>THREE PLACE DECIMAL ± | DRAWN     |      |  |
|  |  | INTERPRET GEOMETRIC<br>TOLERANCING PER:   | CHECKED   |      |  |
|  |  | MATERIAL  | ENG APPR. |      | SCALE: 1:8 SHEET 1 OF 1                              |
|  |  | FINISH  | MFG APPR. |      |  |
|  |  | APPLICATION   | Q.A.      |      |  |
|  |  | DO NOT SCALE DRAWING  | COMMENTS: |      |  |

PROPRIETARY AND CONFIDENTIAL

**SolidWorks Student Edition.**  
For Academic Use Only

THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

| ITEM NO. | PART NUMBER | DESCRIPTION                | QTY. |
|----------|-------------|----------------------------|------|
| 1        | 2-101       | SB RIO ASSEMBLY            | 1    |
| 2        | 2-006       | SB RIO BATTERY             | 1    |
| 3        | 2-007       | BATTERY PACK, (4) D SIZE   | 1    |
| 4        | 2-008       | BATTERY PACK, (6) D SIZE   | 1    |
| 5        | 2-009       | CYTRON DC MOTOR CONTROLLER | 3    |
| 6        | 2-010       | BREADBOARD                 | 1    |
| 7        | #4-STANDOFF | HEX STANDOFF               | 6    |

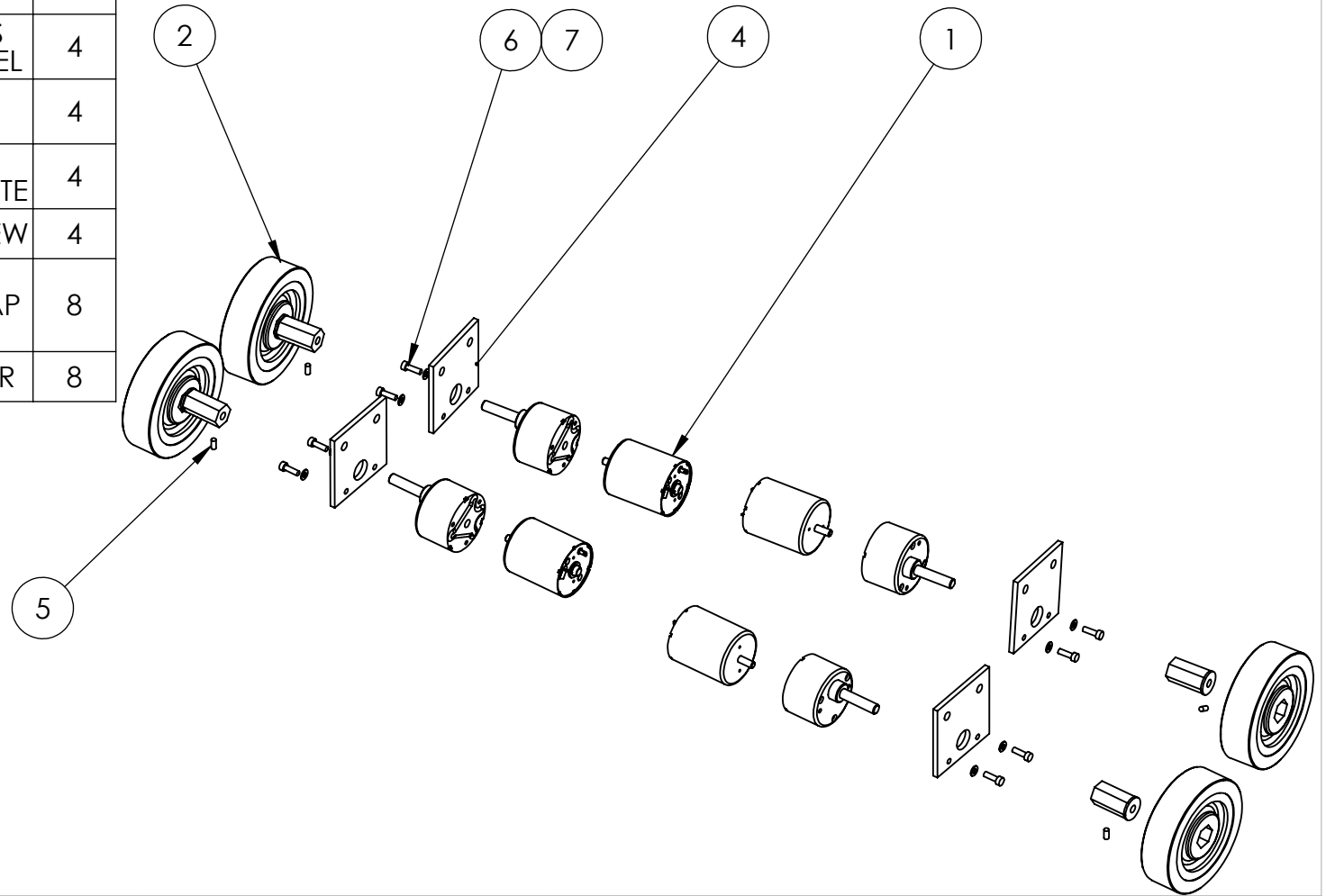


|   |          |   |  |              |      |
|---|----------|---|--|--------------|------|
|   |          | UNLESS OTHERWISE SPECIFIED:   |  | NAME         | DATE |
|   |          | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±<br>THREE PLACE DECIMAL ± |  | DRAWN        |      |
|   |          | INTERPRET GEOMETRIC TOLERANCING PER:  |  | CHECKED      |      |
|   |          | MATERIAL  |  | ENG APPR.    |      |
|   |          | FINISH  |  | MFG APPR.    |      |
|   |          | APPLICATION   |  | Q.A.         |      |
|   |          | DO NOT SCALE DRAWING  |  | COMMENTS:    |      |
| TITLE:<br><b>ELECTRONICS AND CONTROL SYSTEM (ECS)</b> |          |   |  |              |      |
| SIZE  | DWG. NO. |   |  | REV          |      |
| <b>A</b>  | <b>2</b> |   |  | <b>05</b>    |      |
| SCALE: 1:8  |          |   |  | SHEET 1 OF 1 |      |

**PROPRIETARY AND CONFIDENTIAL**  
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION OR TRANSMISSION OF THIS INFORMATION WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

| ITEM NO. | PART NUMBER   | DESCRIPTION             | QTY. |
|----------|---------------|-------------------------|------|
| 1        | 3-101         | TETRIX DC MOTOR         | 4    |
| 2        | 3-003         | BANEBOTS 2.875" WHEEL   | 4    |
| 3        | 3-004         | AXLE SET COLLAR         | 4    |
| 4        | 3-005         | MOTOR MOUNT PLATE       | 4    |
| 5        | #4ss-0.25L    | #4 SET SCREW            | 4    |
| 6        | M3x0.5-0.375L | M3X0.5 SOCKET CAP SCREW | 8    |
| 7        | M3 WASHER     | M3 WASHER               | 8    |

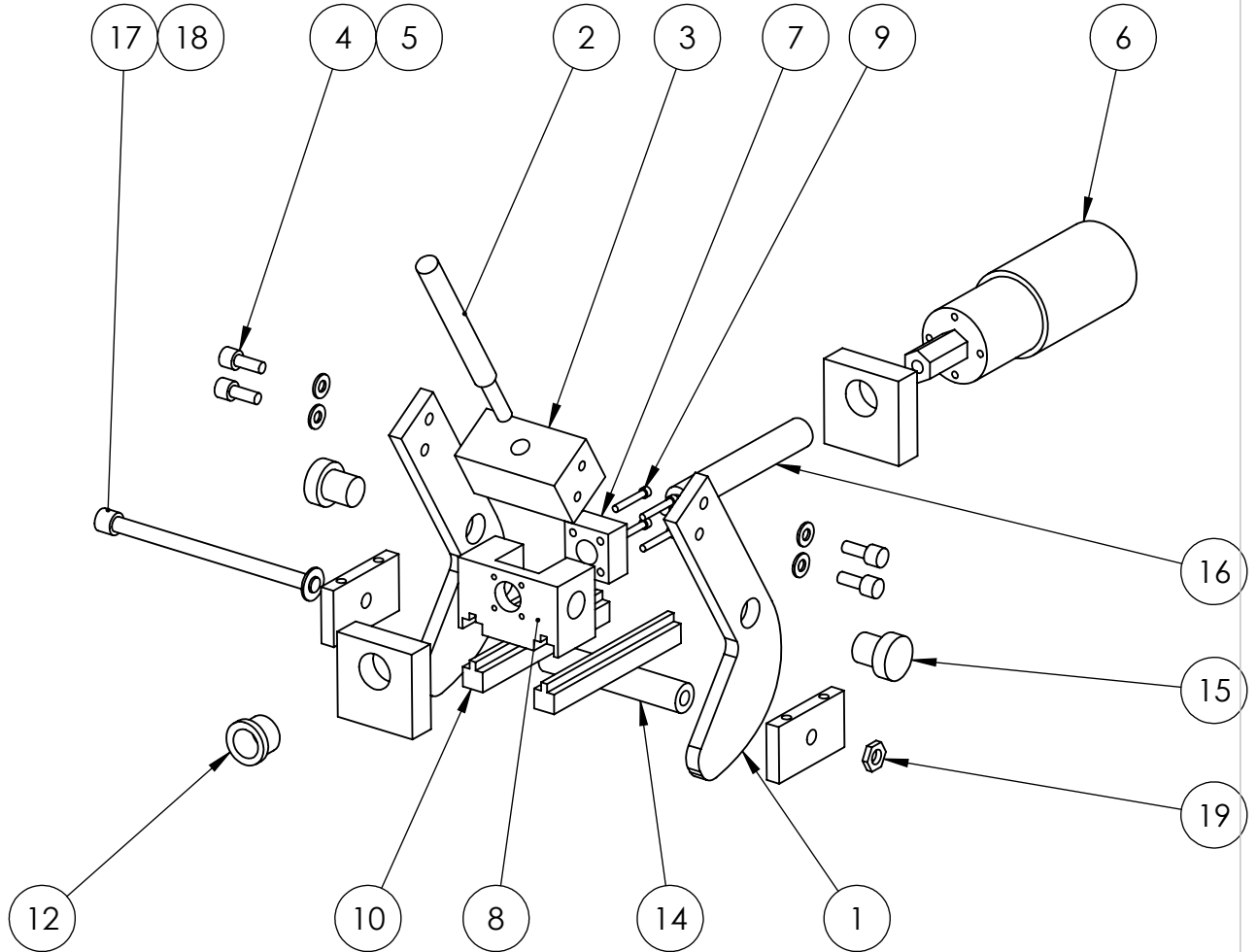


|  |  | UNLESS OTHERWISE SPECIFIED:          | NAME      | DATE | TITLE:                      |          |              |
|--|--|--------------------------------------|-----------|------|-----------------------------|----------|--------------|
|  |  | DIMENSIONS ARE IN INCHES             | DRAWN     |      | <b>VEHICLE DRIVE SYSTEM</b> |          |              |
|  |  | TOLERANCES:                          | CHECKED   |      |                             |          |              |
|  |  | FRACTIONAL ±                         | ENG APPR. |      |                             |          |              |
|  |  | ANGULAR: MACH ± BEND ±               | MFG APPR. |      |                             |          |              |
|  |  | TWO PLACE DECIMAL ±                  | Q.A.      |      | SIZE                        | DWG. NO. | REV          |
|  |  | THREE PLACE DECIMAL ±                | COMMENTS: |      | <b>A</b>                    | <b>3</b> | <b>05</b>    |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER: |           |      | SCALE: 1:8                  | WEIGHT:  | SHEET 1 OF 1 |
|  |  | MATERIAL                             |           |      |                             |          |              |
|  |  | FINISH                               |           |      |                             |          |              |
|  |  | DO NOT SCALE DRAWING                 |           |      |                             |          |              |
|  |  | APPLICATION                          |           |      |                             |          |              |

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

| ITEM NO. | PART NUMBER | DESCRIPTION                     | QTY. |
|----------|-------------|---------------------------------|------|
| 1        | 4-010       | PAYLOAD CARRY ARM               | 2    |
| 2        | 4-011       | PAYLOAD SPINDLE                 | 1    |
| 3        | 4-012       | SPINDLE MOUNT                   | 1    |
| 4        | #10-0.5L    | #10-24 SOCKET CAP SCREW, 0.5" L | 4    |
| 5        | #10 WASHER  | #10 FLAT WASHER                 | 4    |
| 6        | 4-102       | HENNKWELL DC MOTOR ASSEMBLY     | 1    |
| 7        | 4-005       | 1/2"-10 LEAD SCREW NUT          | 1    |
| 8        | 4-009       | LEAD SCREW NUT MOUNT            | 1    |
| 9        | #4-0.75L    | #4 SOCKET CAP SCREW             | 4    |
| 10       | 4-001       | LINEAR ACTUATOR SLIDE           | 2    |
| 11       | 4-002       | DRIVE SCREW BEARING MOUNT       | 2    |
| 12       | 4-003       | DRIVE SCREW BEARING             | 1    |
| 13       | 4-004       | ROLLER MOUNT                    | 2    |
| 14       | 4-006       | ROLLER                          | 1    |
| 15       | 4-007       | 0.5" SHOULDER SCREW             | 2    |
| 16       | 4-008       | 0.5" LEAD SCREW, 4"L            | 1    |
| 17       | .25-3.0L    | 0.25" SOCKET CAP SCREW          | 1    |
| 18       | .25 WASHER  | 0.25" WASHER                    | 1    |
| 19       | 0.25-NUT    | 0.25" HEX NUT                   | 1    |

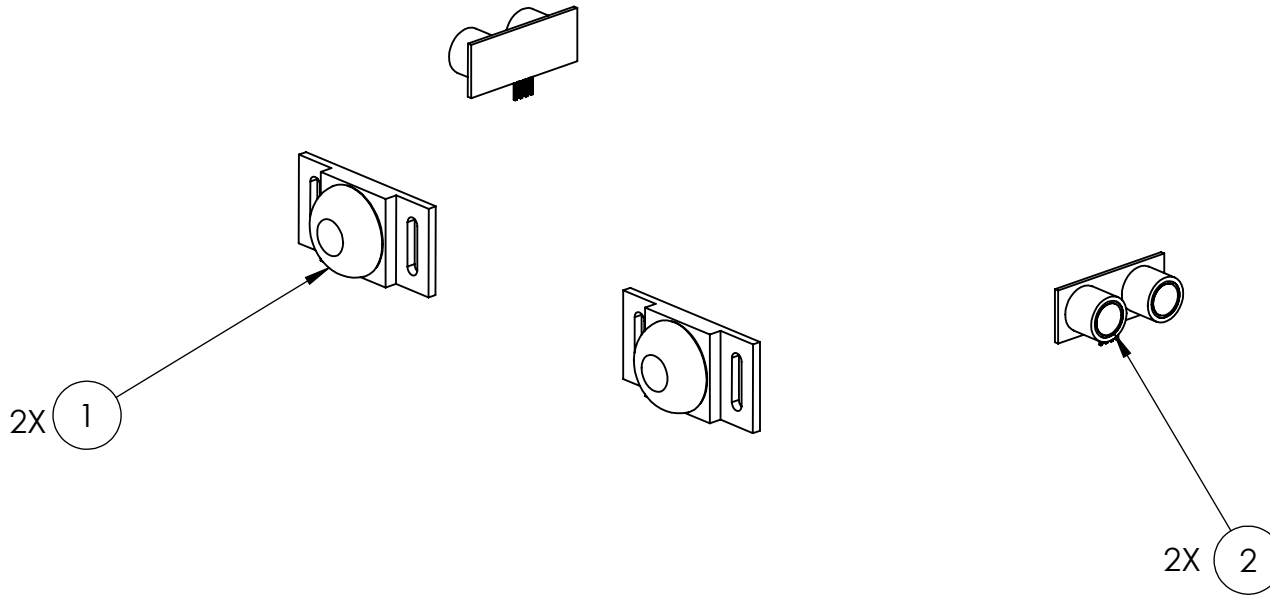


| UNLESS OTHERWISE SPECIFIED:   |                      | NAME         | DATE |
|---|----------------------|--------------|------|
| DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±<br>THREE PLACE DECIMAL ± |                      | DRAWN        |      |
| INTERPRET GEOMETRIC<br>TOLERANCING PER:   |                      | CHECKED      |      |
| MATERIAL  |                      | ENG APPR.    |      |
| FINISH  |                      | MFG APPR.    |      |
| APPLICATION   |                      | Q.A.         |      |
| DO NOT SCALE DRAWING  |                      | COMMENTS:    |      |
| TITLE:<br><b>PAYLOAD DELIVERY SYSTEM</b>  |                      |              |      |
| SIZE<br><b>A</b>  | DWG. NO.<br><b>4</b> | REV          |      |
| SCALE: 1:8  | WEIGHT:              | SHEET 1 OF 1 |      |

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

**SolidWorks Student Edition.  
 For Academic Use Only**

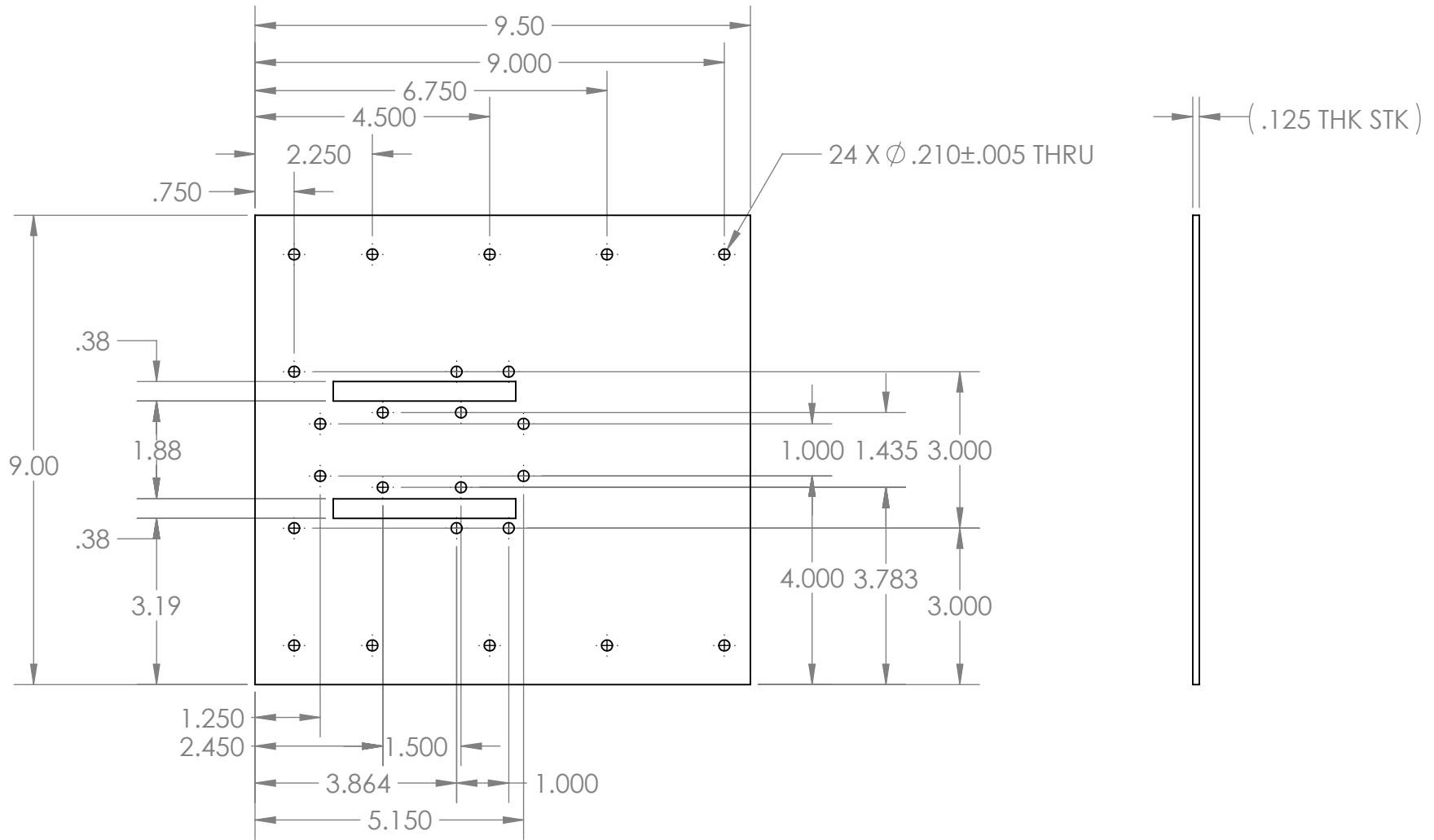
| ITEM NO. | PART NUMBER | DESCRIPTION       | QTY. |
|----------|-------------|-------------------|------|
| 1        | 5-001       | VEX BUMPER SENSOR | 2    |
| 2        | 5-002       | ULTRASONIC SENSOR | 2    |



**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION OR TRANSMISSION OF THIS INFORMATION WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

**SolidWorks Student Edition.  
 For Academic Use Only**

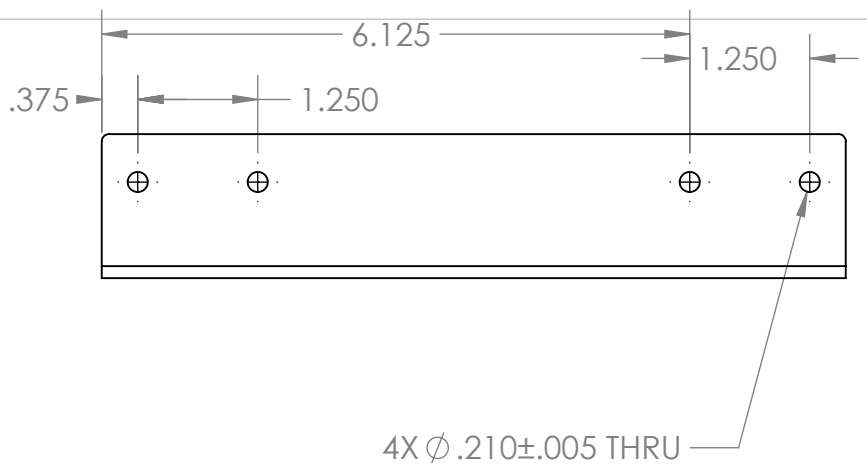
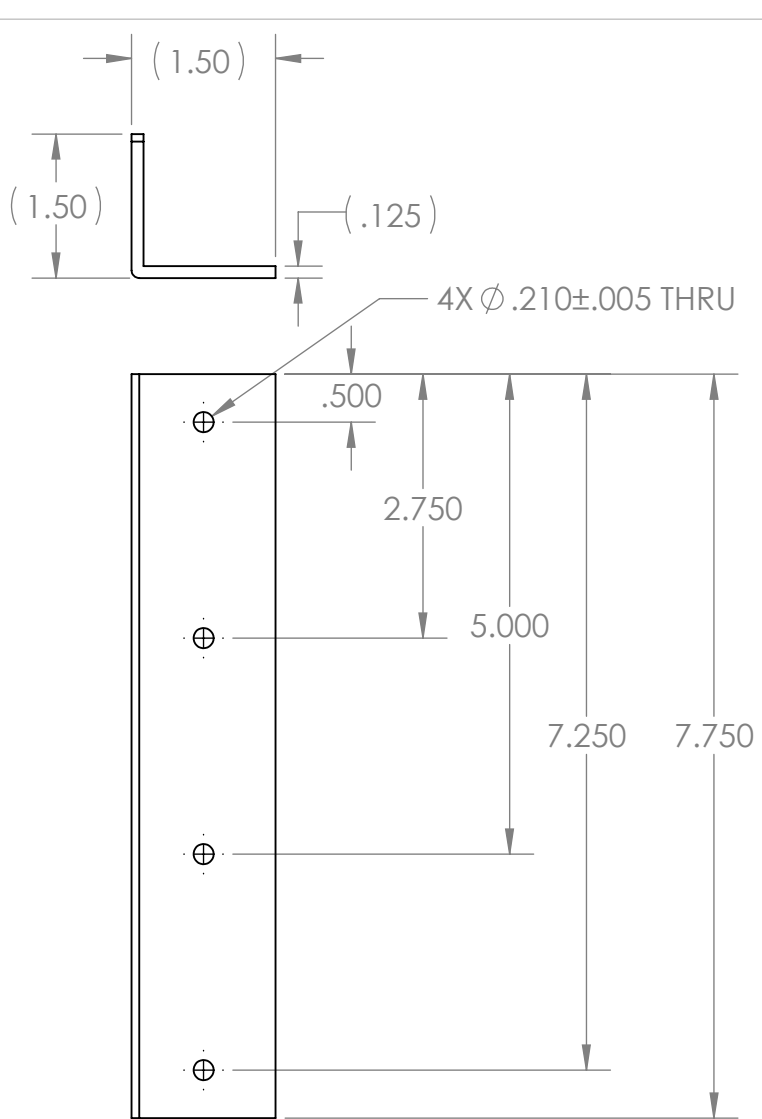
|  |  | UNLESS OTHERWISE SPECIFIED:   | NAME      | DATE | TITLE:                          |              |
|--|--|---|-----------|------|---------------------------------|--------------|
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±<br>THREE PLACE DECIMAL ± | DRAWN     |      | <b>VEHICLE SENSOR<br/>ARRAY</b> |              |
|  |  | INTERPRET GEOMETRIC<br>TOLERANCING PER:   | CHECKED   |      |                                 |              |
|  |  | MATERIAL  | ENG APPR. |      |                                 |              |
|  |  | FINISH  | MFG APPR. |      |                                 |              |
|  |  | DO NOT SCALE DRAWING  | Q.A.      |      | SIZE                            | DWG. NO.     |
|  |  |   | COMMENTS: |      | <b>A</b>                        | <b>5</b>     |
|  |  |   |           |      | SCALE: 1:4                      | WEIGHT:      |
|  |  |   |           |      |                                 |              |
|  |  |   |           |      |                                 | REV          |
|  |  |   |           |      |                                 | <b>05</b>    |
|  |  |   |           |      |                                 | SHEET 1 OF 1 |



**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.  
 For Academic Use Only**

|  |  |  |  |  |              |          |                              |
|--|--|--|--|--|--------------|----------|------------------------------|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME   | DATE         |          |                              |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±.05<br>THREE PLACE DECIMAL ±.010 |  | DRAWN  | C. UNDERHILL | 5/5/2013 | TITLE:<br><br><b>CHASSIS</b> |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED  |              |          |                              |
|  |  | MATERIAL<br>6061 T6 Al. Plate  |  | ENG APPR.  |              |          |                              |
|  |  | FINISH<br>N/A  |  | MFG APPR.  |              |          |                              |
|  |  | APPLICATION  |  | COMMENTS:<br>MAKE FROM 1/8" THK ALUMINUM PLATE STOCK |              |          | SIZE<br><b>A</b>             |
|  |  | DO NOT SCALE DRAWING   |  |  |              |          | DWG. NO.<br><b>1-001</b>     |
|  |  |  |  |  |              |          | REV<br><b>A</b>              |
|  |  |  |  |  |              |          | SCALE 1:3                    |
|  |  |  |  |  |              |          | WEIGHT:                      |
|  |  |  |  |  |              |          | SHEET 1 OF 1                 |

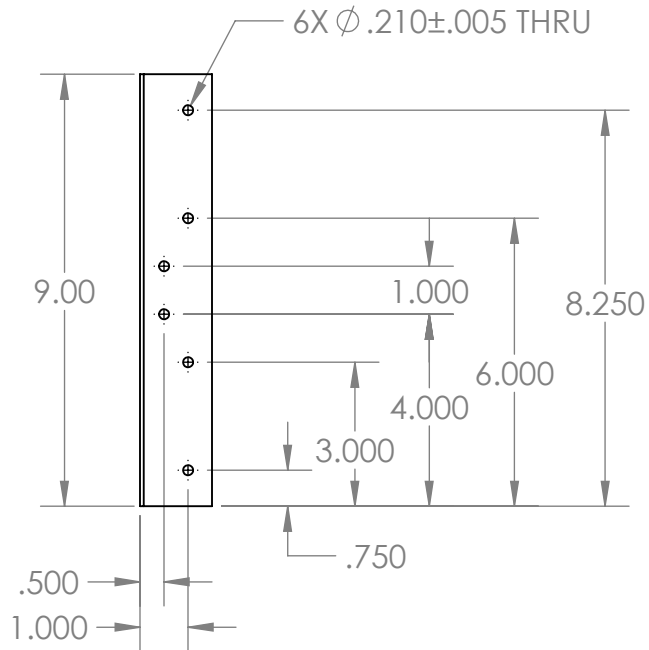
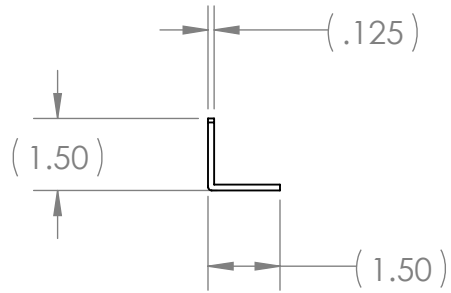


**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |  |  |  |  |              |              |                                       |
|--|--|--|--|--|--------------|--------------|---------------------------------------|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME   | DATE         |              |                                       |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±.05<br>THREE PLACE DECIMAL ±.010 |  | DRAWN  | C. UNDERHILL | 5/5/2013     | TITLE:<br><br>L-CHANNEL SUPPORT, SIDE |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED  |              |              |                                       |
|  |  | MATERIAL<br>6061 T6 Al.  |  | ENG APPR.  |              |              |                                       |
|  |  | FINISH<br>N/A  |  | MFG APPR.  |              |              |                                       |
|  |  | APPLICATION  |  | COMMENTS:<br>MAKE FROM 1.5"X1.5"X0.125"<br>L-CHANNEL EXTRUSION |              | Q.A.         |                                       |
|  |  | DO NOT SCALE DRAWING   |  |  |              | Q.A.         |                                       |
|  |  |  |  | SIZE   | DWG. NO.     | REV          |                                       |
|  |  |  |  | <b>A</b>   | 1-002        | <b>A</b>     |                                       |
|  |  |  |  | SCALE: 1:2   | WEIGHT:      | SHEET 1 OF 1 |                                       |



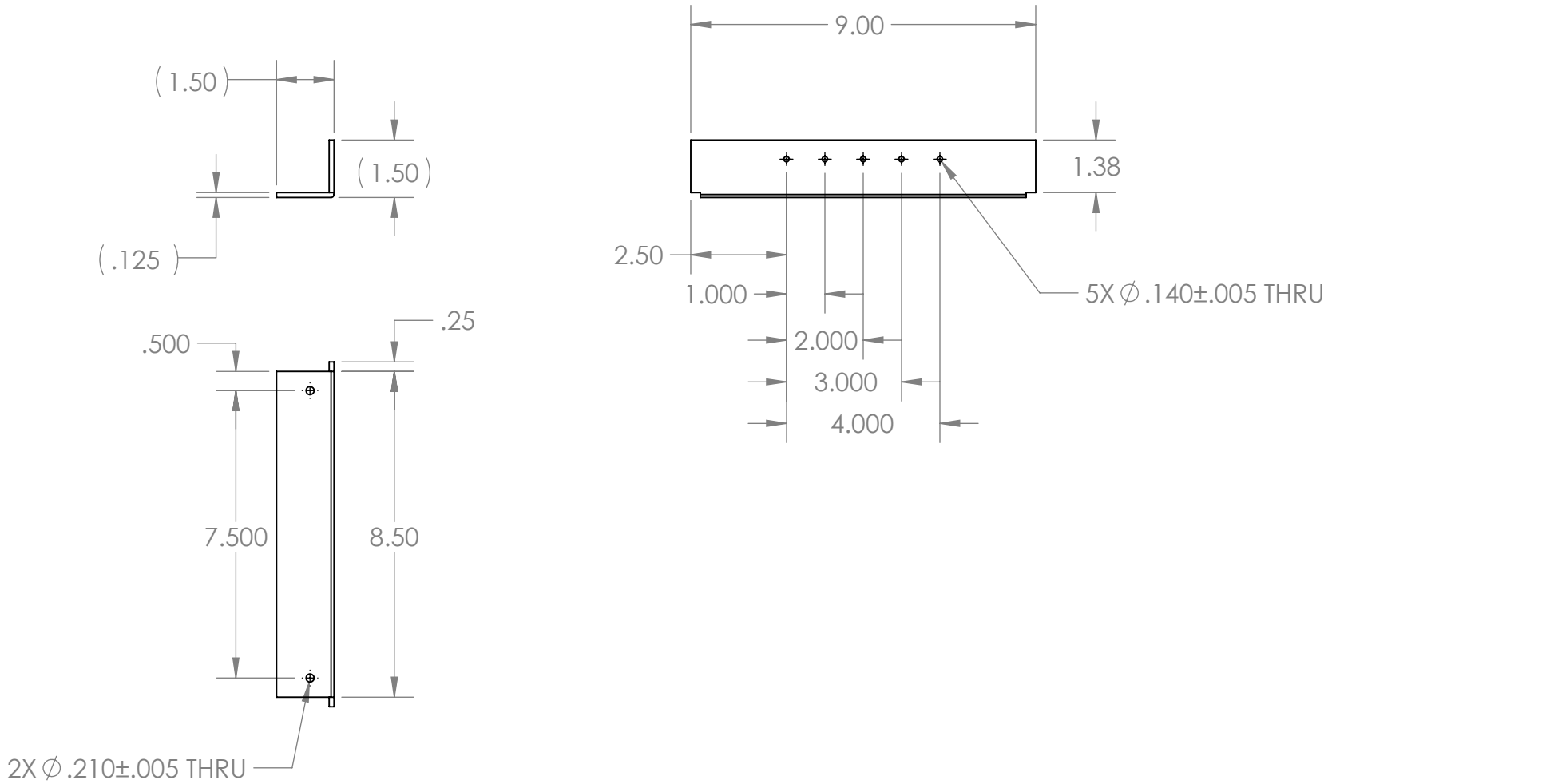


6X  $\phi$  .210 $\pm$ .005 THRU

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |  |  |                      |  |          |                          |              |
|--|--|--|----------------------|--|----------|--------------------------|--------------|
|  |  | UNLESS OTHERWISE SPECIFIED:  |                      | NAME   | DATE     |                          |              |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm$ .05<br>THREE PLACE DECIMAL $\pm$ .010 | DRAWN                | C. UNDERHILL                                   | 5/5/2013 | TITLE:                   |              |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   | CHECKED              |  |          | L-CHANNEL SUPPORT, FRONT |              |
|  |  | MATERIAL   | ENG APPR.            |  |          |                          |              |
|  |  | 6061 T6 Al.  | MFG APPR.            |  |          |                          |              |
|  |  | FINISH   | Q.A.                 |  |          |                          |              |
|  |  | N/A  | COMMENTS:            | MAKE FROM 1.5"X1.5"X0.125" L-CHANNEL EXTRUSION |          |                          | SIZE         |
|  |  | APPLICATION  | DO NOT SCALE DRAWING |  |          | DWG. NO.                 | REV          |
|  |  |  |                      |  |          | <b>A</b>                 | <b>A</b>     |
|  |  |  |                      |  |          | 1-003                    |              |
|  |  |  |                      |  |          | SCALE: 1:4               | WEIGHT:      |
|  |  |  |                      |  |          |                          | SHEET 1 OF 1 |



2X Ø .210±.005 THRU

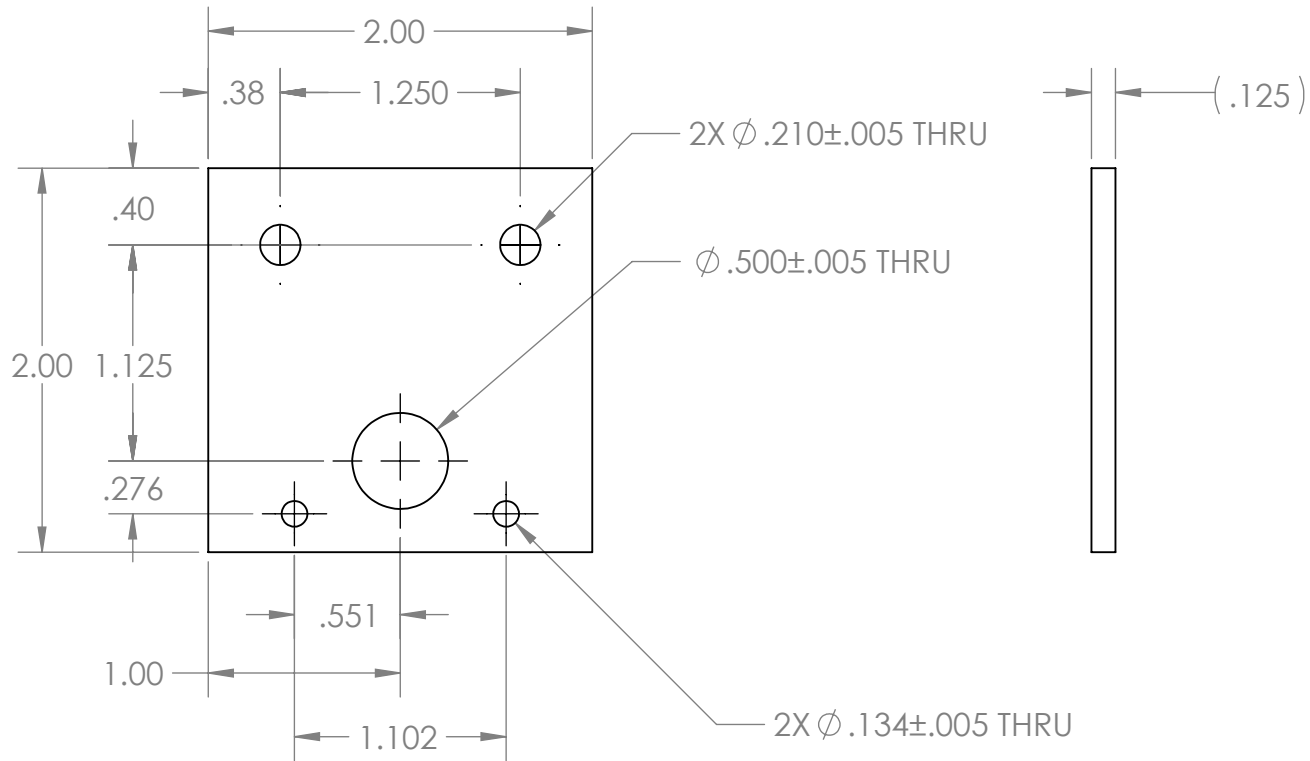
5X Ø .140±.005 THRU

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR DISSEMINATION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |  |  |  |              |              |  |
|--|--|--|--|--------------|--------------|--|
|  |  | UNLESS OTHERWISE SPECIFIED:  | NAME   | DATE         |              |  |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±.05<br>THREE PLACE DECIMAL ±.010 | DRAWN  | C. UNDERHILL | 5/5/2013     | TITLE:<br><br><b>L-CHANNEL SUPPORT, REAR</b> |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   | CHECKED  |              |              |  |
|  |  | MATERIAL<br>6061 T6 Al.  | ENG APPR.  |              |              |  |
|  |  | FINISH<br>N/A  | MFG APPR.  |              |              |  |
|  |  | APPLICATION  | COMMENTS:<br>MAKE FROM 1.5"X1.5"X0.125" L-CHANNEL EXTRUSION. |              | Q.A.         |  |
|  |  | DO NOT SCALE DRAWING   | SCALE: 1:4   | WEIGHT:      | SHEET 1 OF 1 |  |

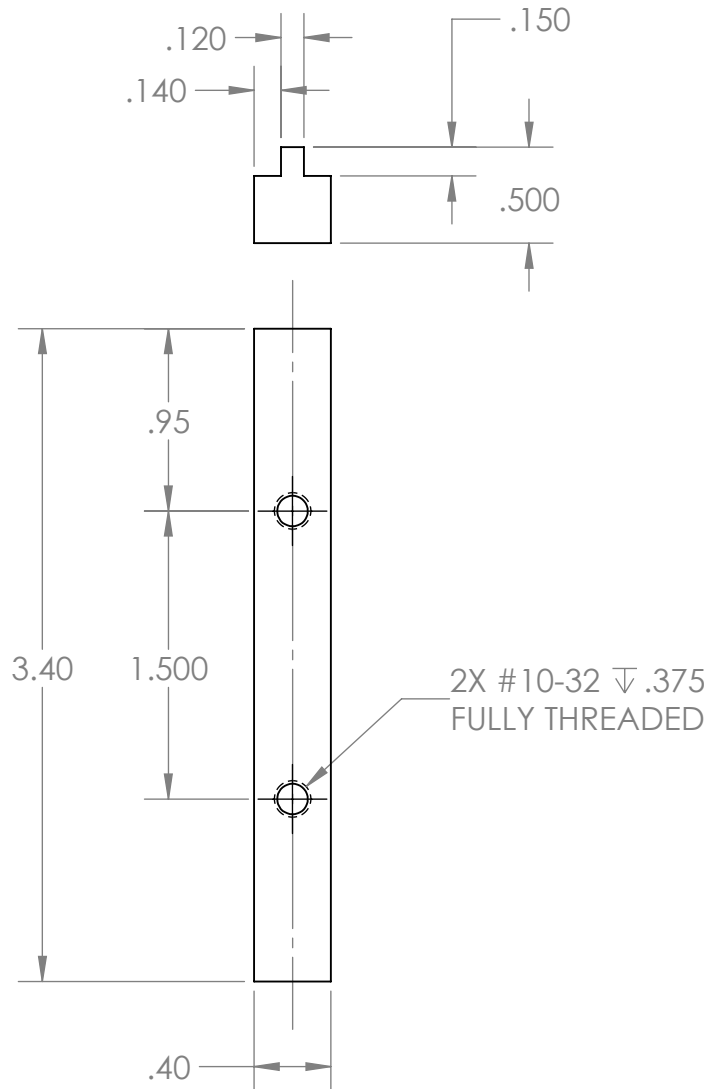
SIZE **A** DWG. NO. **1-004** REV **A**



**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |  |  |  |                               |              |              |                                    |
|--|--|--|--|-------------------------------|--------------|--------------|------------------------------------|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME                          | DATE         |              |                                    |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±.05<br>THREE PLACE DECIMAL ±.010 |  | DRAWN                         | C. UNDERHILL | 5/5/2013     | TITLE:<br><b>MOTOR MOUNT PLATE</b> |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED                       |              |              |                                    |
|  |  | MATERIAL<br>6061 T6 Al.  |  | ENG APPR.                     |              |              |                                    |
|  |  | FINISH<br>N/A  |  | MFG APPR.                     |              |              |                                    |
|  |  | APPLICATION  |  | Q.A.                          |              |              |                                    |
|  |  | DO NOT SCALE DRAWING   |  | COMMENTS:                     |              |              |                                    |
|  |  |  |  | MAKE FROM 0.125" PLATE STOCK. |              |              |                                    |
|  |  |  |  | SIZE                          | DWG. NO.     | REV          |                                    |
|  |  |  |  | <b>A</b>                      | <b>3-005</b> | <b>A</b>     |                                    |
|  |  |  |  | SCALE: 1:1                    | WEIGHT:      | SHEET 1 OF 1 |                                    |

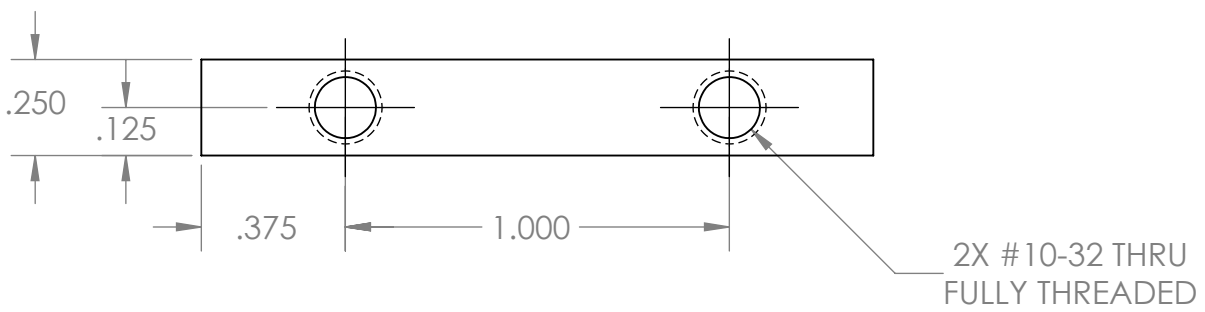
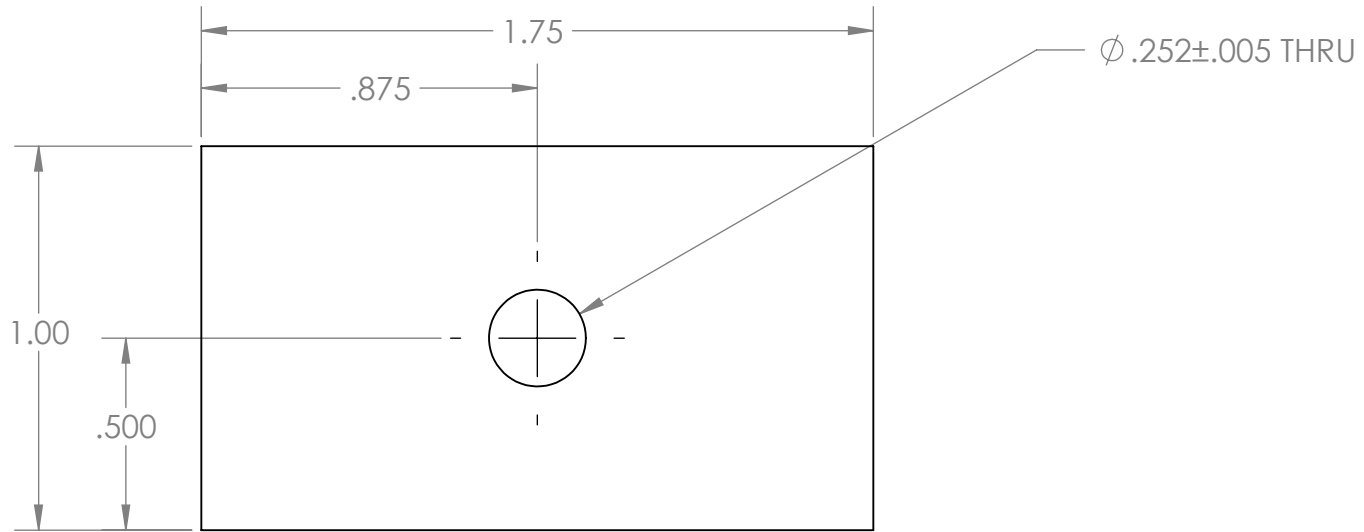


|  |  |  |  |           |              |          |   |
|--|--|--|--|-----------|--------------|----------|---|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME      | DATE         |          |   |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ±<br>ANGULAR: MACH ± BEND ±<br>TWO PLACE DECIMAL ±.05<br>THREE PLACE DECIMAL ±.010 |  | DRAWN     | C. UNDERHILL | 5/5/2013 | TITLE:<br><br><b>LINEAR ACTUATOR SLIDE</b>          |
|  |  |  |  | CHECKED   |              |          |   |
|  |  |  |  | ENG APPR. |              |          |   |
|  |  |  |  | MFG APPR. |              |          |   |
|  |  | INTERPRET GEOMETRIC<br>TOLERANCING PER:  |  | Q.A.      |              |          | SIZE DWG. NO. REV<br><b>A</b> <b>4-001</b> <b>A</b> |
|  |  | MATERIAL<br>6061 T6 Al.  |  | COMMENTS: |              |          |   |
|  |  | FINISH<br>N/A  |  |           |              |          | SCALE: 1:1  |
|  |  | APPLICATION  |  |           |              |          | WEIGHT:   |
|  |  | DO NOT SCALE DRAWING   |  |           |              |          | SHEET 1 OF 1  |

PROPRIETARY AND CONFIDENTIAL

**SolidWorks Student Edition.**  
**For Academic Use Only**

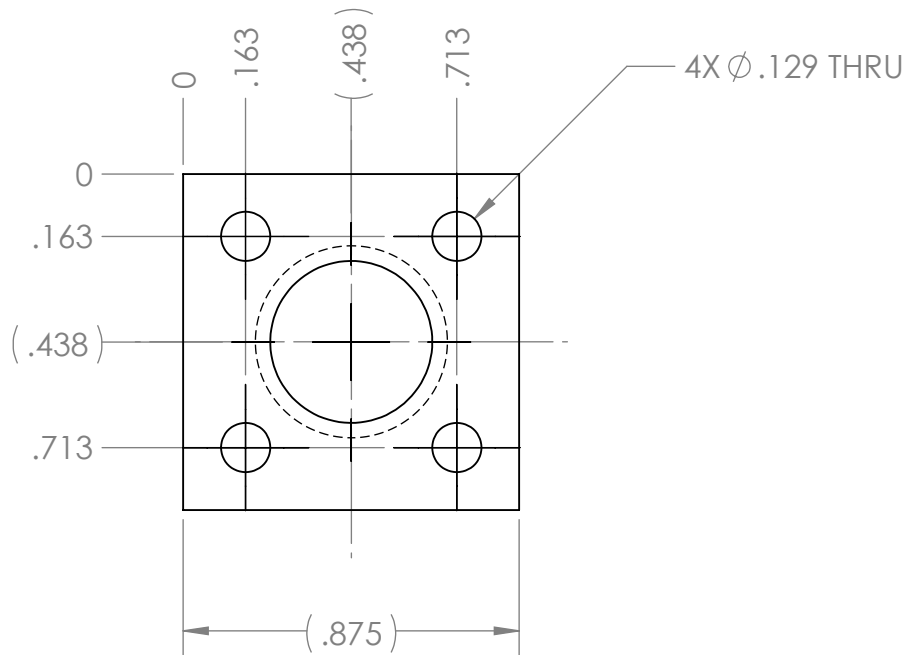
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.



**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

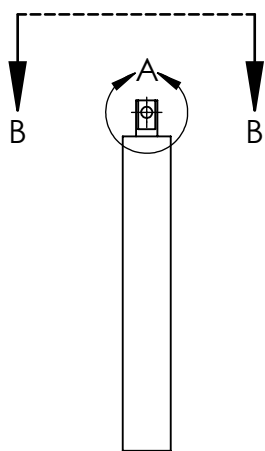
|             |              |                                      |             |              |          |                                   |
|-------------|--------------|--------------------------------------|-------------|--------------|----------|-----------------------------------|
|             |              | UNLESS OTHERWISE SPECIFIED:          | NAME        | DATE         |          |                                   |
|             |              | DIMENSIONS ARE IN INCHES             | DRAWN       | C. UNDERHILL | 5/5/2013 | TITLE:<br><br><b>ROLLER MOUNT</b> |
|             |              | TOLERANCES:                          | CHECKED     |              |          |                                   |
|             |              | FRACTIONAL ±                         | ENG APPR.   |              |          |                                   |
|             |              | ANGULAR: MACH ± BEND ±               | MFG APPR.   |              |          |                                   |
|             |              | TWO PLACE DECIMAL ±.05               | Q.A.        |              |          |                                   |
|             |              | THREE PLACE DECIMAL ±.010            | COMMENTS:   |              |          |                                   |
|             |              | INTERPRET GEOMETRIC TOLERANCING PER: |             |              |          |                                   |
|             |              | MATERIAL                             | 6061 T6 Al. |              |          |                                   |
|             |              | FINISH                               | N/A         |              |          |                                   |
| ASSY        | USED ON      |                                      |             |              |          |                                   |
| APPLICATION |              | DO NOT SCALE DRAWING                 |             |              |          |                                   |
| SIZE        | DWG. NO.     | REV                                  |             |              |          |                                   |
| <b>A</b>    | <b>4-004</b> | <b>A</b>                             |             |              |          |                                   |
| SCALE: 2:1  | WEIGHT:      | SHEET 1 OF 1                         |             |              |          |                                   |



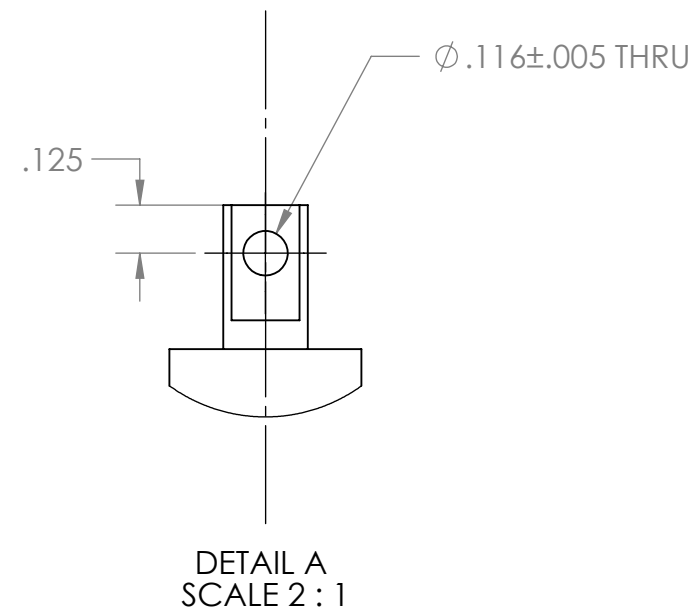
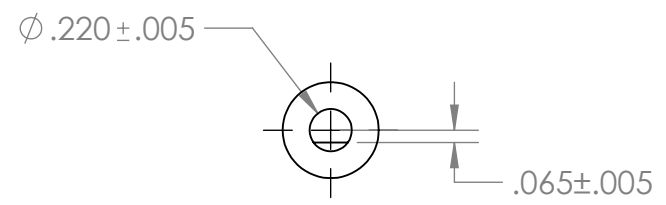
**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |  |  |  |                                |              |                  |   |
|--|--|--|--|--------------------------------|--------------|------------------|---|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME                           | DATE         |                  |   |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm$ .05<br>THREE PLACE DECIMAL $\pm$ .010 |  | DRAWN                          | C. UNDERHILL | 5/5/2013         | TITLE:<br><br><b>1/2"-10 LEAD SCREW NUT</b> |
|  |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED                        |              |                  |   |
|  |  | MATERIAL<br>(BRASS) - SEE COMMENT  |  | ENG APPR.                      |              |                  |   |
|  |  | FINISH<br>N/A  |  | MFG APPR.                      |              |                  |   |
|  |  | APPLICATION  |  | Q.A.                           |              | COMMENTS:        |   |
|  |  | DO NOT SCALE DRAWING   |  | MAKE FROM MCMASTER PN95270A114 |              | SIZE<br><b>A</b> | DWG. NO.<br><b>4-005</b>                    |
|  |  |  |  |                                |              | REV<br><b>A</b>  |   |
|  |  |  |  |                                |              | SCALE: 2:1       | WEIGHT:                                     |
|  |  |  |  |                                |              | SHEET 1 OF 1     |   |



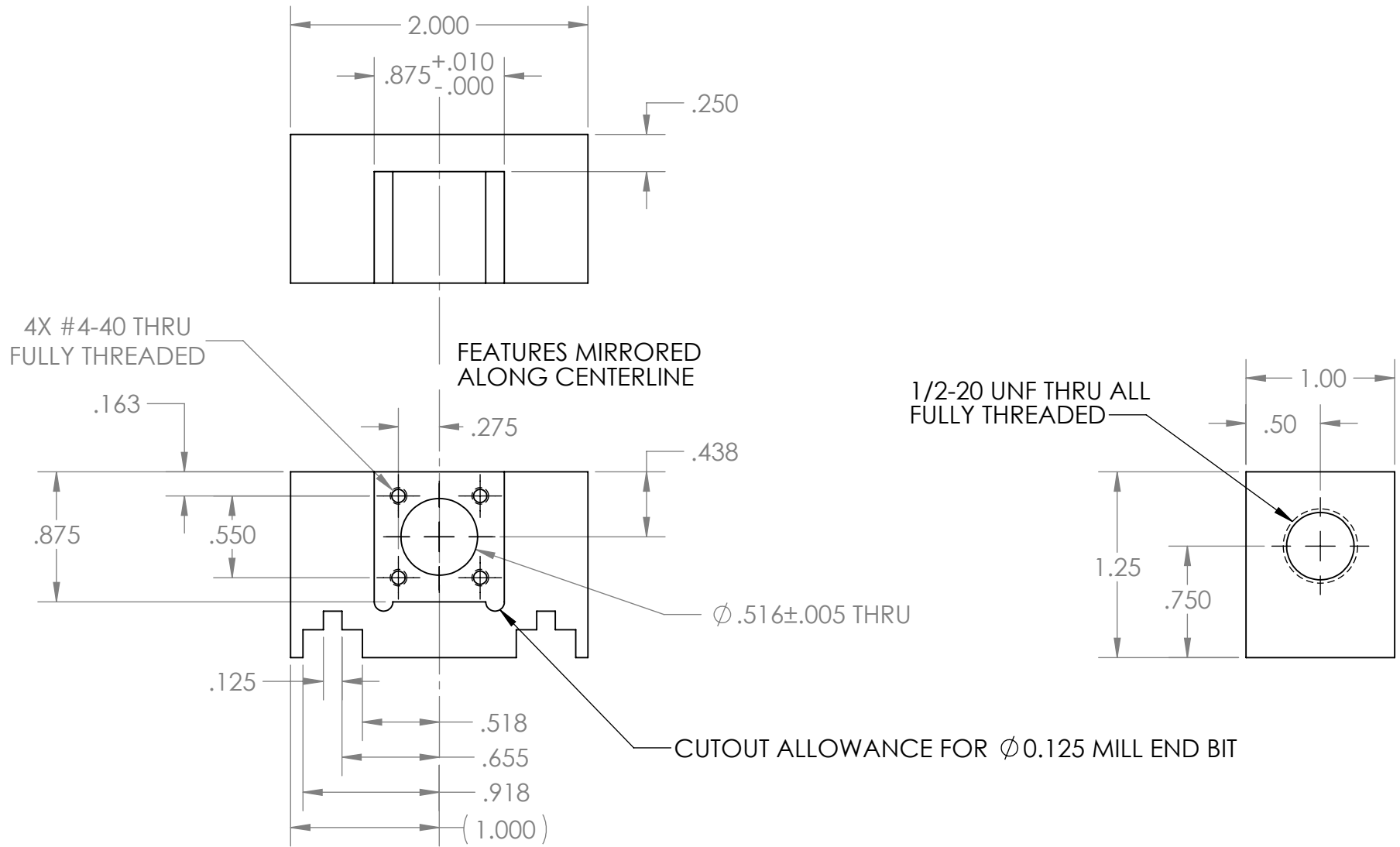
1/2-10 ACME THREADS  
1/2" MAJOR DIAMETER



**PROPRIETARY AND CONFIDENTIAL**  
THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

|             |  |  |  |   |              |                                       |                  |                          |
|-------------|--|--|--|---|--------------|---------------------------------------|------------------|--------------------------|
|             |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME  | DATE         | TITLE:<br><b>0.5" LEAD SCREW, 4"L</b> |                  |                          |
|             |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm .05$<br>THREE PLACE DECIMAL $\pm .010$ |  | DRAWN   | C. UNDERHILL |                                       |                  | 5/5/2013                 |
|             |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED   |              |                                       |                  |                          |
|             |  | MATERIAL<br>GRADE B7 STEEL   |  | ENG APPR.   |              |                                       |                  |                          |
|             |  | FINISH<br>N/A  |  | MFG APPR.   |              |                                       | SIZE<br><b>A</b> |                          |
|             |  | DO NOT SCALE DRAWING   |  | Q.A.  |              |                                       |                  | DWG. NO.<br><b>4-008</b> |
| APPLICATION |  |  |  | COMMENTS:<br>MAKE FROM 1/2-10 LEAD SCREW,<br>MCMaster PN93420A110 |              |                                       | REV<br><b>A</b>  |                          |
|             |  |  |  |   |              | SCALE: 1:2                            | WEIGHT:          | SHEET 1 OF 1             |



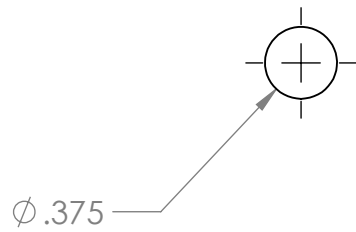
|             |  |                                      |             |              |          |                                       |
|-------------|--|--------------------------------------|-------------|--------------|----------|---------------------------------------|
|             |  | UNLESS OTHERWISE SPECIFIED:          | NAME        | DATE         |          |                                       |
|             |  | DIMENSIONS ARE IN INCHES             | DRAWN       | C. UNDERHILL | 5/5/2013 | TITLE:<br><b>LEAD SCREW NUT MOUNT</b> |
|             |  | TOLERANCES:                          | CHECKED     |              |          |                                       |
|             |  | FRACTIONAL $\pm$                     | ENG APPR.   |              |          |                                       |
|             |  | ANGULAR: MACH $\pm$ BEND $\pm$       | MFG APPR.   |              |          |                                       |
|             |  | TWO PLACE DECIMAL $\pm .05$          | Q.A.        |              |          | SIZE DWG. NO. REV<br><b>A 4-009 A</b> |
|             |  | THREE PLACE DECIMAL $\pm .010$       | COMMENTS:   |              |          |                                       |
|             |  | INTERPRET GEOMETRIC TOLERANCING PER: |             |              |          |                                       |
|             |  | MATERIAL                             | 6061 T6 Al. |              |          |                                       |
|             |  | FINISH                               | N/A         |              |          |                                       |
| APPLICATION |  | DO NOT SCALE DRAWING                 |             |              |          |                                       |

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**





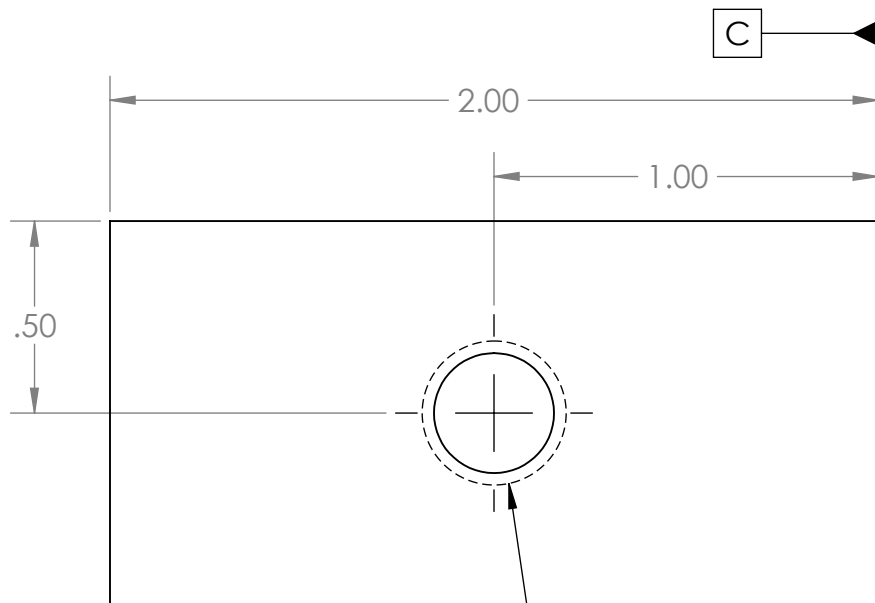


THREAD END WITH 3/8"-16 DIE

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

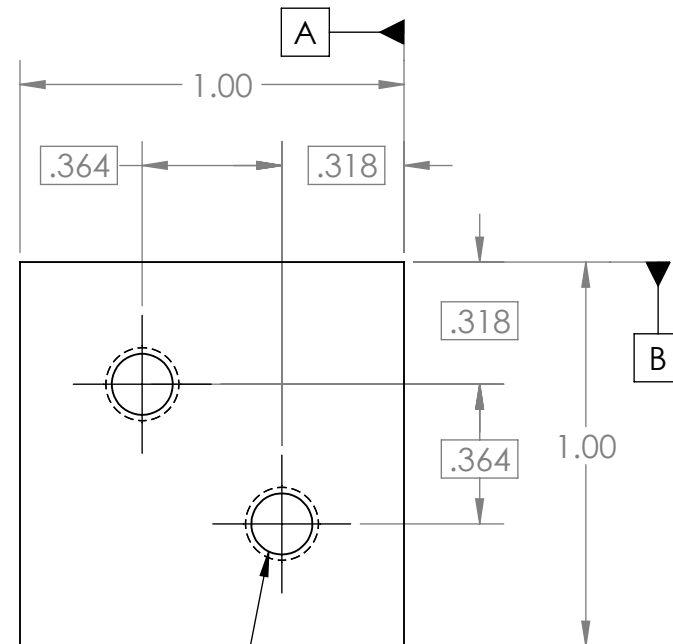
**SolidWorks Student Edition.**  
**For Academic Use Only**

|  |             |  |   |              |          |                                 |
|--|-------------|--|---|--------------|----------|---------------------------------|
|  |             | UNLESS OTHERWISE SPECIFIED:  |   | NAME         | DATE     |                                 |
|  |             | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm .05$<br>THREE PLACE DECIMAL $\pm .010$ | DRAWN                                     | C. UNDERHILL | 5/5/2013 | TITLE:                          |
|  |             | INTERPRET GEOMETRIC TOLERANCING PER:   | CHECKED                                   |              |          | <b>PAYLOAD SPINDLE</b>          |
|  |             | MATERIAL<br>416 STAINLESS STEEL  | ENG APPR.                                 |              |          |                                 |
|  |             | FINISH<br>N/A  | MFG APPR.                                 |              |          | SIZE DWG. NO. REV               |
|  |             | DO NOT SCALE DRAWING   | Q.A.                                      |              |          | <b>A</b> <b>4-011</b> <b>A</b>  |
|  | APPLICATION |  | COMMENTS:                                 |              |          | SCALE: 1:1 WEIGHT: SHEET 1 OF 1 |
|  |             |  | MAKE FROM 3/8" STAINLESS STEEL ROD STOCK. |              |          |                                 |



3/8-16 UNC, THRU, FULLY THREADED

$\text{⊕}$   $\text{⌀}$  .060  $\text{Ⓜ}$  B C



2X #10-32 UNF 0.50  $\nabla$  FULLY THREADED

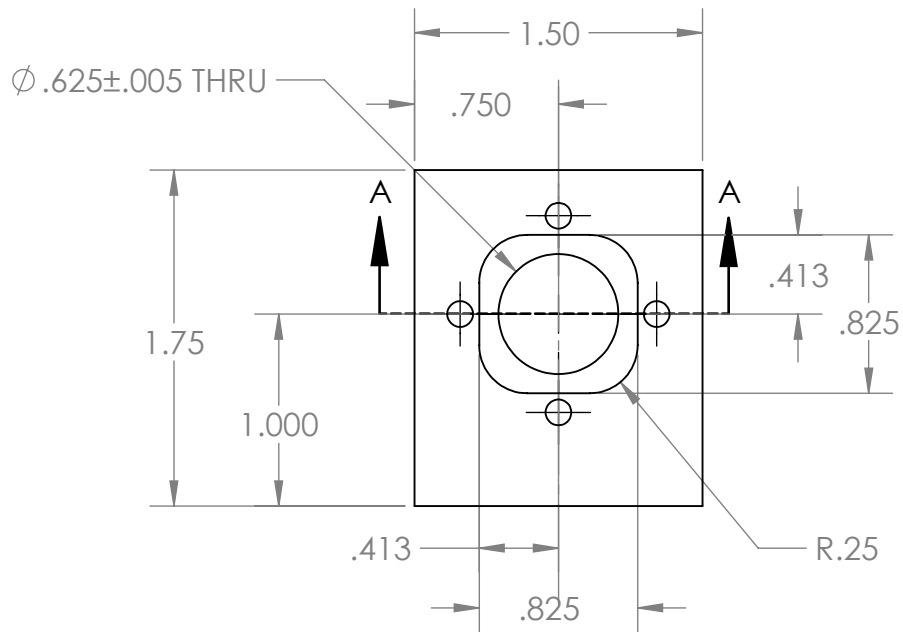
$\text{⊕}$   $\text{⌀}$  .020  $\text{Ⓜ}$  A B

MIRROR HOLE PATTERN ON REVERSE SIDE

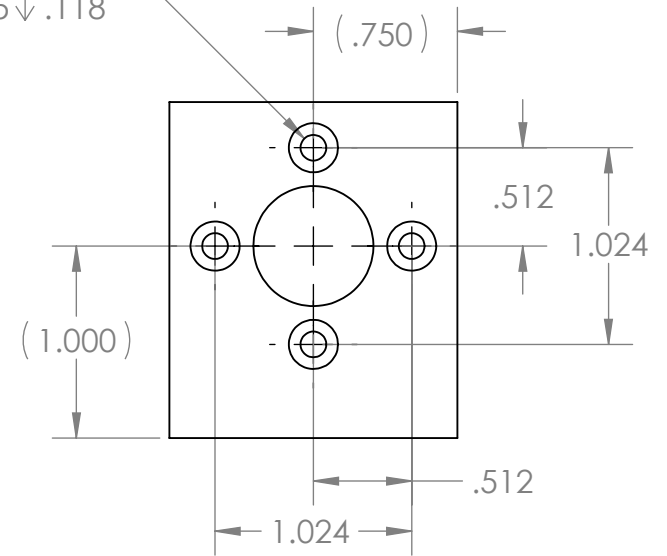
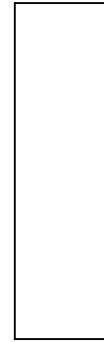
**Proprietary and Confidential**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR USE WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.

**SolidWorks Student Edition.**  
**For Academic Use Only**

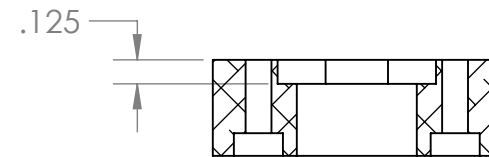
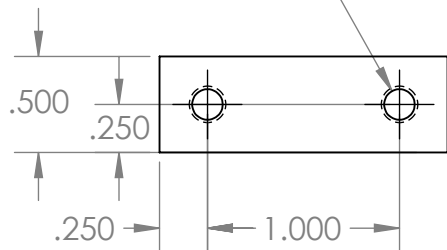
|             |  |  |  |  |              |          |                                    |
|-------------|--|--|--|--|--------------|----------|------------------------------------|
|             |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME                                   | DATE         |          |                                    |
|             |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm$ .05<br>THREE PLACE DECIMAL $\pm$ .010 |  | DRAWN                                  | C. UNDERHILL | 5/5/2013 | TITLE:<br><br><b>SPINDLE MOUNT</b> |
|             |  | INTERPRET GEOMETRIC TOLERANCING PER:   |  | CHECKED                                |              |          |                                    |
|             |  | MATERIAL<br>6061 T6 Al.  |  | ENG APPR.                              |              |          |                                    |
|             |  | FINISH<br>N/A  |  | MFG APPR.                              |              |          |                                    |
| APPLICATION |  | DO NOT SCALE DRAWING   |  | Q.A.                                   |              |          | SIZE                               |
|             |  |  |  | COMMENTS:<br>MAKE FROM 1"X1" BAR STOCK |              |          | DWG. NO.                           |
|             |  |  |  |  |              |          | <b>A</b>                           |
|             |  |  |  |  |              |          | 4-012                              |
|             |  |  |  |  |              |          | REV                                |
|             |  |  |  |  |              |          | <b>A</b>                           |
|             |  |  |  |  |              |          | SCALE: 2:1                         |
|             |  |  |  |  |              |          | WEIGHT:                            |
|             |  |  |  |  |              |          | SHEET 1 OF 1                       |



4X  $\phi .134 \pm .005$  THRU  
 $\square \phi .256 \pm .005 \nabla .118$



2X #10-32  $\nabla .50$   
 FULLY THREADED



SECTION A-A  
 SCALE 1 : 1

|  |  |  |  |            |              |              |   |
|--|--|--|--|------------|--------------|--------------|---|
|  |  | UNLESS OTHERWISE SPECIFIED:  |  | NAME       | DATE         |              |   |
|  |  | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL $\pm$<br>ANGULAR: MACH $\pm$ BEND $\pm$<br>TWO PLACE DECIMAL $\pm .05$<br>THREE PLACE DECIMAL $\pm .010$ |  | DRAWN      | C. UNDERHILL | 5/5/2013     | TITLE:<br><br>DRIVE SCREW BEARING MOUNT |
|  |  | INTERPRET GEOMETRIC<br>TOLERANCING PER:  |  | CHECKED    |              |              |   |
|  |  | MATERIAL<br>6061 T6 Al.  |  | ENG APPR.  |              |              |   |
|  |  | FINISH<br>N/A  |  | MFG APPR.  |              |              |   |
|  |  | APPLICATION  |  | Q.A.       |              |              |   |
|  |  | DO NOT SCALE DRAWING   |  | COMMENTS:  |              |              |   |
|  |  |  |  | SIZE       | DWG. NO.     | REV          |   |
|  |  |  |  | <b>A</b>   | 4-013        | <b>A</b>     |   |
|  |  |  |  | SCALE: 1:1 | WEIGHT:      | SHEET 1 OF 1 |   |

PROPRIETARY AND CONFIDENTIAL

**SolidWorks Student Edition.**  
**For Academic Use Only**

THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF CHRIS UNDERHILL. ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF CHRIS UNDERHILL IS PROHIBITED.