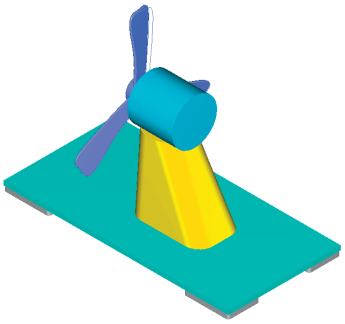
# Chapter 29 MAG-LEV Solid



## A. Create Rectangle For Base.

Step 1. MAIN MENU.

Step 2. Create.

Step 3. Rectangle.

Step 4. 1 Point.

Step 5. Set: Width **5** and Height **2.5**.

Step 6. For the Placement Point, click the bottom left gray rectangle and click OK.

Step 7. Origin.

Step 8. Use **ALT-F1** or  to fit drawing on the screen.

## B. Extrude Base Solid.

Step 1. Change to the Isometric View. Use the green  or **ALT-6 I**. Hold down ALT and press 6. Key-in I.

Step 2. Use **ALT-F1** or  to fit drawing on the screen.

Step 3. MAIN MENU.

Step 4. Solids.

Step 5. Extrude.

Step 6. Chain.

Step 7. Click a line.

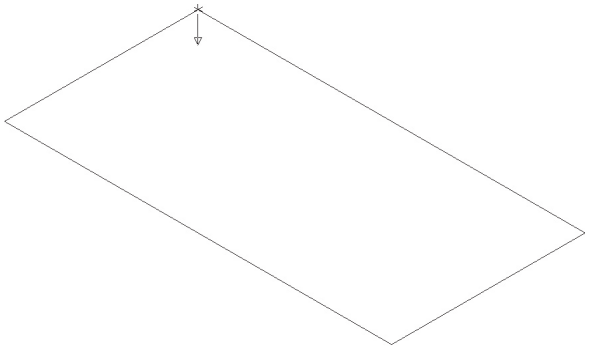


**Fig. 1**

Step 8. Done.

Step 9. The direction arrow on the chain should **point down**, **Fig. 1**. If the arrow points in the wrong direction, click Reverse It.

Step 10. Done.

Step 11. Set: Distance = **.1** and click OK, **Fig. 2**.

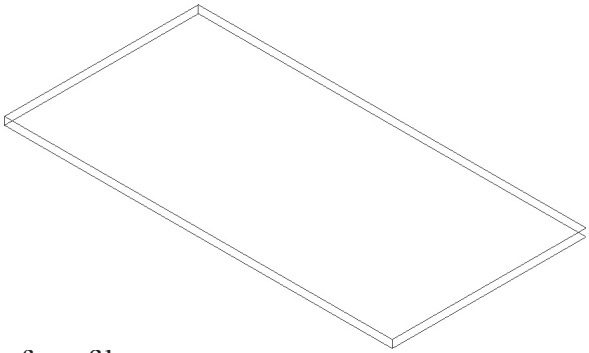


**Fig. 2**

Step 12. Save the drawing. Use: File, Save and **mag lev** for a filename.

## C. Create Rectangles For Magnets.

Step 1. Change to the Top View. Use the green  or **ALT-6 T**.

Step 2. Change the depth of your drawing. Click the Z Button  from the Secondary Menu (bottom of the menu) and key-in **-.1** and press ENTER. (**ALT-0)**

Step 3. Draw the cockpit a different color. Change the color to **light gray**. Click the color swatch in the Secondary Menu. Click light gray, number 7 and click OK (**ALT-1**).

Step 4. MAIN MENU.

Step 5. Create.

Step 6. Rectangle.

Step 7. Options.

Step 8. Click Corner Fillet On and key-in .05 for radius and click OK, **Fig. 3**.

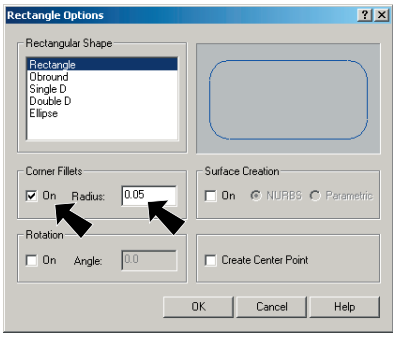



**Fig. 3**

Step 9. 1 Point.

Step 10. Set: Width **1** and Height **.7**.

Step 11. For the Placement Point, click the bottom left gray rectangle and click OK.

Step 12. Click to place a rectangle in each corner, **Fig. 4**.

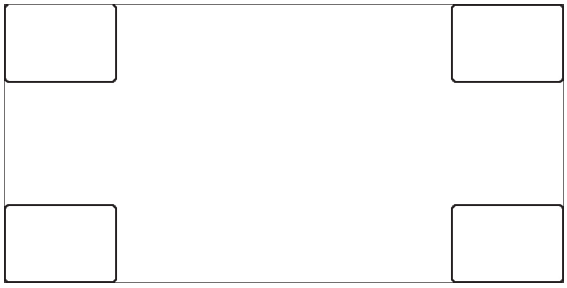


**Fig. 4**

## D. Extrude Magnets.

Step 1. Change to the Isometric View. Use the green  or **ALT-6 I**.

Step 2. MAIN MENU.

Step 3. Solids.

Step 4. Extrude.

Step 5. Chain.

Step 6. Click a line of each magnet geometry, **Fig. 5**.

Step 7. Done.

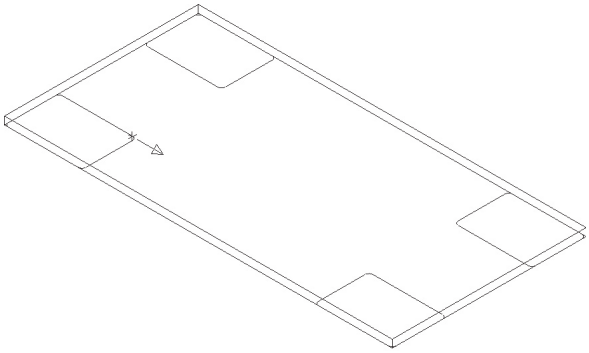


**Fig. 5**

Step 8. The direction arrow on each chain should **point down**, **Fig. 6**. If both arrows point to the right go to the next step. If they don't, do one of the following:
If both arrows point in the wrong direction, click Reverse It.
If one arrow points in the wrong direction, click Reverse One, and click the chain whose arrow points in the wrong direction.

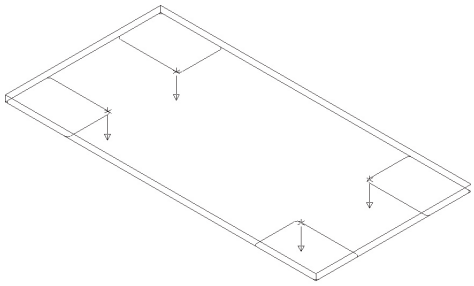


**Fig. 6**

Step 9. Done.

Step 10. Set: Distance = **.1** and click OK, **Fig. 7**.

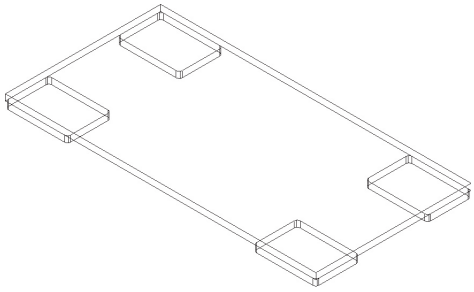


**Fig. 7**

## E. Draw Body.

Step 1. Change to the Front View. Use green Front View  or **ALT-6 F**.

Step 2. Use **ALT-F1** or  to fit drawing on the screen.

Step 3. Change the depth of your drawing. Click the Z Button  from the Secondary Menu (bottom of the menu) and key-in **-.75** and press ENTER. (**ALT-0)**

Step 4. Draw the wing lines a different color. Change the color to **yellow**. Click the color swatch in the Secondary Menu. Click yellow, number 14 and click OK (**ALT-1**).

Step 5. MAIN MENU.

Step 6. Create.

Step 7. Line.

Step 8. Multi.

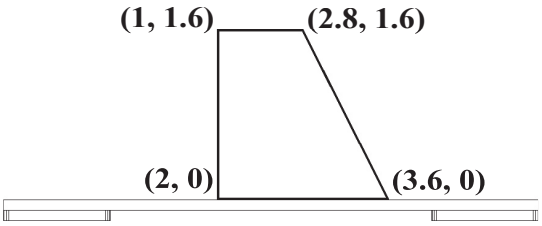



**Fig. 8**

Step 9. Click the 4 points in **Fig. 8**. Start with **(2, 0)** up to **(2, 1.6)** across to **(2.8, 1.6)** and down to **(3.6, 0)** and back to **(2, 0)**. Press ESC to stop the line. Use the Cursor Tracking Window located in the top right corner of the display to view the coordinates. Position the cursor as close as possible then click.

## F. Extrude Body Solid.

Step 1. Change to the Isometric View. Use the green  or **ALT-6 I**.

Step 2. MAIN MENU.

Step 3. Solids.

Step 4. Extrude.

Step 5. Chain.

Step 6. Click a line of the body, **Fig. 9**.

Step 7. Done.

Step 8. The direction arrow on the chain should **point back**, **Fig. 9**. If the arrow points in the wrong direction, click Reverse It.

Step 9. Done.

Step 10. Set: Distance = **1** and click OK, **Fig. 10**.

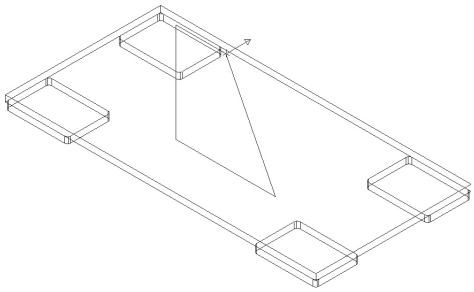


**Fig. 9**

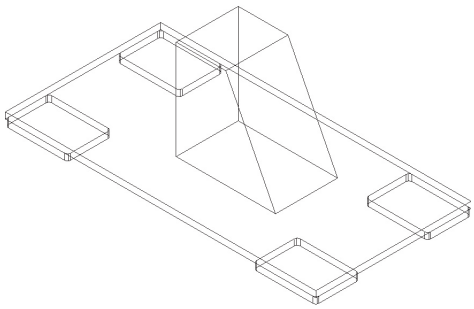


**Fig. 10**

## G. Create Circle For Motor.

Step 1. Change to the Side View. Use the green  or **ALT-6 S**.

Step 2. Change the depth of your drawing. Click the Z Button  from the Secondary Menu (bottom of the menu), key-in **2** and press ENTER. (**ALT-0)**

Step 3. Draw the motor a different color. Change the color to **blue**. Click the color swatch in the Secondary Menu. Click blue, number 75 and click OK.

Step 4. MAIN MENU.

Step 5. Create.

Step 6. Arc.

Step 7. Circle Point and Diameter.

Step 8. Key-in **1** for diameter and press ENTER.

Step 9. Key-in **1.25, 2** for center point and press ENTER, **Fig. 11**.

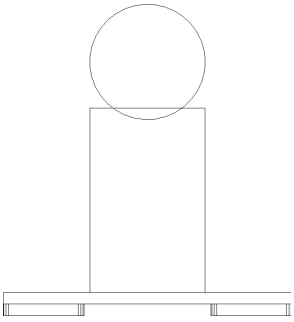


**Fig. 11**

## H. Cut Out Motor Groove And Extrude Motor.

Step 1. Change to the Isometric View. Use the green  or **ALT-6 I**.

Step 2. MAIN MENU.

Step 3. Solids.

Step 4. Extrude.

Step 5. Click the motor circle.

Step 6. Done.

Step 7. The direction arrow on the chain should **point to the right towards the base**, **Fig. 12**. If the arrow points in the wrong direction, click Reverse It.

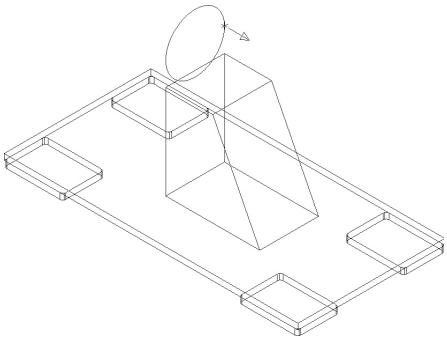


**Fig. 12**

Step 8. Done.

Step 9. Set: **Cut Body**.
Distance = **1** and click OK, **Fig. 13** and **Fig. 14**.

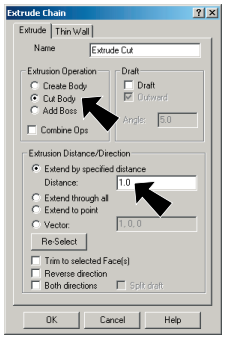



**Fig. 13**

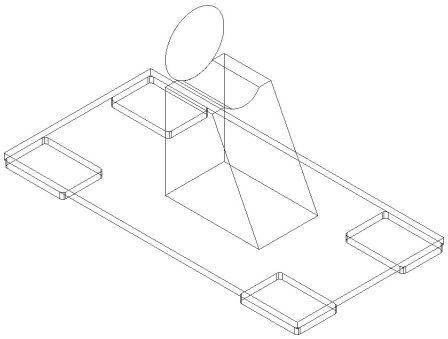


**Fig. 14**

Step 10. Click the body as the target.

Step 11. Extrude.

Step 12. Click the motor circle.

Step 13. Done.

Step 14. The direction arrow on the chain should **point to the right towards the base**, **Fig. 12**. If the arrow points in the wrong direction, click Reverse It.

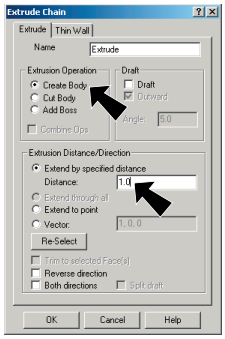



**Fig. 15**

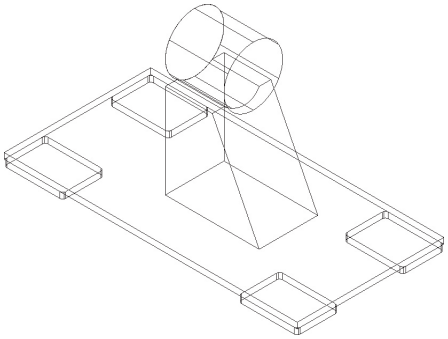


**Fig. 16**

Step 15. Done.

Step 16. Set: **Create Body**.
Distance = **1** and click OK, **Fig. 15** and **Fig. 16**.

## I. Draft Body Sides.

Step 1. Hide all entities except the body solid. Use **Alt-E**, then click the body solid, **Fig. 17** and click Done.

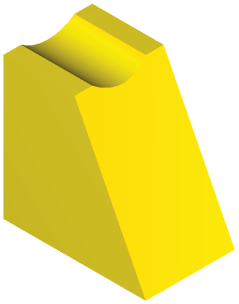


**Fig. 17**

Step 2. MAIN MENU.

Step 3. Solids.

Step 4. Next Menu.

Step 5. Draft faces.

Step 6. Click the side face, **Fig. 18**.

Step 7. Change From Back to Yes, **Fig. 19**.

Step 8. Click the other side face, **Fig. 20**.

Step 9. Done.

Step 10. Set: Draft to Face.
Draft Angle = **4** and click OK, **Fig. 21**.

Step 11. Click the bottom face for the draft plane, **Fig. 22**.

Step 12. The arrow on the cone shaped graphic should point up. If the arrow points in the wrong direction, click Reverse It, **Fig. 23**.

Step 13. Done, **Fig. 24**.

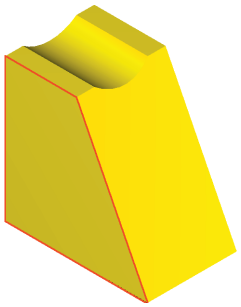


Fig. 18


Fig. 19

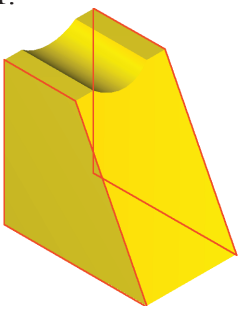


Fig. 20

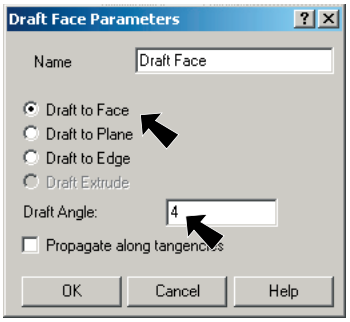



Fig. 21

## J. Fillet Corners.

Step 1. MAIN MENU.

Step 2. Solids.

Step 3. Fillet.

Step 4. Click Edges to **Y** and others N, **Fig. 25**.

Step 5. Click a side edge of the body, **Fig. 26**.

Step 6. Done.

Step 7. Set Radius **.3** and click OK, **Fig. 27** and **Fig. 28**.

Step 8. Repeat and Fillet the 3 other side edges of the body, **Fig. 29**.

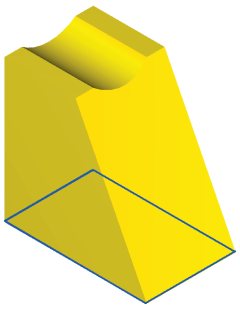


Fig. 22

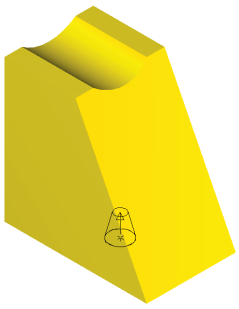


Fig. 23

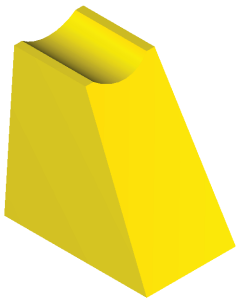


Fig. 24

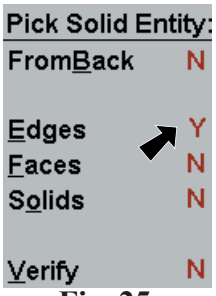



Fig. 25

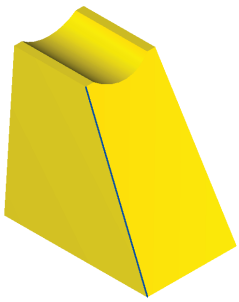


Fig. 26

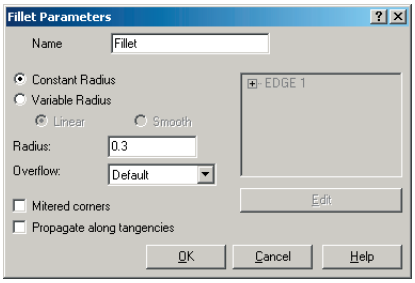



Fig. 27

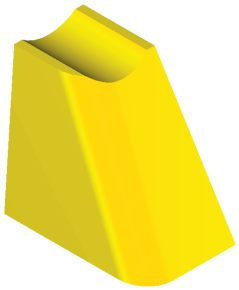


Fig. 28

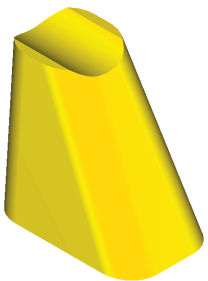


Fig. 29

## K. Create Motor Shaft Circle.

Step 1. Change to the Side View. Use the green  or **ALT-6 S**.

Step 2. Draw the motor shaft a different color. Change the color to **gray**. Click the color swatch in the Secondary Menu. Click brown, number **7** and click OK.

Step 3. Use **Alt-E** to unhide all entities.

Step 4. Turn off the shading, use **ALT-S**.

Step 5. MAIN MENU.

Step 6. Create.

Step 7. Arc.

Step 8. Circle Point and Diameter.

Step 9. Key-in **.08** for diameter and press ENTER.

Step 10. Center.

Step 11. Click the motor circle, **Fig. 30**.

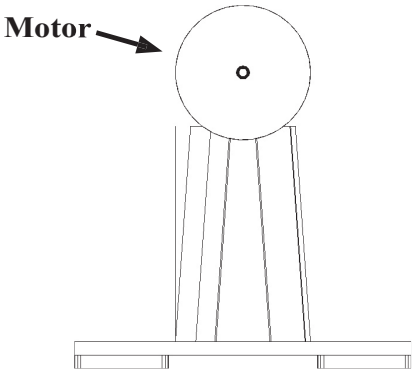



**Fig. 30**

## L. Extrude Motor Shaft Solid.

Step 1. Change to the Isometric View. Use the green  or **ALT-6 I**.

Step 2. MAIN MENU.

Step 3. Solids.

Step 4. Extrude.

Step 5. Single.

Step 6. Click the motor shaft circle.

Step 7. Done.

Step 8. The direction arrow on the chain should **point back**, **Fig. 31**. If the arrow points in the wrong direction, click Reverse It.

Step 9. Done.

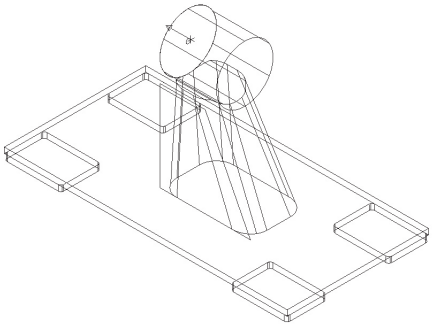


**Fig. 31**

Step 10. Set: Distance = **.2** and click OK, **Fig. 32** and **Fig. 33**.

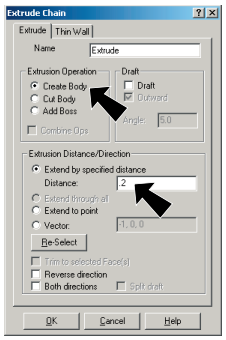



**Fig. 32**

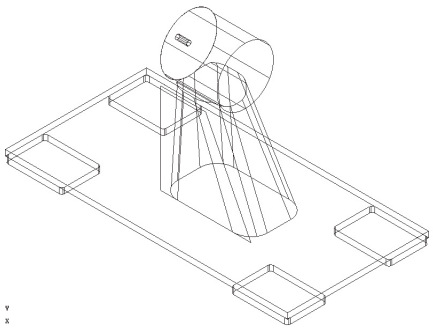


**Fig. 33**

## M. Move Solids To New Level.

Step 1. Turn on the shading, use **ALT-S**.

Step 2. MAIN MENU.

Step 3. Screen.

Step 4. Change levels.

Step 5. **Uncheck Use Main Level**, **Fig. 34**.

Step 6. Key-in **2** for Level Number and click OK, **Fig. 34**.

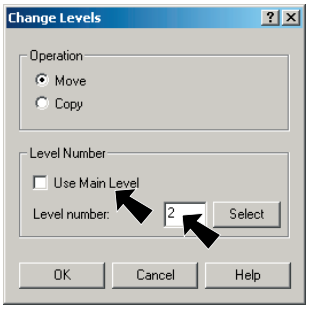



**Fig. 34**

Step 7. All.

Step 8. Solids.

Step 9. Display Levels Manager. Use **ALT-Z**.

Step 10. Press the Tab key to move to the Name Field and key-in **mag-lev geometry**, **Fig. 35**.

Step 11. Press Shift-Tab key (hold down the Shift key and press Tap key) to move back to the Number Field and key-in **2**, **Fig. 35**.

Step 12. Press Tab key to move to the Name Field and key-in **mag-lev solids**, **Fig. 35**.

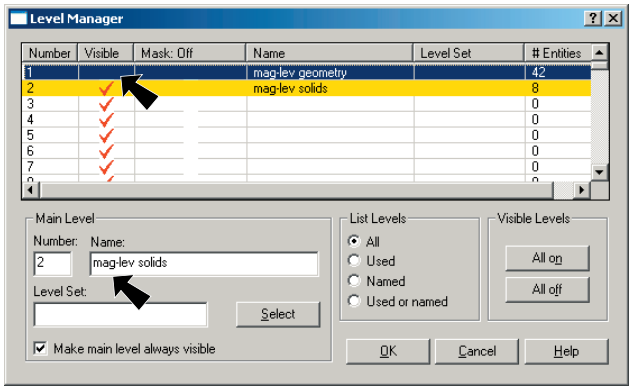



**Fig. 35**

Step 13. **Uncheck Level 1** in the Visible column to hide the geometry and click OK, **Fig. 35**.

Step 14. Use  or **F3** to repaint the screen.

Step 15. Save your drawing. Use **Alt-A**.

## N. Retrieve Propeller.

Step 1. MAIN MENU.

Step 2. Create.

Step 3. Next Menu.

Step 4. Pattern.

Step 5. Click the Browse Button ... to view files.

Step 6. Click your **propeller** file and click Open.

Step 7. Set: Rotation **0** and click OK.

Step 8. Key-in 1**.95, 1.25** and press ENTER, **Fig. 36**.

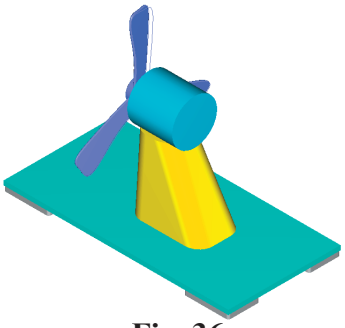


**Fig. 36**

Step 9. Display Levels Manager. Use **ALT-Z**.

Step 10. **Uncheck Level 3** in the Visible column to hide the propeller geometry and click OK, **Fig. 37**.

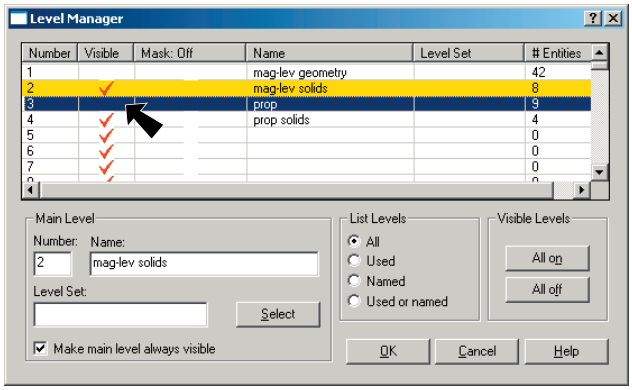



**Fig. 37**

Step 11. Use  or **F3** to repaint the screen.

Step 12. Save your drawing. Use **Alt-A**.

## O. Layout.

Step 1. MAIN MENU.

Step 2. Solids.

Step 3. Next menu.

Step 4. Layout.

Step 5. Set: **Paper Size to Custom**.

Step 6. Key-in **16** and **10.5** for size.

Step 7. Set: **Scale Factor 1**.

Step 8. Click **4 View ANSI**.

Step 9. OK.

Step 10. Key-in **5** for Level Number and **layout** for Name and click OK, **Fig. 39**.

Step 11. AllSolids.

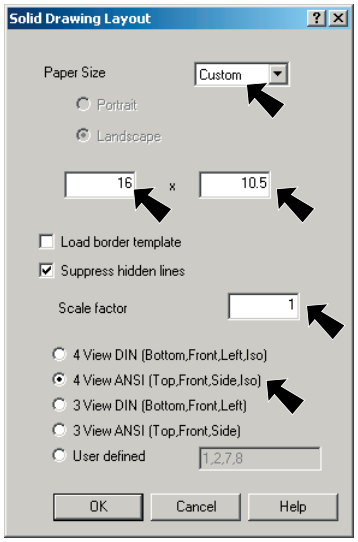



**Fig. 38**

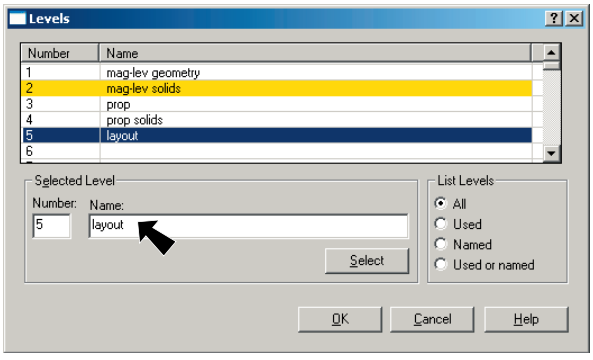



**Fig. 39**

## P. Hide Solids Level.

Step 1. MAIN MENU and click Yes exit.

Step 2. Display Levels Manager. Use **ALT-Z**.

Step 3. Click the **5** in the Number column to make **Level 5 active**, **Fig. 40**.

Step 4. **Uncheck Level 2 and 4** in the Visible column to hide the solids and click OK, **Fig. 40**.

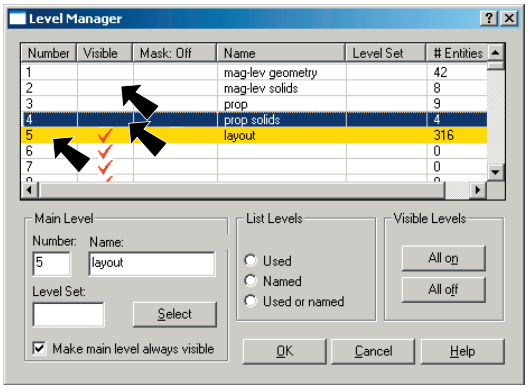



**Fig. 40**

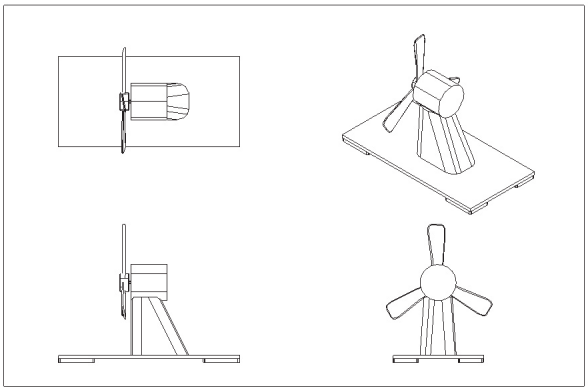
Step 5. Use **ALT-F1** or  to fit drawing on the screen.

## Q. Add Your Name and Period To Drawing.

Step 1. Delete the borders lines around the views, **Fig. 41**. Use **F5** to delete.

Step 2. Use: **Create, Drafting, Note** commands to add your names and period to the drawing.

Step 3. Save your drawing. Use **Alt-A.**



**Detete the 4 borders lines**

**Fig. 41**