

Fundamentals III



PROJECT EXERCISE

This project exercise provides step-by-step instructions for creating the Base Plate design shown in Figure P4-1. The intent is to guide you in applying the concepts and tools presented in Chapters 1 through 4. The instructions are not necessarily the most efficient way to draw the objects. Your efficiency will improve as you learn more tools in later chapters.

This project introduces the use of the following tools:

- ▶ Placement: Line String, Arc, Circle
- ▶ Manipulation: Mirror, Copy Parallel, Fillet, Array



Notes: The dimensions are not part of this project. They are included in Figure P4-1 only to show the size of the design.

As you complete each step in the project procedures, place a check mark by the step to help you keep up with where you are in the project.

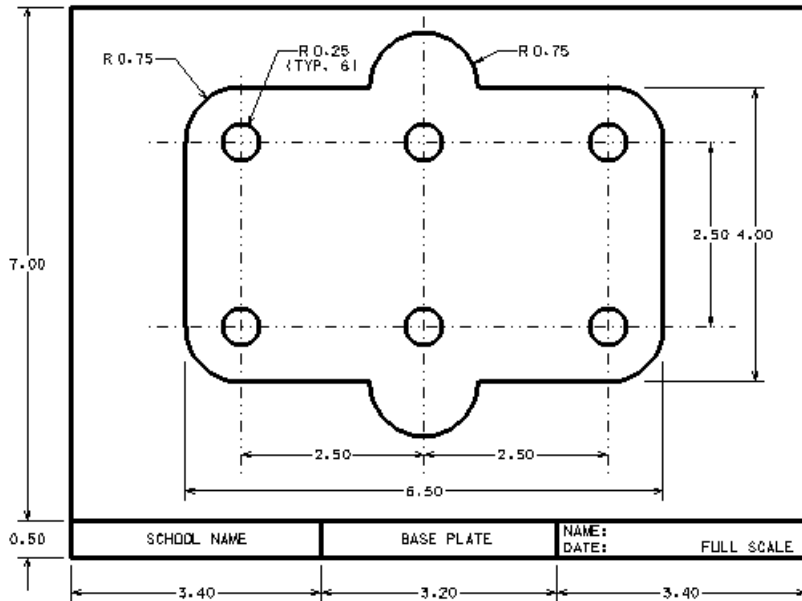


Figure P4-1 Completed project design

PREPARE THE DESIGN FILE

This procedure has you start MicroStation, create a design file, and enter the initial settings.

STEP 1: Invoke MicroStation program.

STEP 2: Create a new design file named **CH4.dgn** using the **seed2d.dgn** seed file.

STEP 3: In the Design File dialog box:

- ▶ Select the **Working Units** category and set the **Master Unit** and **Sub Unit** to Inches.
- ▶ Select the **Coordinate Readout** category and set the **Coordinates Format** to **Master Units**.
- ▶ Click the **OK** button to close the Design File dialog box.

STEP 4: Open the design File dialog box again, select the **Grid** category, set the **Grid Master** to 0.1 and the **Grid Reference** to 10, turn OFF the **Grid Lock**, and click **OK** to close the dialog box.

STEP 5: Click the **Active Snap Mode** icon in the Status bar and, in the Snaps menu, select **Keypoint** mode while pressing SHIFT.

STEP 6: Select **Settings > Level > Manager** to open the Level Manager settings box, and create the following level names and assign the properties:

- ▶ Objects

- ▶ Center Lines
- ▶ Title Block – Color to blue (1), Line Style to 0 (solid line), and Line Weight to 2.

STEP 7: In the Attributes tool box, set the **Active Level** to **Title Block**.

STEP 8: Click **Active Snap Mode** on the Status bar and select **AccuSnap** from the Snaps menu.

STEP 9: In the AccuSnap settings box, turn the **Enable AccuSnap** check box ON, turn on any other AccuSnap settings you want to use for tentative snapping, and close the settings box.

STEP 10: Select **File > Save Settings**

DRAW THE BORDER AND TITLE BLOCK

This procedure presents the steps for drawing the border and title block, as shown in Figure P4–2.

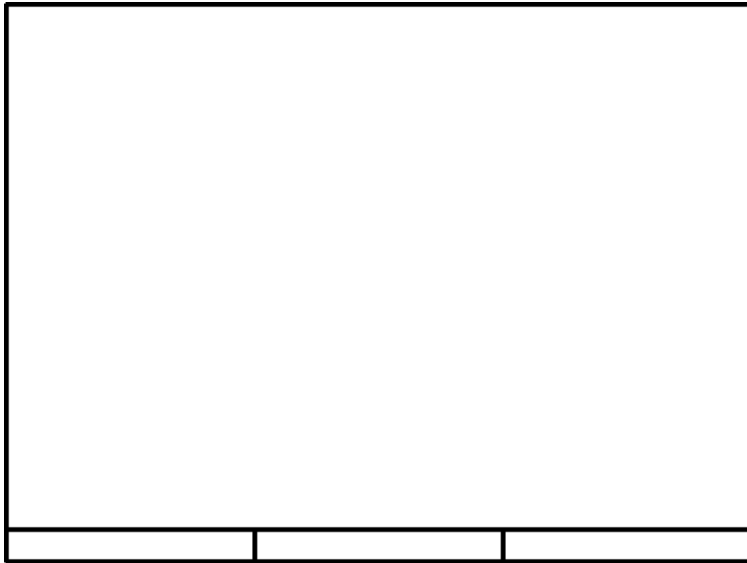


Figure P4–2 Border and title block before the title block text is entered

- STEP 1:** Create the border by drawing a block 12 inches wide by 9 inches tall, with the lower left corner at coordinate **0,0**.
- STEP 2:** Fit the view.
- STEP 3:** Create the title block area by drawing a horizontal line across the width of the block and one-half inch above the bottom of the block.

STEP 4: Divide the title block into three sections of equal width by drawing two vertical lines.

STEP 5: Select **File > Save Settings**.

Compare your completed border to the one shown in Figure P4-2.

FILL IN THE TITLE BLOCK TEXT

This procedure has you place text in the title block, as shown in Figure P4-3.

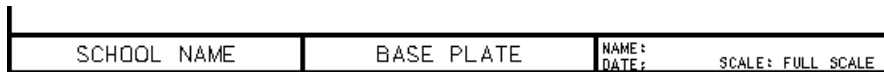


Figure P4-3 Filled-in title block

STEP 1: Set the Active **Line Weight** to **0**.

STEP 2: Invoke the Place Text tool from the Task Navigator tool box (active task set to Text) and, in the Tool Settings window, click the expand arrow on the lower right corner of the box to display additional tool settings.

STEP 3: Set the values in the Text tool settings as shown in Figure P4-4.

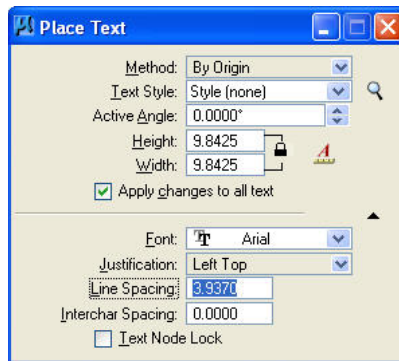


Figure P4-4 Enter the text parameters shown here

STEP 4: In the Text Editor window, type a school or company name and place the text in the left title block area.

STEP 5: Clear the Text Editor window, type **BASE PLATE** in the window, and place the text in the center title block area.

STEP 6: In the Tool Settings window, set the **Height** and **Width** to 0.125 and the **Justification** to **Left Top**.

STEP 7: Use either the Zoom In or Window Area tool to zoom in close to the right title block area.

STEP 8: In the right title block area, place the text shown in Figure P4-3. Key-in **Name:** and your name, press ENTER, key-in **Date:** and today's date, and then key-in three spaces and the scale information.

STEP 9: Fit the view and select **File > Save Settings**.

Compare your completed title block to the one shown in Figure P4-3.

DRAW THE CENTER LINES

This procedure describes the steps required to draw a horizontal and vertical centerline, and then use the Copy Parallel tool to create the other three centerlines, as shown in Figure P4-5.

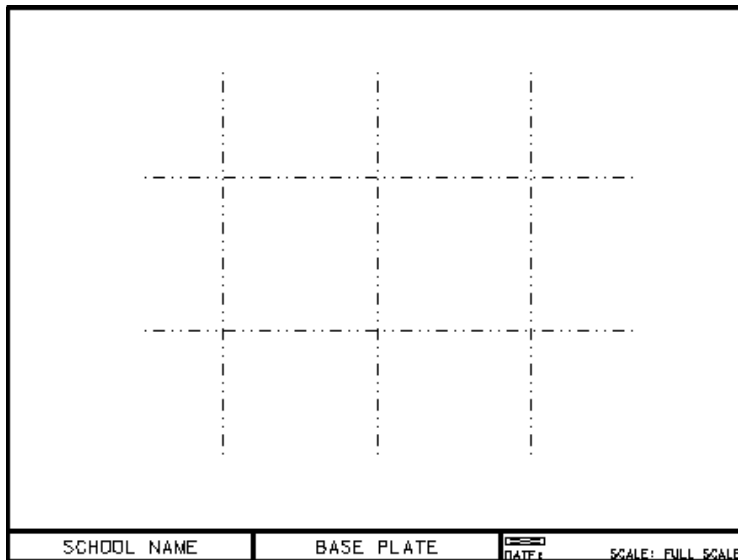


Figure P4-5 Completed centerlines

STEP 1: In the Attributes tool box, set the **Active Level** to **Center Lines**, set the **Active Color** to **green (2)**, the **Active Line Style** to **6** (center line), and the **Active Line Weight** to **0**.

STEP 2: Place the top horizontal centerline 8 inches long starting at coordinate **2.25,6.25**.

STEP 3: Place the left vertical centerline 6.25 inches long starting at coordinate **3.5,1.75**.

STEP 4: Invoke the Move Parallel tool from the Manipulate tool box. In the Tool Settings window, turn **ON** the **Make Copy** and **Distance** check boxes, and key-in **2.5** in the **Distance** text field.

STEP 5: Select the horizontal centerline, move the pointer below the line, and click the Data button to place a copy of the line 2.5 inches below the original line.

STEP 6: Click the Reset button to release the line and then select the vertical centerline.

STEP 7: Make two parallel copies of the vertical centerline.

Compare your completed centerlines to Figure P4–5.

DRAW PART OF THE BASE PLATE OUTLINE

This procedure draws the left half of the base plate outline using the Place Line, Fillet, and Arc tools, as shown in Figure P4–6. The figure shows the top arc as it is initially placed. The arc is mirrored after placement to correct its orientation.

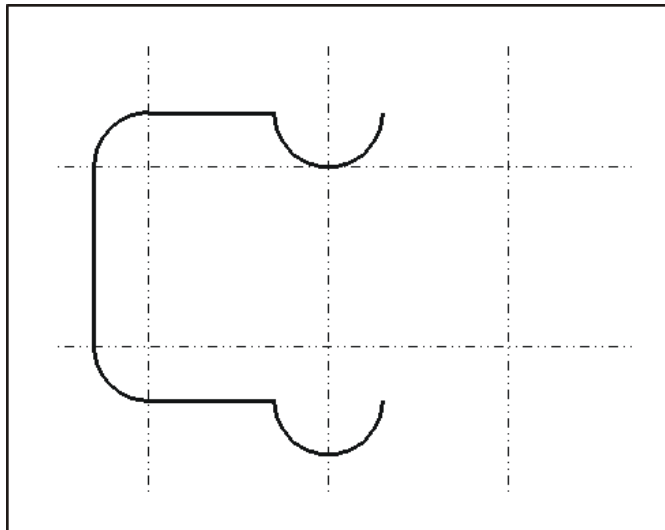


Figure P4–6 Result of drawing the left half of the base plate outline

STEP 1: In the Attributes tool box, set the **Active Level** to **Object**, set the **Active Color** to **white (0)**, the **Active Line Style** to **0 (solid line)**, and the **Active Line Weight** to **2**.

STEP 2: Select **File > Save Settings**.

STEP 3: Invoke the Place Line tool from the Task Navigator tool box (active task set to Linear) and place three lines using the following precision key-ins (see Figure P4–7):

- ▶ XY=5.25,3
- ▶ DI=2.5,180
- ▶ DI=4,90

► DI=2.5,0

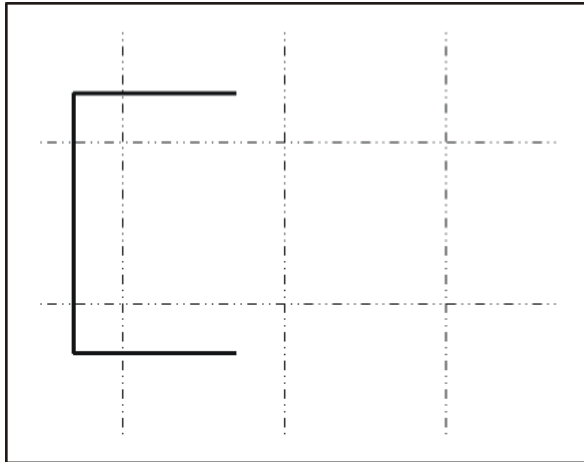


Figure P4-7 View after placing three lines in Step 2

- STEP 4:** Invoke the Construct Circular Fillet tool from the Modify tool box. In the Tool Settings window, key-in **0.75** in the Radius text field and select **Truncate > Both**.
- STEP 5:** Select the bottom horizontal line and then select the vertical line.
- STEP 6:** Click the Data button to complete placing the circular fillet.
- STEP 7:** Construct a circular fillet at the intersection of the vertical line and the top horizontal line.
- STEP 8:** Invoke Place Arc from the Arcs tool box. In the Tool Settings window, make the following settings:
- Select **Method > Edge**.
 - Turn the **Radius** check box ON and key-in **0.75** in the associated text field.
 - Turn the **Start Angle** check box ON and key-in **180** in the associated text field.
 - Turn the **Sweep Angle** check box ON and key-in **180** in the associated text field.
- STEP 9:** Drag the pointer toward the right end of the bottom horizontal line until AccuSnap snaps to the end of the line. Click the Data button to accept the point and place an arc at the end of the line.
- STEP 10:** Drag the pointer toward the right end of the top horizontal line until AccuSnap snaps to the end of the line. Click the Data button to accept the point and place an arc at the end of the line.

COMPLETE THE BASE PLATE OUTLINE

This procedure uses the Mirror tool to complete the outline of the base plate, as shown in Figure P4–8.

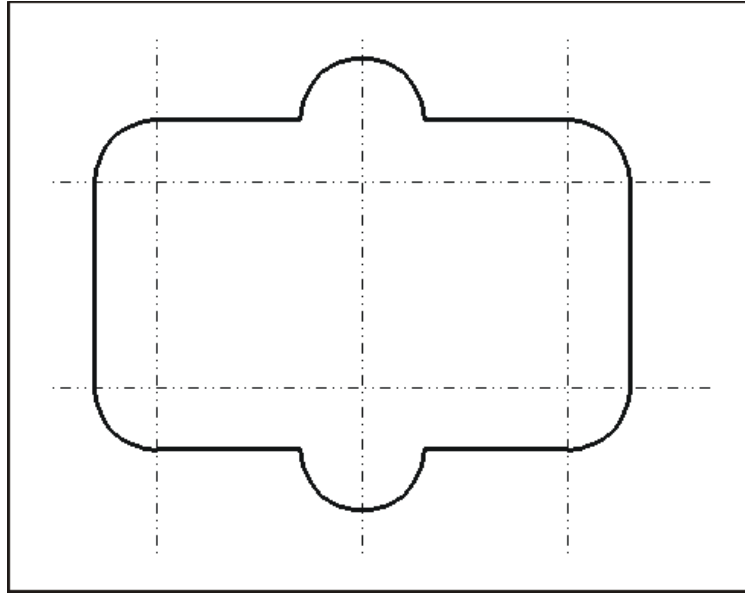


Figure P4–8 Completed base plate outline

- STEP 1:** Invoke the Mirror tool from the Manipulate tool box. In the Tool Settings window, select **Mirror About > Horizontal** and turn the **Make Copy** check box OFF.
- STEP 2:** Select the top arc and drag the pointer toward the right end of the top horizontal line until AccuSnap snaps to either the end of the line or the arc.
- STEP 3:** Click the Data button to accept the snap point and mirror the arc, and click the Reset button to release the arc.
- STEP 4:** In the Tool Settings window, select **Mirror About > Vertical** and turn the **Make Copy** check box ON.
- STEP 5:** Click the Active Snap Mode button in the Status Bar and in the Snaps menu, make **Center** the permanent snap mode.
- STEP 6:** Select the top, left fillet and drag the pointer toward the center of one of the arcs until AccuSnap snaps the arc center.
- STEP 7:** Click the Data button to accept the snap and place a mirrored copy of the fillet, and then click the Reset button to release the arc.

STEP 8: Using the center of one of the arcs as the mirror axis, create mirrored copies of the other fillet, the two horizontal lines and the vertical line.

Compare your design to Figure P4–8.

PLACE THE BOLT HOLE CIRCLES

This procedure uses the Place Circle and Array tools to place the bolt hole circles in the design, as shown in Figure P4–9.

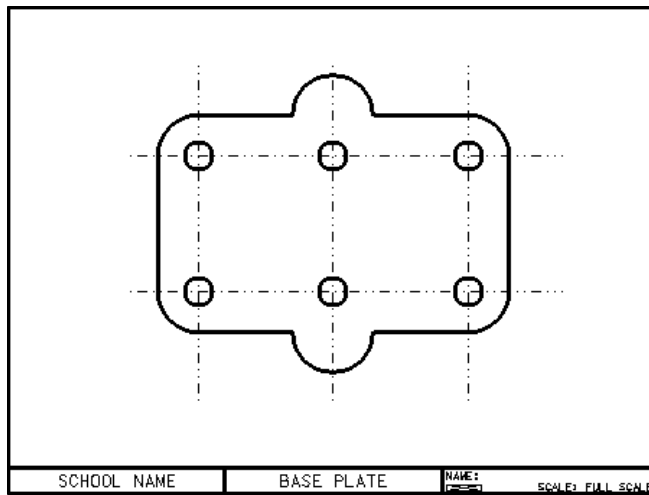


Figure P4–9 Design after placing the bolt hole circles

- STEP 1:** Click Active Snaps Mode on the Status bar, and in the Snaps menu, make **Intersection** the permanent snap mode.
- STEP 2:** Invoke the Place Circle tool from the he Task Navigator tool box (active task set to Circles). In the Tool Settings window, select **Method > Center**, turn ON the checkbox at the bottom of the window, select **Radius** from the drop-down menu, and key-in a **Radius** of **0.25**.
- STEP 3:** Move the pointer toward the intersection of the bottom and left vertical centerlines until AccuSnap snaps to the intersection.
- STEP 4:** Click the Data button to place a circle at the intersection and click the Reset button to release the circle as shown in Figure P4–10.

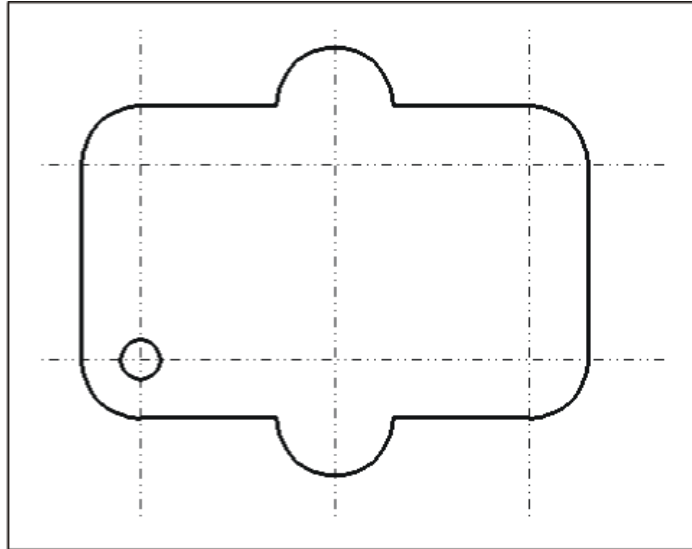


Figure P4-10 A circle is placed on the lower left center intersection

STEP 5: Invoke the Construct Array tool from the Manipulate tool box. In the Tool Settings window, make the following settings:

- ▶ **Array Type > Rectangular**
- ▶ **Active Angle: 0**
- ▶ **Rows: 2**
- ▶ **Columns: 3**
- ▶ **Row Spacing: 2.5**
- ▶ **Column Spacing: 2.5**

STEP 6: Select the circle and then move away from the circle and click the Data button to accept the circle and construct the rectangular array.

STEP 7: Select **File > Save** Settings.

Compare your design to Figure P4-9.

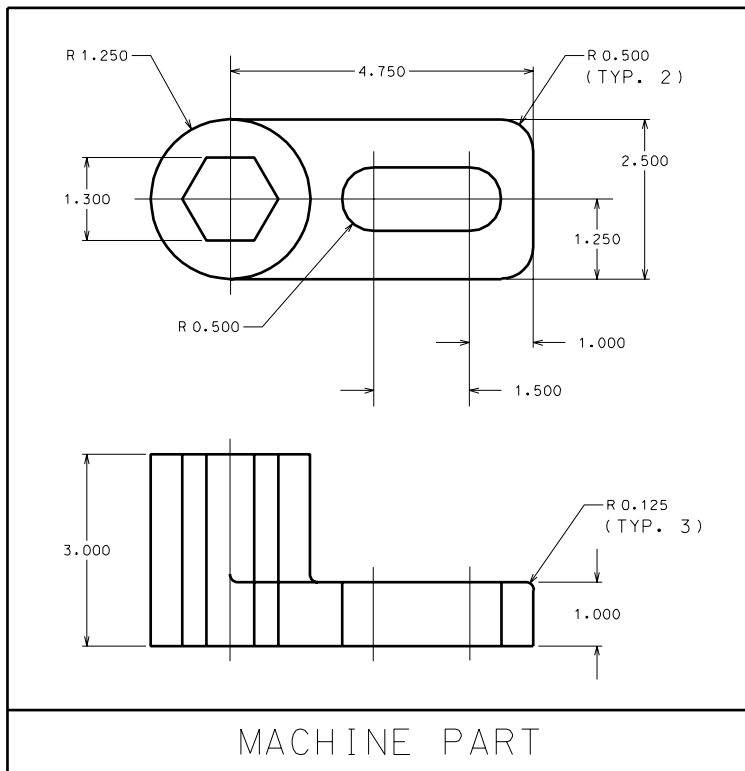
DRAWING EXERCISES 4-1 THROUGH 4-10

Use the following table to set up the design files for Exercises 4-1 through 4-3.

SETTING	VALUE
Seed File	seed2d.dgn
Working Units	Master Unit = Inches, Sub Unit = Inches
Grid	Grid Master = .25, Grid Reference = 4 Grid Lock ON
Object Elements	Level = Object, Color = 0, Style = 0, Weight = 1
Hidden Lines	Level = Hidden, Color = 0, Style = 3, Weight = 1
Centerlines	Level = Center, Color = 3, Style = 6, Weight = 0

Exercise 4-1

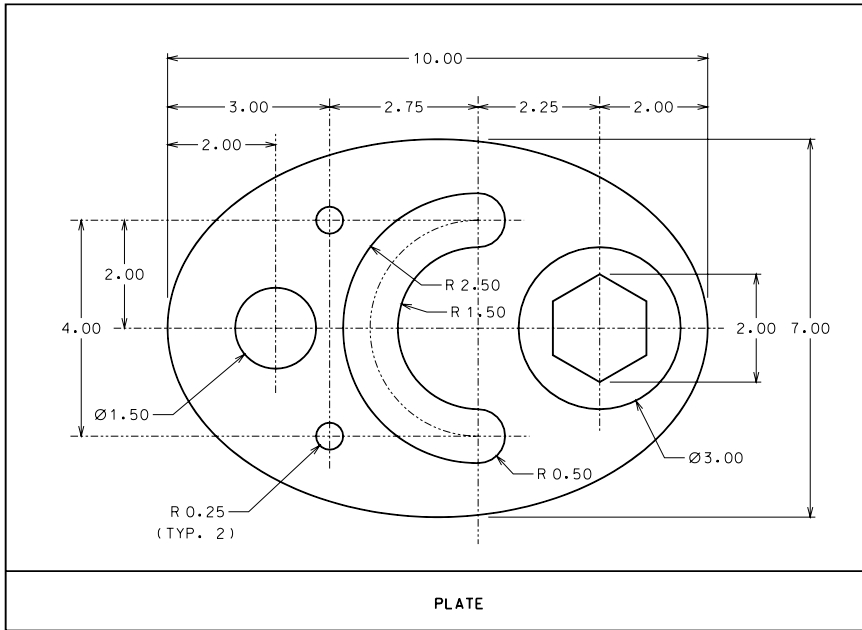
MACHINE PART



MACHINE PART

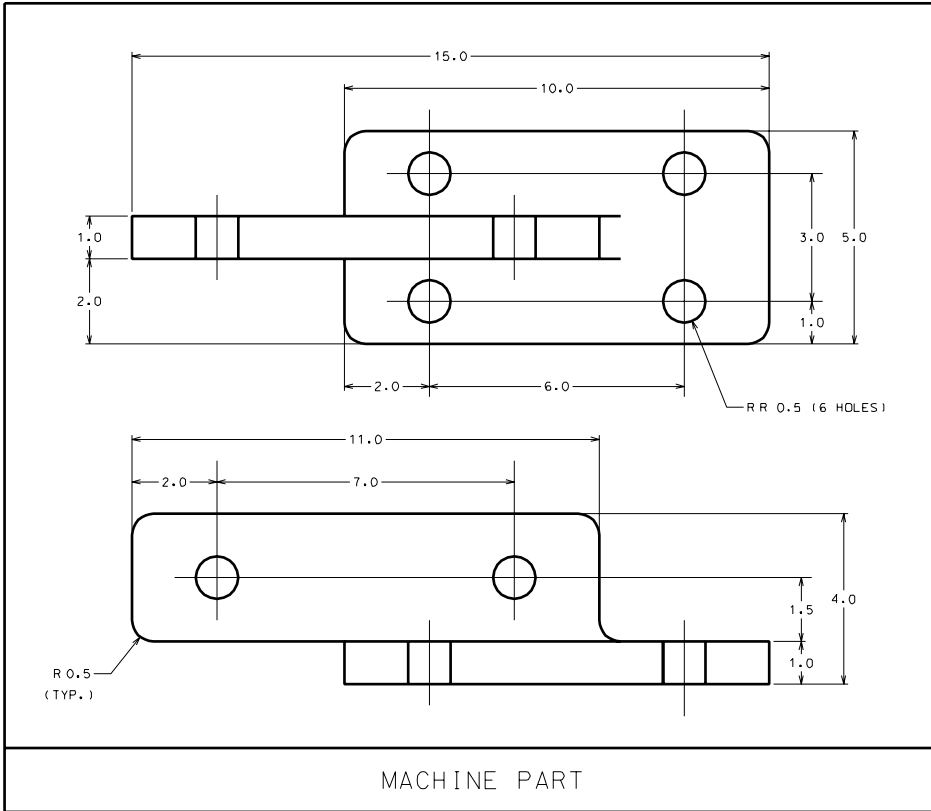
Exercise 4-2

PLATE



Exercise 4-3

MACHINE PART

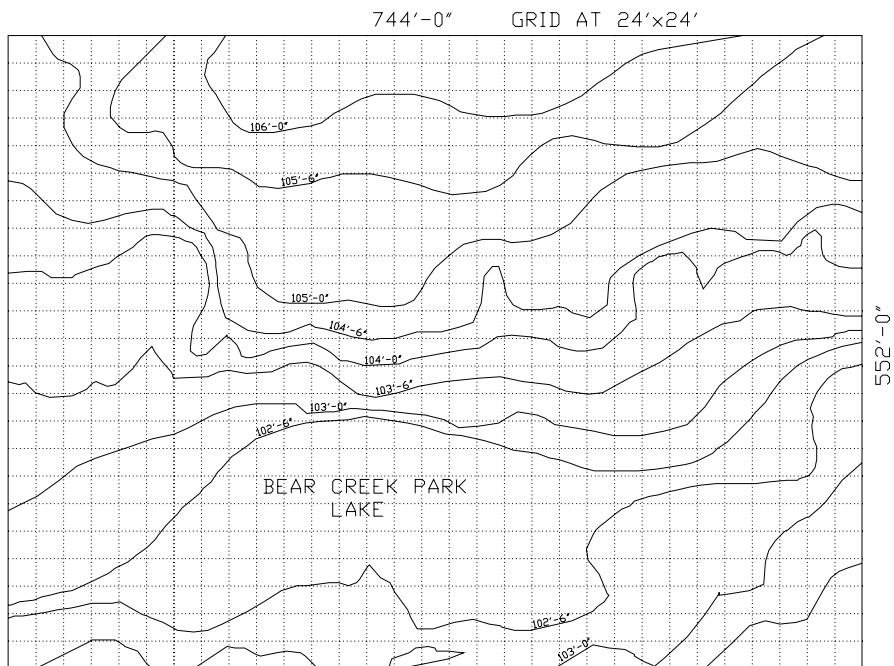


Use the following table to set up the design files for Exercises 4-4 and 4-5.

SETTING	VALUE
Seed File	seed2d.dgn
Working Units	Master Unit = Feet, Sub Unit = Inches
Grid	Grid Master = .25, Grid Reference = 4, Grid Lock OFF
Object Elements	Level = Object, Color = 0, Style = 0, Weight = 1
Grid Lines	Level = Grid Color = 3, Style = 6, Weight = 0

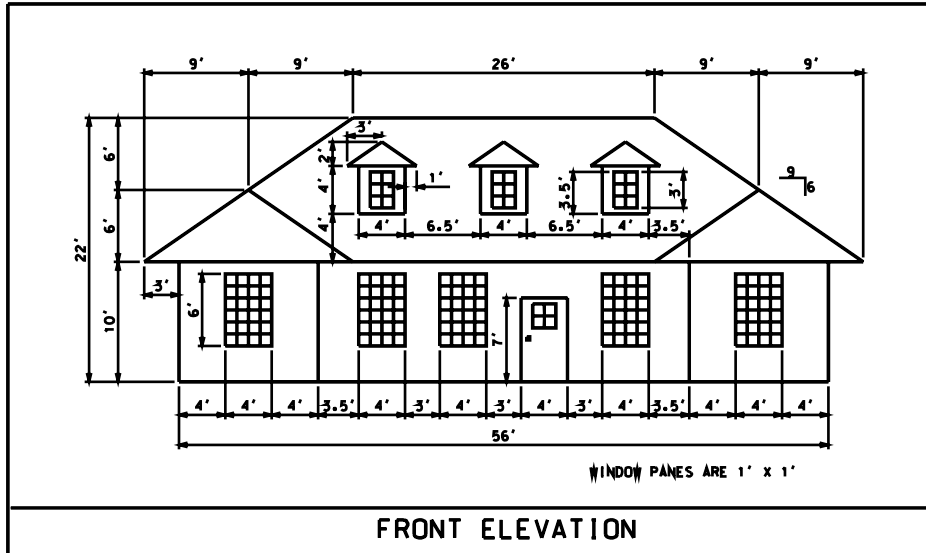
Exercise 4-4

TOPOGRAPHY MAP



Exercise 4-5

FRONT ELEVATION



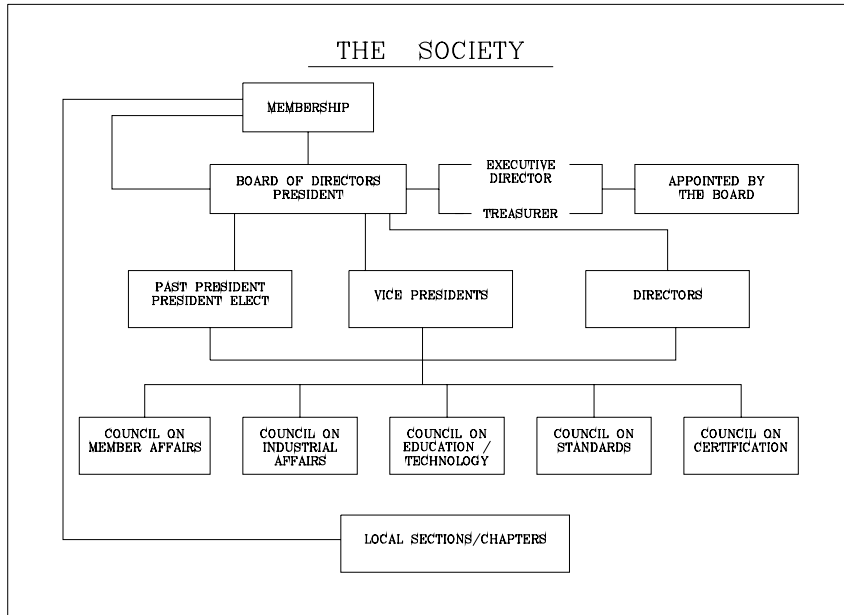
Use the following table to set up the design files for Exercises 4-6 through 4-9.

SETTING	VALUE
Seed File	2dEnglishGeneral.dgn
Working Units	Maser Unit = Feet, Sub Unit=inch
Grid	Grid Master = .1, Grid Reference = 10, Grid Lock ON
Object Elements	Color = 0, Level = 1, Style = 0, Weight = 1
Center Lines	Color = 3, Level = 2, Style = 6, Weight = 0

For Figures 4-6 and 4-7, set the Font to 3 and the text **Height** and **Width** to 0.125'.

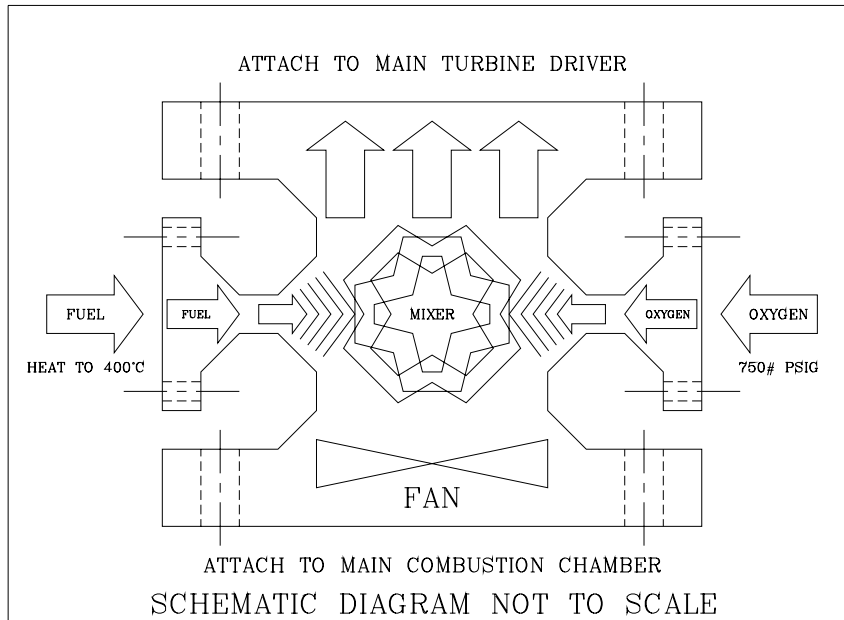
Exercise 4-6

ORGANIZATION CHART

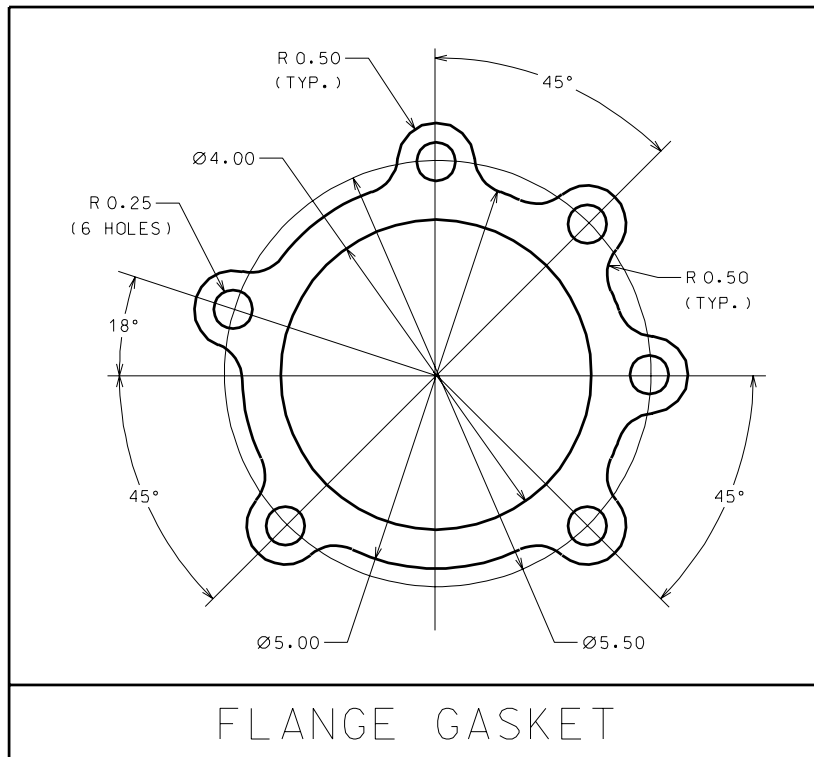


Exercise 4-7

SCHEMATIC DIAGRAM

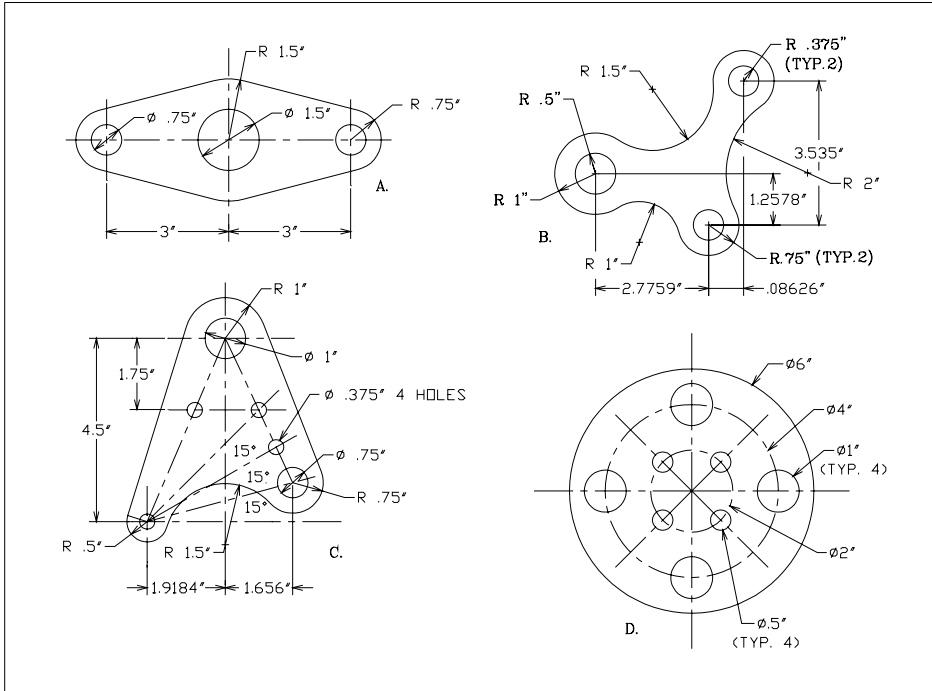


Exercise 4-8
FLANGE GASKET



Exercise 4-9

MACHINE PARTS



Exercise 4-10

SPRING

SETTING	VALUE
Seed File	seed2d.dgn
Working Units	Master Unit = Inches, Sub Unit = Inches
Grid	Grid Master = 1, Grid Reference = 10, Grid Lock OFF
Object Elements	Level = Object, Color = 0, Style = 0, Weight = 1
Hidden Elements	Level = Hidden, Color = 0, Style = 3, Weight = 1
Center Elements	Level = Center, Color = 1, Style = 6, Weight = 0

