



ثانوية التكنولوجيا التطبيقية  
Applied Technology High School

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# AutoCAD 2D I

Module 14

Object Properties

and

Offsetting Objects

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PREPARED BY

**IAT Curriculum Unit**

January 2011

**Module 14**

Auto CAD Self-paced Learning Modules

# AutoCAD 2D

## Object Properties and Offsetting Objects

**Learning Outcomes:**

When you have completed the module, you will be able to:

1. Describe object properties, linetype, linetype scale, and how to select objects using pick, window, and crossing.
2. Describe and use the **PROPERTIES**, **LTSCALE**, **CELTSCALE** commands to find and set object properties and linetype scale.
3. Describe and apply the **OFFSET** command to insert objects parallel to existing objects.
4. Describe and apply the **ID** command to establish temporary reference locations.

### Object Properties

AutoCAD stores all existing objects and their properties in a database format file called the *drawing file*. The name of the file is the name you have given the drawing with the extension **.DWG**. In the drawing file, all drawing objects are stored along with the properties of each object in the form of a database. The objects you have learned up to now are lines, circles and arcs. Figure 14-1 displays the properties of a typical Line.

When you open an existing drawing, AutoCAD uses the drawing file to reconstruct the objects from the database and displays the objects in the graphic window.

You can change the properties of existing drawing Objects by using commands or a much better method is to edit them with the **Properties** dialogue box. Not all properties can be edited. AutoCAD grays the boxes or properties that cannot

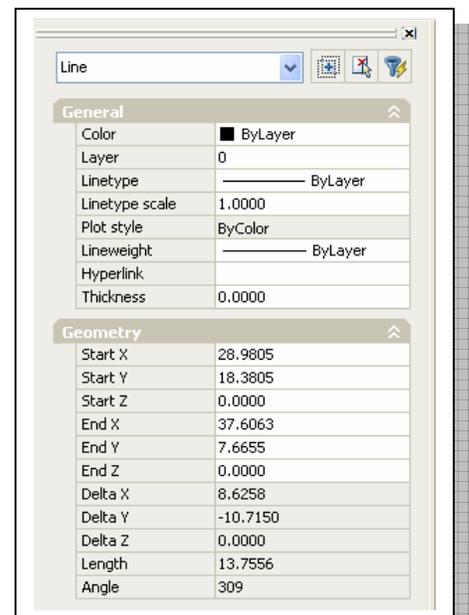


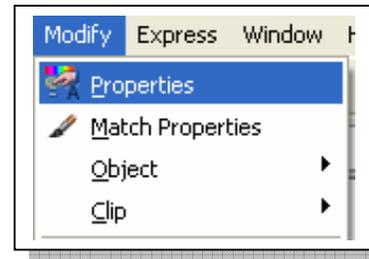
Figure 14-1. Properties of a Line

## AutoCAD Command: **PROPERTIES**

The **PROPERTIES** command opens the Properties dialogue box.

Command Line Syntax:

Command: **PROPERTIES** or Command: **CTRL + 1**



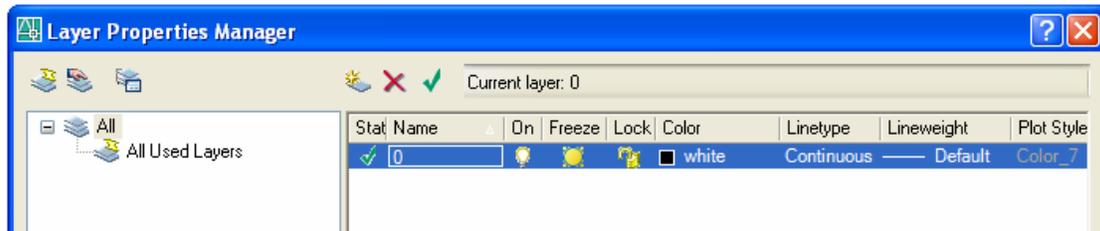
2004-2006

Properties CTRL+1

## Using Linetypes

A *linetype* is a repeating pattern of dots, dashes, text, objects and blank spaces displayed in objects such as lines or circles.

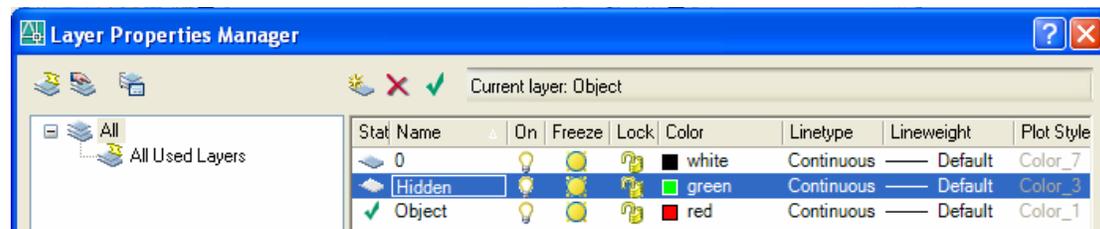
Until this point in the modules, you have been using the default linetype continuous. See Figure 14-2. A continuous line is a solid line. In this module, you will be shown how to assign linetype that are ByLayer. By default when a drawing is created, AutoCAD only loads the continuous linetype. Before you can assign a different linetype, you must load it into your drawing database. All loaded linetypes will stay in the drawing file for future use. They can be purged out of the drawing file if they are not in use.



**Figure 14-2**  
Continuous Linetype

It is easier to load all of the available linetypes into the drawing at the same time. With today's faster computers this will not affect the drawing speed as it might have in the past. First, create the layers as shown in Figure 14-3.

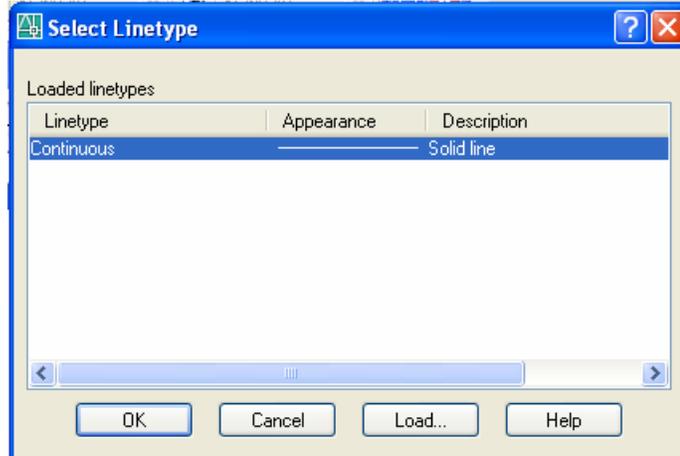
Then, right click on the linetype name in the Layer Property Manager dialogue box.



**Figure 14-3**  
Preparing the Layer to Load Linetypes

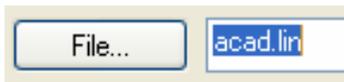
## Using Linetypes – Continued

This will open the Select Linetype dialogue box as shown To the right. Notice only the Continuous linetype is available. Next, click the Load button.

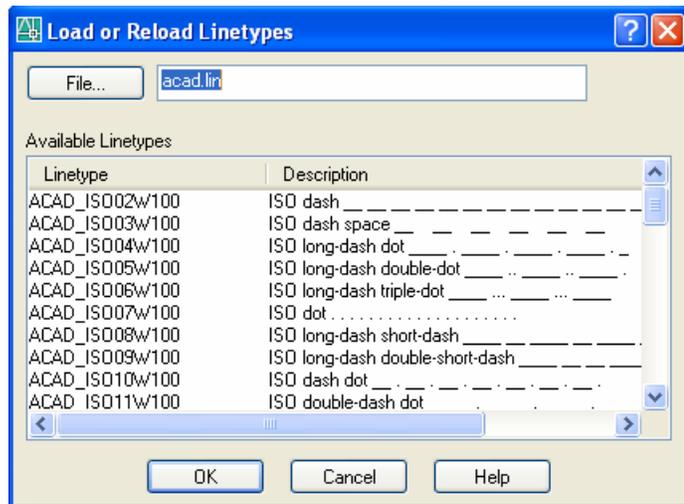
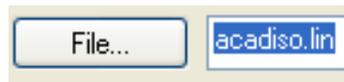


AutoCAD supplies two files that Contain the standard linetype. The files are as follows:

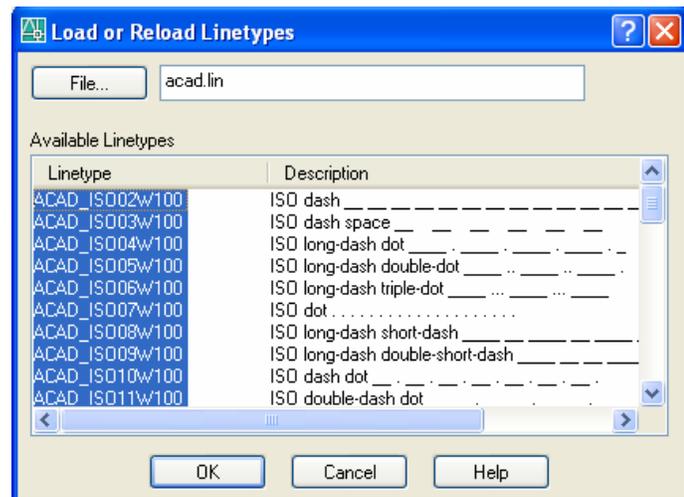
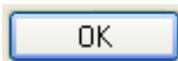
### ACAD.LIN – AutoCAD English



### ACADISO.LIN – AutoCAD Metric



You can pick the linetypes you want to load, or you can just load them all as most experienced users do. To load all of them at the same time, highlight one and then press CTRL + A. That will highlight all of them as shown in the figure to the right. Then click the OK button.

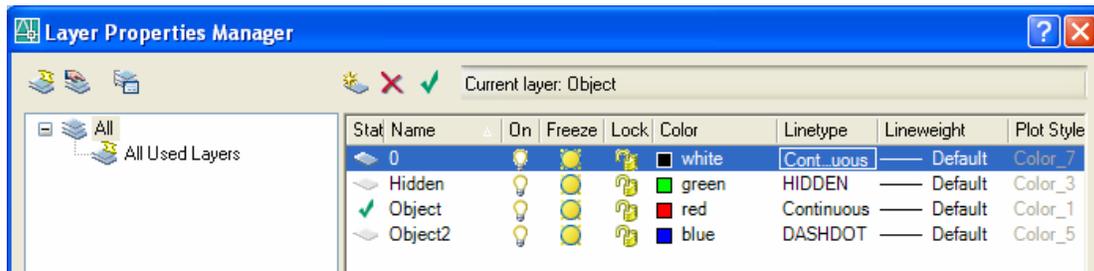
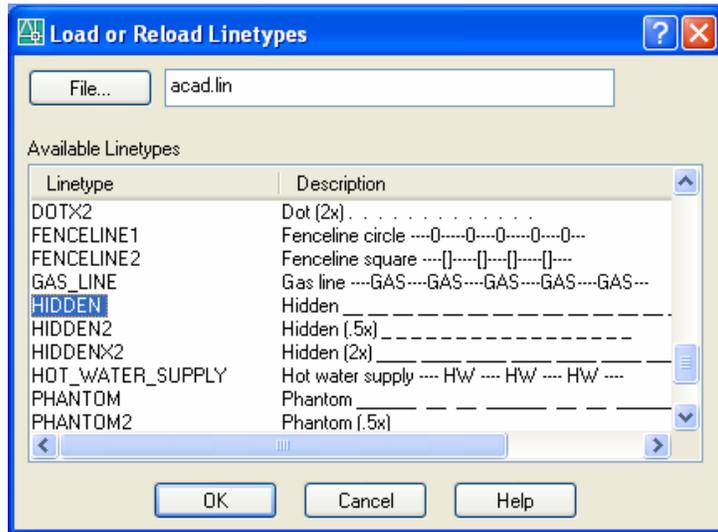


## Using Linetypes – Continued

Once you load the linetypes, you will not have to do it again for that drawing.

Select the linetype you want to assign to the layer.

As you can see in the Layer Properties Manager dialogue box, the linetype HIDDEN is assigned to the layer named Hidden and the linetype DASHDOT is assigned to layer named Object 2.

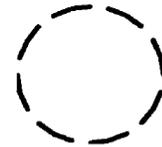


## Using Linetypes Scale

You can change the appearance of the linetypes by changing the *linetype scale*. You can either change the scale globally for all linetypes in the drawing, existing or future, or you can change the scale of each object individually. The command LTSCALE changes the scale globally and the CELTSCALE change the linetype scale for individual objects inserted at its present setting. Linetype scale uses a *scale factor*. This means it multiplies the scale factor times 1 get the proportion.

For example:

*(Inserted a circle on the layer assigned with the hidden linetype. The Default linetype scale (LTSCALE) is set to 1 and the individual linetype Scale (CELTSCALE) is set to 1. It appears as shown to the right.)*



Command: **LTSCALE**

Enter new linetype scale factor<1.0000>: **3**

Regenerating model.

*(With the LTSCALE set to 3, you can see that dashes are 3 times as large.)*

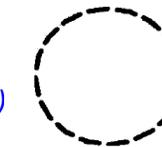


Command: **LTSCALE**

Enter new linetype scale factor<1.0000>: **.5**

Regenerating model.

*(With the LTSCALE now set at 0.5, the dashes appear at 1/2 the size of The original. Remember the scale factor multiplies the number times 1.)*



Setting the individual linetype scale is best done in the Properties dialogue box. Always leave the CELTSCALE set to 1. The CELSCALE multiplies the scale factor times the LTSCALE.

Command: **CELTSCALE**

Enter new value for CELTSCALE<1.000>: **.5**

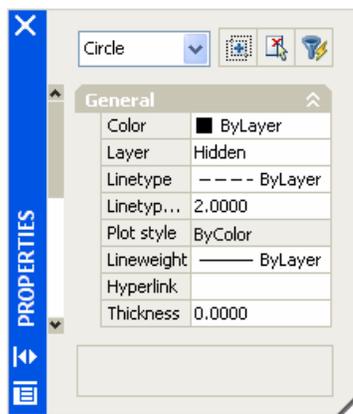
*(This should always be set to one when working on the AutoCAD Modules.)*

Command: **LTSCALE**

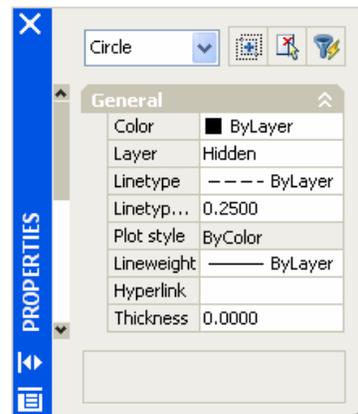
Enter new linetype scale factor<1.0000>: **2**

Regenerating model.

*(Set the LTSCALE to 2 and the individual linetype scale to 2. That will set the linetype scale of that object to 2 times 2 equaling 4)*



The linetype scale of circle is set to  $2 \times 2 = 4$

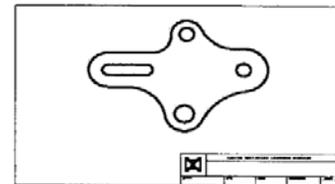


The linetype scale of circle is set to  $2 \times 0.25 = 0.5$

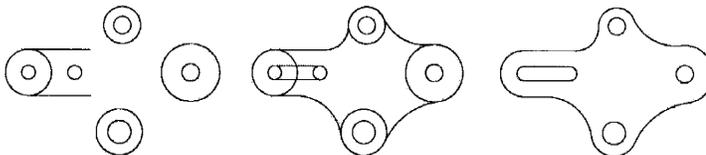
Lab Exercise 14-1		Time Allotted: 30 min.		
Drawing Specifications				
Name	Template	Units	Text Style	Font
AutoCAD 2D Lab 14-1	Module Template B	Inches	N/A	N/A
Note: Color, Linetype and Lineweight are all 'ByLayer' unless otherwise instructed.				
Layering Scheme				
Objects on Layer	Name	Color	Linetype	Lineweight
Construction Objects	Construction	253	N/A	N/A
All Objects	Object	Red	N/A	N/A

**Instruction:**

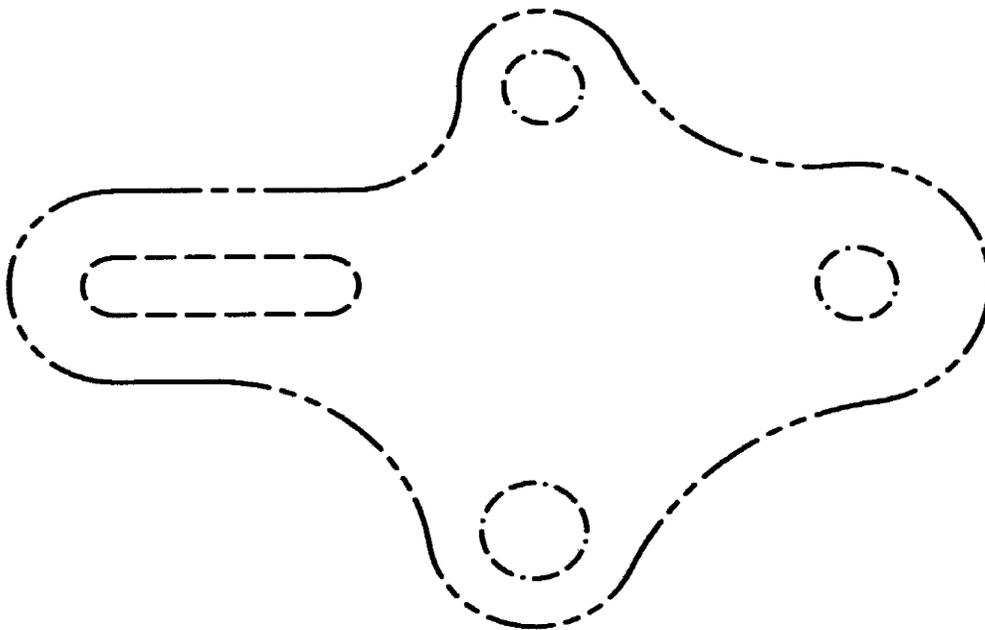
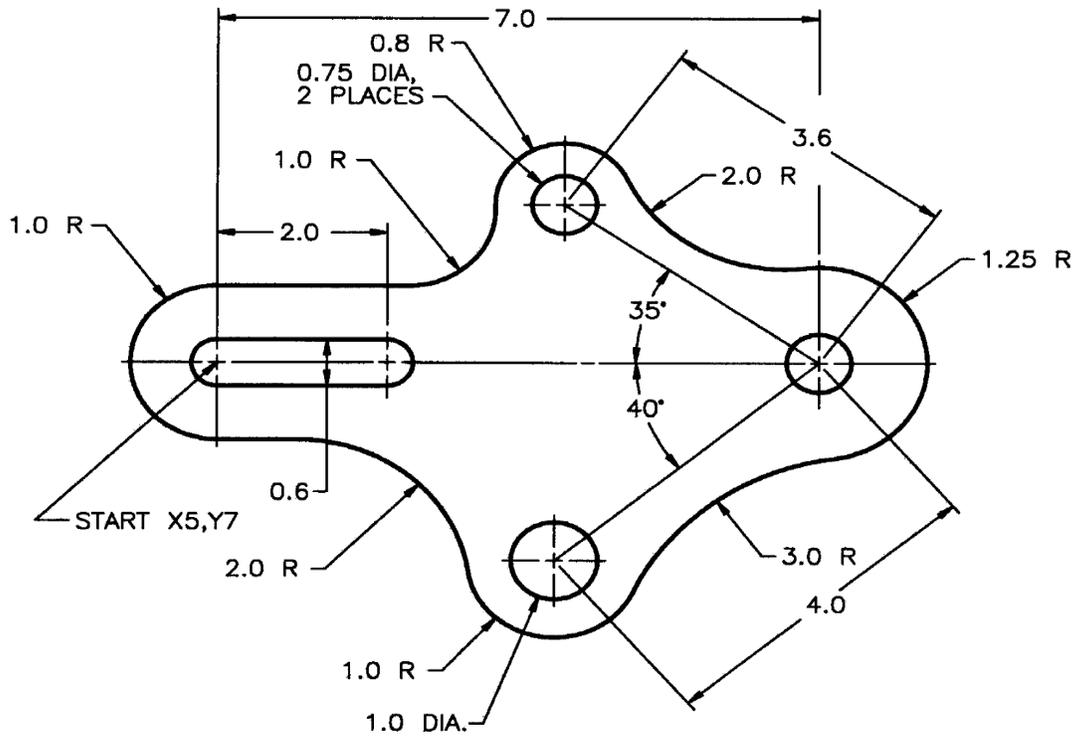
1. Setup the layers using the Layering Scheme above.
2. Draw the object shown below.
3. Check your drawing with the key.
4. Change Layering Scheme to match the one above.
5. Using Properties dialogue box, change the layers of the
6. Objects as indicated in the Layering Scheme.



Completed Drawing



Construction Hints



## Offsetting Objects

Offsetting objects is simply creating another object parallel to an existing object at a specified distance away. This is done using the OFFSET command. It will change the way you draw as demonstrated in this module. Lines, circles or arcs {plus other objects that will be taught in later modules} can be offset.

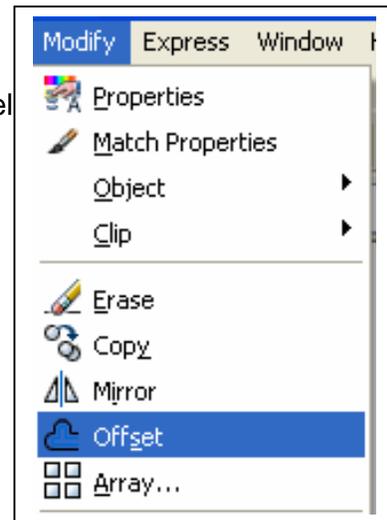
### AutoCAD Command:           **OFFSET**

The OFFSET command is used to create an object parallel to an existing object at a specified distance away.

Command Line Syntax:

Command: **OFFSET** or Command: **O**

2004-2006



### **AutoCAD User “Must Know” No. 14-4**

When you offset an object, the newly constructed object will be on the same layer as the original object regardless of the current layer. If you want to newly created object to be on a different layer than the original, you will have to change its properties using the PROPERTIES command.

## Using the OFFSET Command

The OFFSET command requires you to enter the offset distance first. Once the distance is set, you select the object to offset and then the side of the object you want the offset to be inserted. The actual location you pick is not important, just make sure it is on the side you want the offset to be placed. See example below.

Command: **OFFSET**

Specify offset distance or [Through] <0.2500>: **2**

*(First, enter the offset distance)*

Select object to offset or <exit>: **P1**

*(Then select the object to offset)*

Specify point on side to offset: **P2**

*(Next, select the side to insert the offset.)*

Select object to offset or <exit>: **P3**

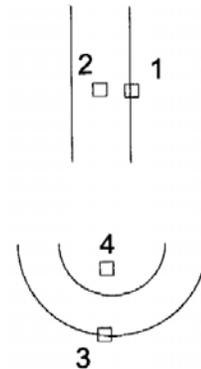
Specify point on side to offset: **P4**

*(This command allows you to offset as many objects as required.)*

Select object to offset or <exit>:

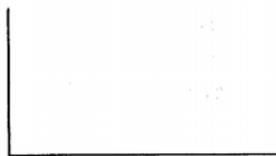
*(Press the Enter or Space key to exit the command.)*

Command:

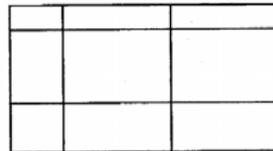


## AutoCAD User Tip 14-5

Study the construction techniques used to construct the object below. Notice how offsets and trimming are used rather than drawing from point to point.



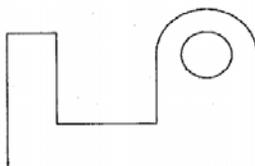
**Step 1** - Construct a horizontal and vertical line



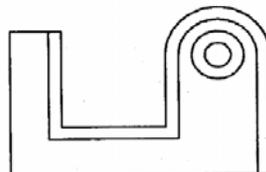
**Step 2** - Using the OFFSET command, draw construction lines. Use layer Construction



Object to be Constructed



**Step 3** - Trim the lines and add the circle and the arc.



**Step 4** - Add the additional objects using offsets

### AutoCAD User Tip 14-6

The OFFSET command allows you to set the offset distance by indicating a through point on the drawing.

Command: **OFFSET**

Specify offset distance or [Through] <1.0000>: **T**

(Enter **T** for through)

Select object to offset or <exit>: **P1**

(Next, AutoCAD wants to know which object to offset.)

Specify through point: **mid** of **P2**

(Select the point to go through.)

Select object to offset or <exit>:

Command: **OFFSET**

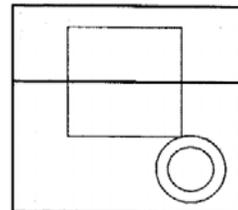
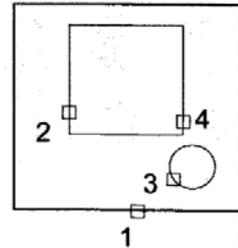
Specify offset distance or Through] <1.0000>: **T**

Select object to offset or <exit>: **P3**

Specify through point: **end** of **P4**

Select object to offset or <exit>:

Command:



### AutoCAD User Tip 14-7

TO learn how to draw faster and more accurately, it is important to show AutoCAD distances and sizes rather than entering the number on the keyboard. This technique can be used in almost all AutoCAD command requiring numeric input.

Command: **OFFSET**

Specify offset distance or [Through] <0.2>: **quad** of **P1**

Specify second point: **quad** of **P2**

(First, measure the distance from quad to quad and use it as the offset distance.)

Select object to offset or <exit>: **P3**

Specify point on side to offset: **P4**

Select object to offset or <exit>: **P5**

Specify point on side to offset: **P6**

Select object to offset or <exit>: **P7**

Specify point on side to offset: **P8**

Select object to offset or <exit>:

Command: **OFFSET**

Specify offset distance or [Through] <0.2455>: **end** of **P9**

Specify second point: **end** of **P10**

(Set the distance from end of line to end of line.)

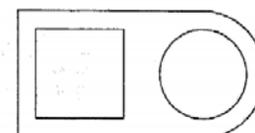
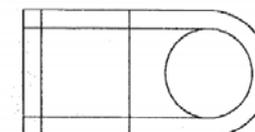
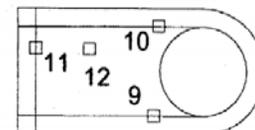
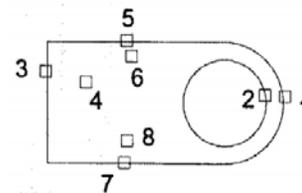
Select object to offset or <exit>: **P11**

Specify point on side to offset: **P12**

Select object to offset or <exit>:

Command:

(Trim to finish the object.)



### AutoCAD User Tip 14-8 - Continued

Command: **LINE**

*(Insert a constructed line. Locate it on the construction layer.)*

Specify first point: **@**

*(Specify the start point of the line by using an @ which is the lastpoint.)*

Specify next point or [Undo]: **@-2,0**

*(Use an arbitrary length.)*

Specify next point or [Undo]:

Command: **OFFSET**

Specify offset distance or [Through] < Through >: **2.6**

Select object to offset or <exit>: **P2**

Specify point on side to offset: **P3**

Select object to offset or <exit>:

Command: **ARC**

Specify center point of arc: **cen** of **P4**

Specify start point of arc: **cen** of **P5**

*(Set the radius and the start point.)*

Specify end point of arc or [Angle/chord Length]: **P6**

*(Draw the construction arc and pick a point in space to end it.)*

Command: **CIRCLE**

Specify center point for circle or [3p/2p/Ttr(tan tan radius)]: **int** of **P7**

*(Draw the circle with its center at the instruction of line and arc.)*

Specify radius of circle or [Diameter]<0.3000>:

*(Accept the default.)*

Command: **OFFSET**

Specify offset distance or [Through] < Through >: **cen** of **P8**

Specify second point: **quad** of **P9**

*(Sets the offset distance to the size of the radius of the circle.)*

Select object to offset or <exit>: **P10**

Specify point on side to offset: **P11**

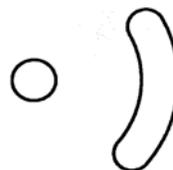
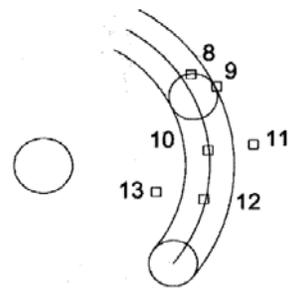
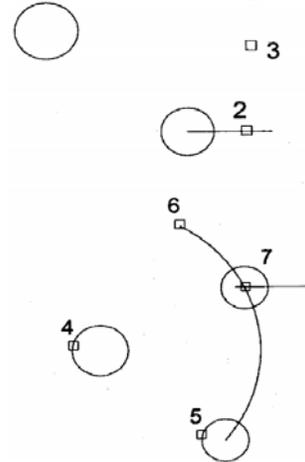
Select object to offset or <exit>: **P12**

Specify point on side to offset: **P13**

Select object to offset or <exit>:

Command:

*(Finally, trim the arcs and circles to complete the object.)*



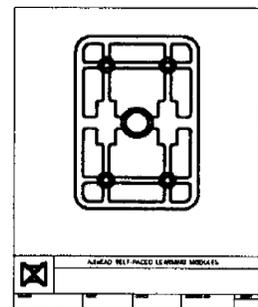
### AutoCAD User "Must Know" No. 14-9

Using the ID command to set a reference point or the lastpoint is a useful drawing tool. Once you pick an ID point, ignore the actual coordinate. On your next command, use the @ to measure a distance from the ID point.

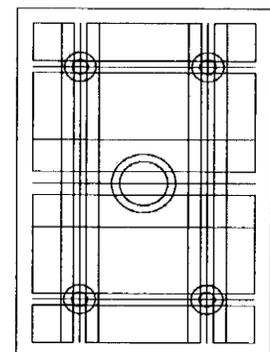
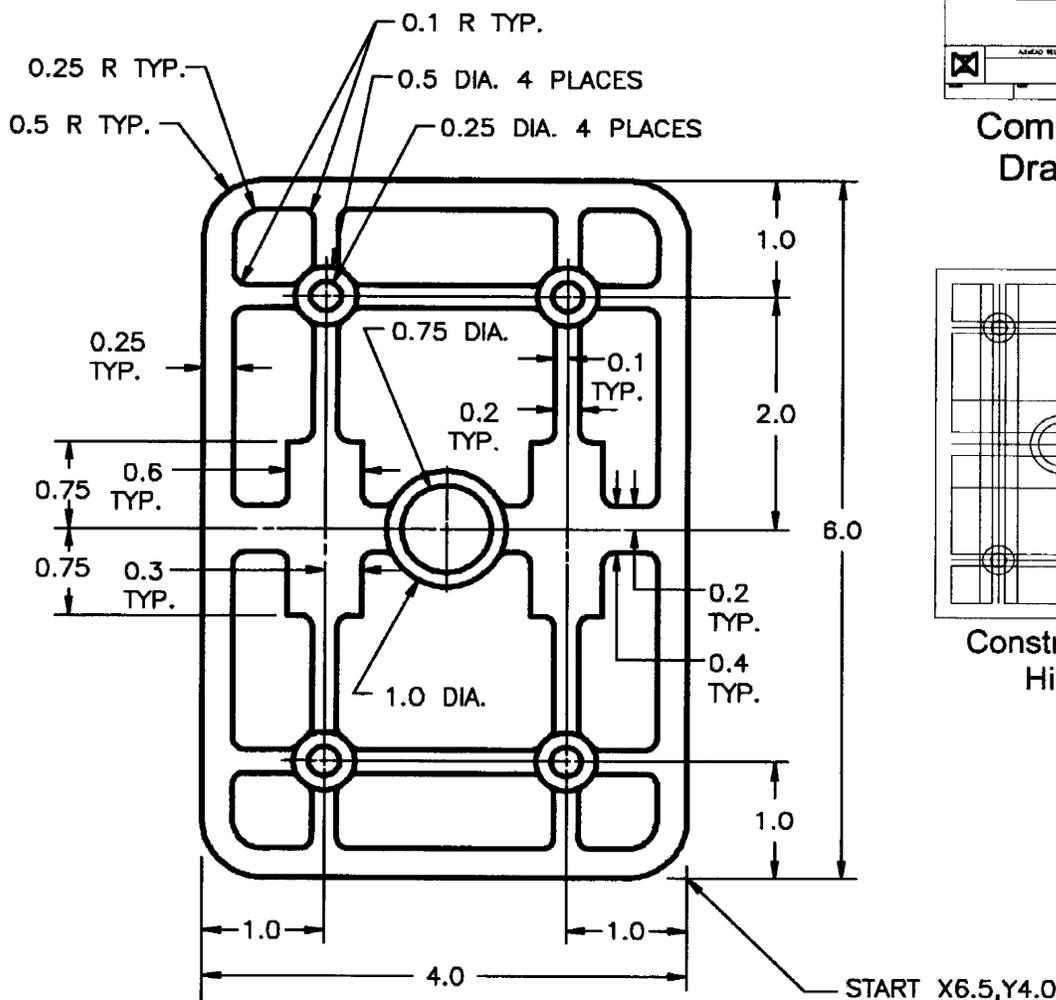
Lab Exercise 14-2			Time Allotted: 50 min.	
Drawing Specifications				
Name	Template	Units	Text Style	Font
AutoCAD 2D Lab 14-2	Module Template A	Inches	N/A	N/A
Note: Color, Linetype and Lineweight are all 'ByLayer' unless otherwise instructed.				
Layering Scheme				
Objects on Layer	Name	Color	Linetype	Lineweight
Construction Objects	Construction	253	Continuous	N/A
All Objects	Object	Red	Continuous	N/A

**Instruction:**

1. Setup the layers using the Layering Scheme at
2. Draw the object shown below.
3. Check your drawing with the key.



**Completed Drawing**



**Construction Hints**