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Hands-on Introduction to Dynamic Blocks

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GD101-2L This lab introduces you to the tools and techniques for creating Dynamic Blocks in AutoCAD. You will become familiar with the Block Editor, and how to add parameters and actions to block definitions to create Dynamic Blocks exposing custom properties and grips. You'll also learn how Dynamic Blocks allow one block to be displayed many different ways.

Key Topics:

- Editing blocks with the Block Editor
- Creating dynamic blocks with custom grips and custom properties
- Combining block parameters with block actions to manipulate block geometry
- Inserting and manipulating dynamic blocks
- Creating blocks that align to other geometry

About the Speaker:

As a member of the AutoCAD Development Team at Autodesk, John has contributed to every AutoCAD release for the past 14 years. He is proud to have been one of the lead engineers for the Dynamic Blocks feature in AutoCAD 2006, and has worked on many other AutoCAD features, including 3D Solid Editing, Annotation Scaling, and the Properties palette. Prior to Autodesk, John worked for an Autodesk developer where he was introduced to AutoCAD Release 11. He has been an avid user ever since. John holds a Master of Science degree in Structural Mechanics from the University of California at Los Angeles.
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What is a Dynamic Block?

A dynamic block has flexibility and intelligence. A dynamic block reference can easily be changed in a drawing while you work. You can manipulate the geometry in a dynamic block reference through custom grips or custom properties.

A dynamic block reference may be displayed differently in the drawing than the original block definition. However, the displayed block reference remains a reference to the original block definition.

In addition to the geometry contained in all block definitions, *dynamic* block definitions contain parameters and actions. Parameters define custom grips and properties. Actions define how the geometry of a dynamic block reference will move or change when the block reference is manipulated in a drawing.

Creating Blocks in the Block Editor (BEDIT Command)

AutoCAD 2006 introduced the Block Editor (BEDIT command). The Block Editor looks and acts like model space, but all of the geometry you create becomes part of the block definition.


The Block Editor allows block authors to:

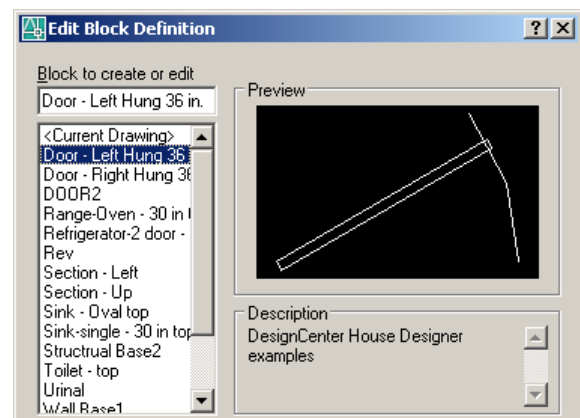
- Create new blocks or edit existing blocks
- Change the block description, block units, and scale and explode settings
- Edit geometry using existing AutoCAD commands
- Add parameters, which create custom grips and properties for changing the geometry of individual blocks after they have been inserted into a drawing
- Add actions, which define how the block will move or change when the block reference is manipulated in a drawing

Edit Block Definition Dialog Box

The BEDIT command initially displays the Edit Block Definition dialog box. This dialog box displays a list of existing blocks to edit or allows you to enter a new block name. The dialog shows a preview of the selected block and the description of the block. Dynamic block previews have a small lightning bolt in the bottom right corner.

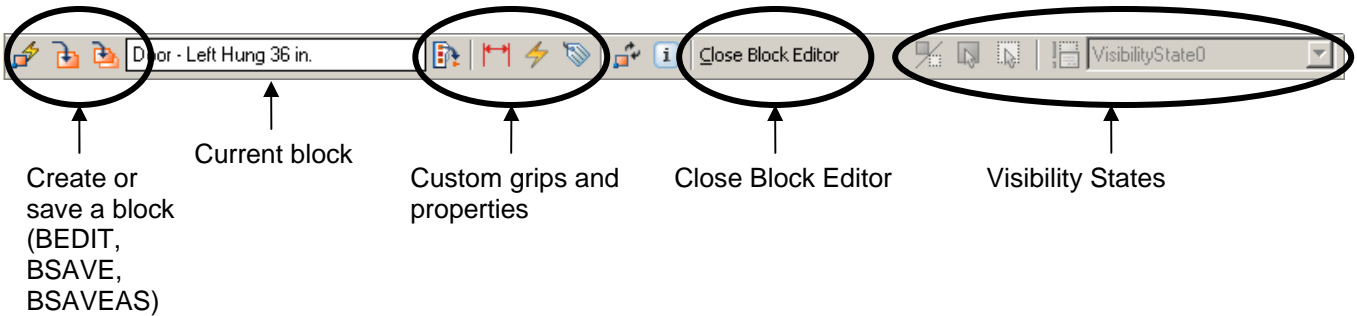
The <Current Drawing> block is actually the Model Space tab of the current drawing. To create custom grips and properties for drawings that are part of a block library edit them using the <Current Drawing> entry in the list.

 **Tip:** Double-clicking on a block in model or paper space launches the BEDIT command and selects the corresponding block from the Edit Block Definition dialog box. You can disable this by setting the BLOCKEDITLOCK system variable to 1.



Block Editor Toolbars and Palettes


The Block Editor has a custom toolbar that appears at the top of the drawing area. The toolbar provides access to common operations:

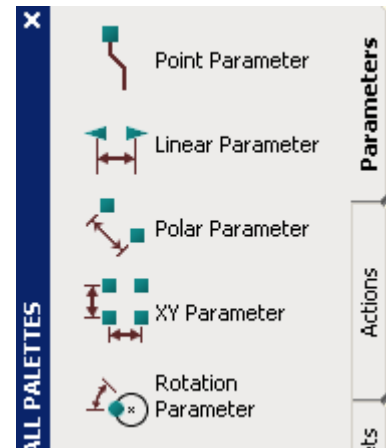


AutoCAD presents you with various palettes, tailored to specific features or capabilities. For example, the Tool Palettes window contains standard or custom *tools* that behave a lot like powerful toolbar buttons.


The Block Editor provides Block Authoring Palettes. The Block Authoring Palettes are similar to tool palettes, but they contain special tools for creating dynamic blocks.


Block parameter tools (Parameters tab) define custom grips and properties for dynamic blocks. Block action tools (Actions tab) change geometry within a block when a custom grip or property changes.

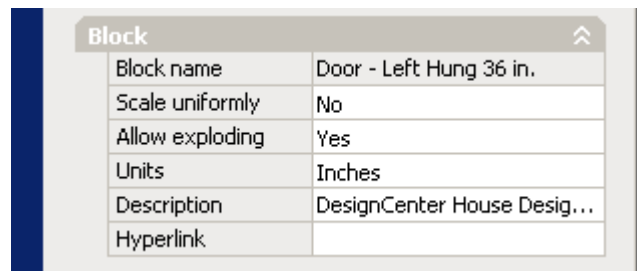
 **Tip:** The BAUTHORPALETTE command displays the Block Authoring Palettes window, which you can also access by clicking the Authoring Palettes button on the Block Editor toolbar.



If you haven't used the Properties palette before, you might want to start! The Properties palette is a great way to view and edit properties for your dynamic block. If you are in the Block Editor with no objects selected, the Properties palette displays properties for the overall block.



 **Tip:** The PROPERTIES command displays the Properties palette.

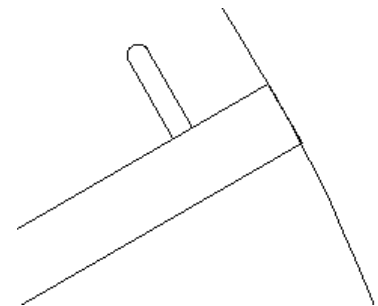
 **Tip:** In AutoCAD 2007 and later you can manipulate the properties of a block *while you insert it* via the Properties palette.



Lesson 1 Using the Block Editor to Create and Edit Blocks

Objective: Become familiar with the Block Editor. Learn how to use the BEDIT and BSAVE commands to create new blocks or edit existing blocks.

1. Open the sample drawing *Wall Base.dwg*.
 - Review the drawing. Notice that many of the fixtures, including doors and plumbing fixtures, are block references.
 - Display the Properties palette (CTRL+1 or enter **properties** on the command line). Select different block references and examine their properties.
2. Open an existing block in the Block Editor.
 - Enter **bedit** on the command line to display the Edit Block Definition dialog box.
 - In the Edit Block Definition dialog box, select the “Door – Left” block from the list.
 -  **Tip:** To create a new block, type the new block name in the edit box instead of selecting an existing block from the list.
 - Click OK to close the dialog box and open the Block Editor.
3. Examine the layout of the Block Editor.
 - Notice the Block Editor background color (a visual cue that the Block Editor is active).
 - Notice the Block Editor toolbar at the top of the drawing area.
 - Notice that the Block Authoring Palettes window is automatically displayed.
 - Display the Properties palette and notice the block properties displayed there.
 -  **Tip:** You can define whether blocks can be non-uniformly scaled and whether they can be exploded. These properties can be specified when defining a block using the Block Definition dialog box (BLOCK command), or by setting them in the Properties palette while editing the block.
4. Add a handle to the door and save the block.
 - Using PLINE or other commands, add geometry to the door for a handle.
 - Enter **bsave** on the command line to save the block. Enter **bclose** on the command line or click the Close Block Editor button on the Block Editor toolbar to close the Block Editor and return to the model space tab.
5. Examine the drawing and notice that all of the left-swing door block references now have door handles.



Making Blocks Dynamic: Adding Parameters and Actions

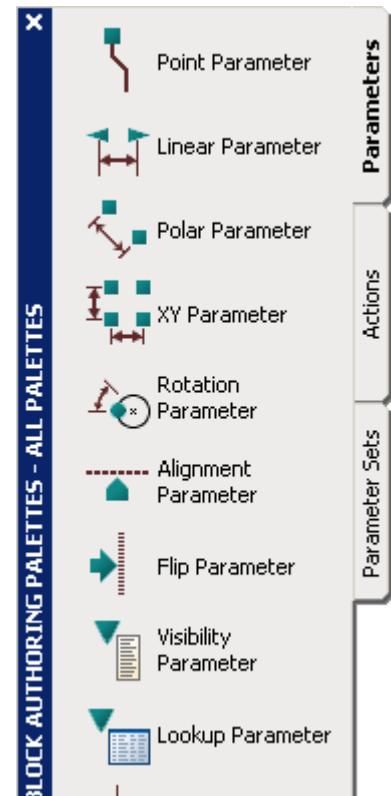
Dynamic block definitions contain objects and attributes just like other block definitions and you place them in drawings using the same INSERT command. They can be nested and counted using AutoCAD's data extraction feature.

What distinguishes a dynamic block from one that is not dynamic is the presence of parameters and actions. Parameters define custom properties and grips, and actions define how the block reference will move or change when the block reference is manipulated in a drawing. Parameters and actions allow different references to the block to be manipulated separately from the definition. Depending on how the block was authored, manipulated references may have different (sometimes significantly different) visual representations from each other and from the initial block definition.

Dynamic block parameters define the custom properties and grips that are displayed when you select a dynamic block reference in a drawing. When these custom properties or grips are changed, the underlying actions are triggered, changing the appearance of the block reference.


Dynamic block actions define how the geometry of a block reference will change when a property of the block reference changes. For example, changing a distance property of a dynamic block reference might move geometry in the block to make a door wider. You might think of dynamic block actions as stand-ins for regular AutoCAD commands like MOVE, ROTATE, SCALE, MIRROR, and STRETCH.

Parameters and actions work together but can only be used in certain combinations. Appendix A lists all of the parameters and actions, and how they can be combined.



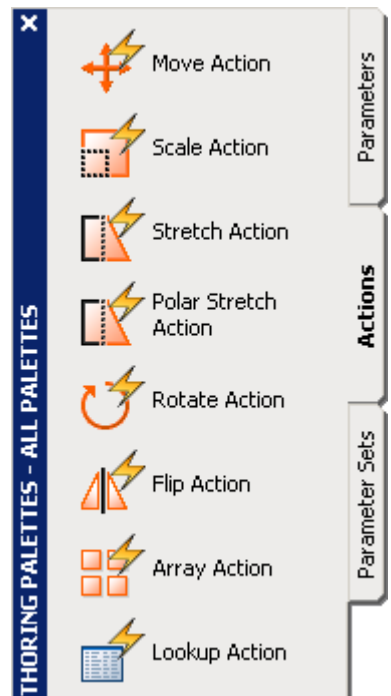
Defining Custom Grips and Properties: Adding Block Parameters

You add parameters to a dynamic block definition in the Block Editor. In the Block Editor, parameters have an appearance similar to dimensions. Parameters define custom properties for the block. Parameters also specify positions, distances, and angles for geometry in the block reference. When you add a parameter to a dynamic block definition, the parameter defines one or more custom properties for the block, and one or more custom grips for the block.

 **Key Concept:** Block parameters define what properties or grips can vary from one block reference to another.

A dynamic block definition must contain at least one parameter. When a parameter is added to a dynamic block definition, grips associated with key points of the parameter are automatically added.

Use the BPARAMETER command or the tools on the Parameters tab of the Block Authoring Palettes window to add parameters to blocks.



Defining Dynamic Geometry: Adding Actions

You add actions to a dynamic block definition in the Block Editor. Actions are associated with parameters and geometry. Actions tie changes to properties or grips on the block reference to changes in the geometry of the block reference.

In a drawing, you use a grip or a custom property in the Properties palette to manipulate a block reference. When you manipulate a block reference in a drawing by moving a grip or changing the value of a custom property in the Properties palette, you change the value of the parameter that defines that custom property in the block. When you change the value of the parameter, it drives the action that is associated with that parameter, which changes the geometry (or a property) of the dynamic block reference.



Key Concept: Actions don't appear outside of the Block Editor, but work behind the scenes like a scripted command to manipulate the block.

Most dynamic block actions take the place of commonly used AutoCAD commands and have the same name as the command they mimic: MOVE, ROTATE, SCALE, STRETCH, ARRAY. You associate actions with geometry. This geometry is modified when the actions are triggered.

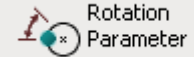
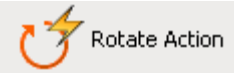
Not all actions can be combined with all parameters, and some actions can only be used with a single kind of parameter.

Use the BACTION command or the tools on the Actions tab of the Block Authoring Palettes window to add actions to blocks.

Rotating Block Geometry

You rotate dynamic block geometry using a rotate action and associating it with a rotation or polar parameter. Whenever the parameter changes, the rotate action rotates the geometry in the block.

A rotation parameter defines a single, round grip and a single angle custom property. Rotation parameters measure the angle property from a base line defined when you place the parameter.

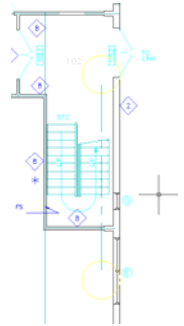


Lesson 2 Rotating Block Geometry

Objective: Learn how to use a rotate parameter and a rotate action to rotate geometry within a block. Learn about dependency highlighting and how to use it. Learn how to use the RESETBLOCK command to restore a dynamic block reference to its original state.


1. Open the sample drawing *Wall Base.dwg*.


- Make the “Lesson 2 Notes” layer visible.
- Notice the yellow circle around the callout block near the bottom of the drawing and the two empty yellow circles along the right side of the floor plan. We are going to modify the callout block so that the callout arrow can be rotated separately from the block attributes.



2. Open the “Section” block in the Block Editor.

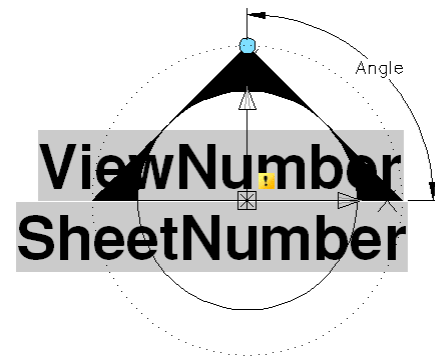
- Enter **bedit** on the command line to display the Edit Block Definition dialog box.
- In the Edit Block Definition dialog box, select the “Section” block from the drop-down list and click OK to open the Block Editor.

 **Tip:** Double-clicking on a block reference *without* attributes opens the Edit Block Definition dialog box (BEDIT command). If the block has attributes, double-clicking on the block opens the Enhanced Attribute Editor (EATTEDIT command). You can also select the block reference in a drawing, and choose Block Editor from the right-click menu.


 **Tip:** AutoCAD 2006 introduced the ability to create *locked* attributes. These attributes do not display grips in the drawing window and cannot be moved separately from the block reference that contains the attributes. This property can be specified when using the Attribute Definition dialog box (ATTDEF command) to define new attribute definitions, or by selecting an existing attribute definition and changing the Lock Position property in the Properties palette.

3. Insert a rotation parameter and place the grip at the tip of the arrow.

- Make layer 0 current.
- On the Parameters tab of the Block Authoring Palettes window, click the Rotation Parameter tool.
- For the base point, pick the center of the circle.
- For the radius and base angle, pick the point of the arrow.
- Pick a point further out for the label location.



Notice the alert icon (exclamation point) displayed near the parameter. Hover over the alert icon with your mouse and notice the tool tip that displays, describing a problem with the parameter.

 **Tip:** Adding a parameter creates at least one label and one or more grips. You can select and move the labels and grips *independently* after placing them.



Tip: You can customize:

- Parameter labels
- Parameter descriptions. AutoCAD 2007 displays Parameter descriptions as tool tips when the mouse hovers over custom grips.
- Whether a parameter appears as a custom property of a block in the Properties palette or in data extraction dialog boxes
- How many custom grips the parameter exposes
- Many other parameter settings


The BPARAMETER command exposes these options when creating new parameters or you can change them for an existing parameter by selecting the parameter and changing its properties in the Properties palette.

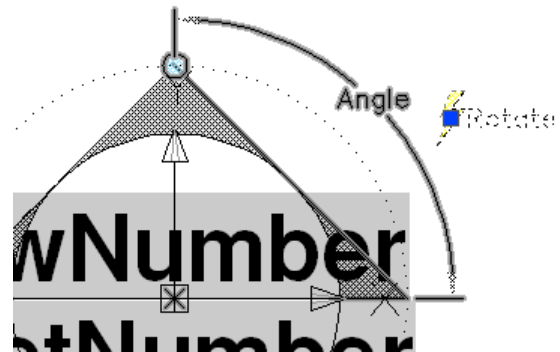


Tip: Alert icons in the Block Editor draw attention to problems with the grips, parameters, or actions in the block. These alert icons identify problems with relationships between actions and parameters in the block that might not otherwise be apparent. For example, an alert icon might indicate a parameter with no associated action, an action with no associated parameter, or an action with no geometry to manipulate. Double-clicking an alert icon starts the appropriate command to correct the problem.

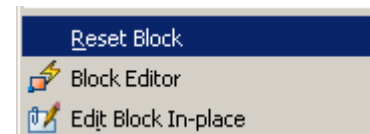
4. Insert a rotation action, associate it with the rotation parameter, and select the arrow geometry for the action's selection set.
 - On the Actions tab of the Block Authoring Palettes window, click the Rotate Action tool.
 - Select the rotation parameter that you've already added to the block definition.
 - Select the arrow geometry for the selection set. Be sure to select both the hatch object that forms the solid part of the arrow, and the bounding lines that form the arrow shape. (The lines are tricky and actually aren't distinguishable from the hatch itself. You should select a total of 5 objects).
 - Place the rotate action.

5. Check to see whether the rotate action operates on the right objects.

 **Tip:** The Block Editor uses *dependency highlighting* to visually indicate the relationships between parameters, actions, and geometry in a drawing. When a parameter is selected, any associated actions and grips are highlighted in a bold outline. When an action is selected, any associated parameters and any geometry the action operates on are highlighted in a bold outline. You can use this as a tool for ensuring that you have correctly established the relationships between parameters, actions, and geometry in a block.

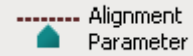


- Experiment with dependency highlighting by selecting first the parameter, and then deselecting the parameter and selecting just the action. Do the relationships highlighted in bold make sense for each of these objects?
6. Save your changes and return to the floor plan.
 - Enter **bclose** on the command line and save your changes to the block.
 7. Insert two new copies of the “Section” block.
 - Make the “Text1” layer current.
 - Enter **insert** on the command line to insert two copies of the “Section” block at the ends of the line as indicated by the empty yellow circles on the right half of the drawing. You will need to scale them by a factor of 48.0, and insert the blocks un-rotated so that the attribute text remains horizontal.
 - Select the newly inserted blocks and use the Properties palette to set the ViewNumber attribute to “2” and the SheetNumber attribute to A-05 for both blocks.
 - Select each of the blocks and use the custom rotation grip to rotate the section arrows 90 degrees counter clockwise.
 8. Notice that the existing “Section” blocks have been updated and are now dynamic blocks.
 - Select the “Section” block at the bottom of the drawing and note the new rotation grip.
 9. Use the RESETBLOCK command on one of the blocks.
 - Select the “Section” block at the bottom of the drawing. Right-click on the block and select Reset Block. Notice how the block geometry and properties reset to the default appearance and values.



Automatically Aligning Blocks and Using Multiple Insertion Points

You can add alignment parameters to dynamic blocks. Alignment parameters define grips that align the block reference to other geometry in your drawing. Alignment parameters do not define custom properties, cannot have associated actions, and always act on the entire block reference rather than on objects within the block.



When adding an alignment parameter to a block definition, you must define an alignment axis and alignment type (perpendicular or tangent). When moving a dynamic block using an alignment grip and the grip passes over other geometry in the block, AutoCAD rotates the entire block about the grip so that the alignment axis is either perpendicular or tangent to the geometry under the grip. The alignment grip also snaps to the nearest point on the underlying geometry.

Dynamic blocks can have multiple insertion points, which you can cycle through by pressing the CTRL key when inserting the block reference. All dynamic block grips have a Cycling property. When this property is set to Yes, it can act as an insertion point for the block and can be cycled to while inserting the block.

This Cycling property is set to Yes by default for new grips on point, linear, XY, polar, and alignment parameters. You can change the property for any grip and define the order in which AutoCAD cycles to them using the Insertion Cycling Order dialog box (BCYCLEORDER command).

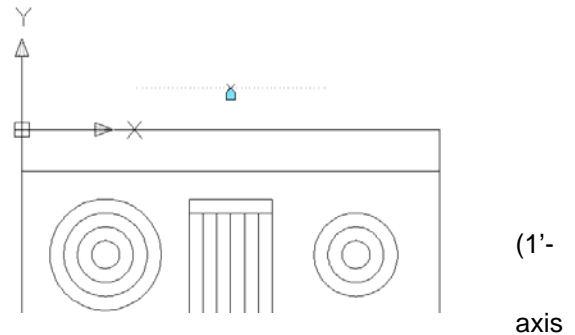
Lesson 3 Automatically Aligning Blocks and Using Multiple Insertion Points


Objective: Learn how to use the alignment parameter to align blocks to other geometry. Learn about specifying insertion point cycling and the Insertion Cycling Order dialog box (BCYCLEORDER command).

1. Open the sample drawing *Wall Base.dwg*.
2. Open the “Range” block.
 - Enter **bedit** on the command line to display the Edit Block Definition dialog box.
 - In the Edit Block Definition dialog box, select the “Range” block from the list.
 - Click OK to close the dialog box and open the Block Editor.

3. Add an alignment parameter to the back of the stove to align the stove to adjacent objects while maintaining a 3” offset from the other objects.

- On the Parameters tab of the Block Authoring Palettes window, click the Alignment Parameter tool.
- Specify the base point as the midpoint of the back of the stove, offset 3” along the Y axis. (3”, 0’-3”).
- Specify the alignment direction along the X (2’-0”, 0’-3”). Notice the caret-shaped grip that displays, along with a line indicating the alignment direction.
- Select the alignment parameter and change the Parameter Name property to “Back”.




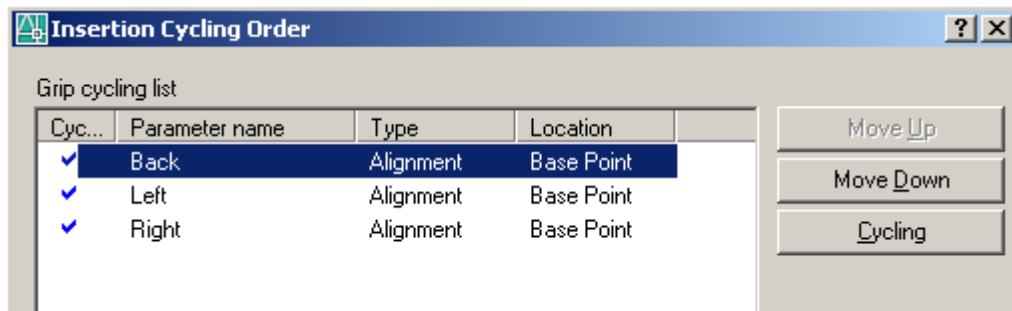
 **Tip:** The alignment direction determines the axis to which the block reference is aligned. When grip-editing a block using an alignment grip, the block is rotated so that the alignment axis is either perpendicular to the normal to other curves under the grip, or tangent to other curves under the grip. The Alignment Type property defaults to Perpendicular but can be changed to Tangent when placing the alignment parameter in the block definition or by changing the Alignment Type property in the Properties palette after placing the parameter.

4. Add an alignment parameter to the left side of the stove.
 - On the Parameters tab of the Block Authoring Palettes window, click the Alignment Parameter tool.
 - Specify the base point as the midpoint of the left of the stove, offset -3” along the X axis. (- 0’-3”, - 1’-0”).
 - Specify the alignment direction along the Y axis (- 0’-3”, 0’-0”).
 - Select the alignment parameter and change the Parameter Name property to “Left”.

5. Add an alignment parameter to the right side of the stove.
 - On the Parameters tab of the Block Authoring Palettes window, click the Alignment Parameter tool.
 - Specify the base point as the midpoint of the left of the stove, offset -3" along the X axis. (2'-9", - 1'-0").
 - Specify the alignment direction along the Y axis (2'-9", 0'-0").
 - Select the alignment parameter and change the Parameter Name property to "Right".

6. Specify the order that insertion points are cycled: (1) Back, (2) Right, and (3) Left

 **Tip:** AutoCAD 2006 introduced support for multiple insertion points for blocks. When using the mouse to select the insertion point for a block reference, you can cycle between insertion points by pressing the CTRL key. Each time you press the CTRL key, AutoCAD cycles to the next insertion point in the block reference. When you cycle past the last insertion point, AutoCAD returns to the first (default) insertion point. The default insertion point for a block reference is always the first insertion point listed in the Insertion Cycling Order dialog box. Custom grips you add to the block can also be used for insertion points. By default, all grips except those on rotation, flip, lookup, and visibility parameters are enabled for cycling. You can change this after inserting a parameter by selecting the grip and changing the Cycling property, or by selecting the grip in the Insertion Cycling Order dialog box (BCYCLEORDER command) and clicking the Cycling button to toggle cycling for the grip on and off.

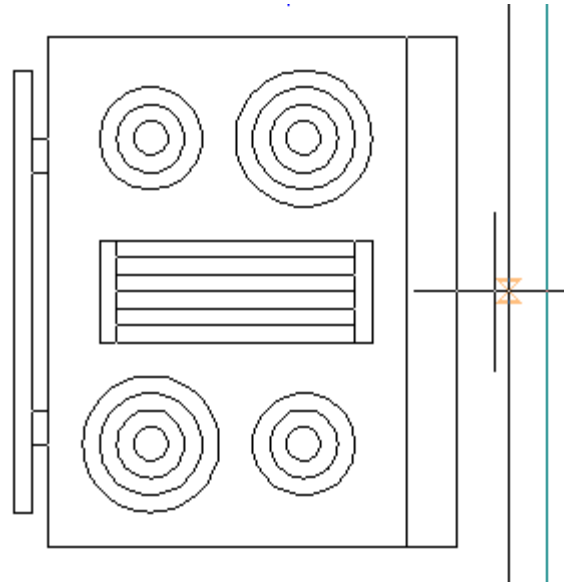



- Enter **bcycleorder** on the command line to display the Insertion Cycling Order dialog box,
 - Select the Right parameter, and then click Move Up once to move it from the bottom of the list up one level.
 - Click OK to accept the changes.
7. Save your changes and return to the floor plan.
 - Enter **bclose** on the command line and save your changes to the block.



8. Insert a new range in the drawing.

- Make the “Stove” layer current.
- Enter **insert** on the command line.
- In the Insert dialog box, select “Range” from the Name drop-down list.
- In the Scale and Rotation areas, clear the Specify On-screen check boxes, but leave it selected under Insertion Point.
- Click OK to close the dialog box.
- While dragging the block, press the CTRL key to cycle through the insertion points. Notice how the insertion point starts at the default point, then cycles to (1) back, (2) right, and (3) left sides of the stove in order, then back to the default point again.
- Use the CTRL key to cycle to the insertion point at the back of the stove.
- Move the mouse close to other geometry in the drawing. Notice how the stove “snaps” to align to other geometry as you move over the geometry with the mouse.



 **Tip:** The block is aligned to the side of the geometry approached by the mouse. For example, if you approach a vertical line from the right, the block snaps to the right side of the line. If you approach the line at the same point from the left, the block snaps to the left side of the line.

Creating Blocks with Multiple Views

You can define sets of objects in a block that become invisible when a special property of the block changes. This special property is called a *visibility* property and is added to the block when you add a visibility parameter to the block. The visibility parameter also adds a triangular grip to the block. When you click this grip on a block reference in a drawing, a drop-down menu of the allowed visibility property values (called visibility states) is displayed. A block can only contain one visibility parameter, and hence, only one visibility property or grip.



When you add a visibility parameter to a block the visibility state controls on the Block Editor toolbar are enabled. These toolbar buttons and controls allow you to change the current visibility state in the Block Editor and allow you to add or remove objects from the current visibility state. You can also manage visibility states using the Visibility States dialog box (BVSTATE command).




Lesson 4 Creating Blocks with Multiple Views

Objective: Learn how to use a visibility parameter to control visibility of parts of a block. Learn about the Visibility States dialog box (BVSTATE command). Learn about the BVMODE system variables and the visibility controls on the Block Editor toolbar.

1. Open the sample drawing *Wall Base.dwg*.
 - Open the “Range” block in the Block Editor.
 - Enter **bedit** on the command line to display the Edit Block Definition dialog box.
 - In the Edit Block Definition dialog box, select the “Range” block from the list.
 - Click OK to close the dialog and open the Block Editor.

2. Add a visibility parameter to the block

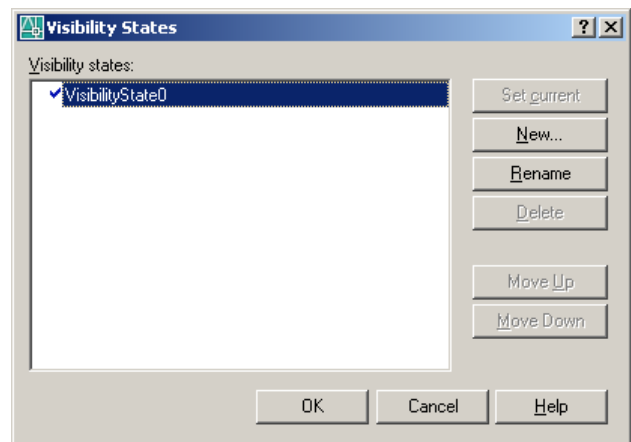
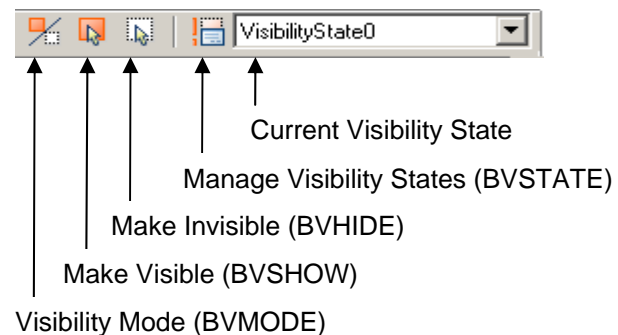
- On the Parameters tab of the Block Authoring Palettes window, click the Visibility Parameter tool.
- Place the parameter at the center of the stove, just below the door (1'-3 1/16", - 2'-5").
- Notice how the Current Visibility State drop-down list becomes enabled on the Block Editor toolbar.

 **Tip:** A block can contain only one visibility parameter. The Current Visibility State drop-down list remains disabled until the block contains a visibility parameter. Every block has a default visibility state called “VisibilityState0” that initially contains all of the geometry, parameters, and actions in the block when you add a visibility parameter to the block definition. This visibility state can be renamed.

- Select the visibility parameter in the block definition, and change the Visibility Label to “Range Type”.

3. Rename the default visibility state “Electric”.

- Enter **bvstate** on the command line, or click on the Manage Visibility States button on the Block Editor toolbar.
- In the Visibility States dialog box, select “VisibilityState0”, click Rename, and rename the state “Electric”.




4. Add a new visibility state "Gas".
 - Click New...
 - In the New Visibility State dialog box, type "Gas" for the visibility state name.
 - Select Show All Existing Objects in New State.
 - Click OK to close the New Visibility State dialog box. In the Visibility States dialog box, notice that the new "Gas" visibility state is the current state.
 - Click OK to close the Visibility States dialog box.

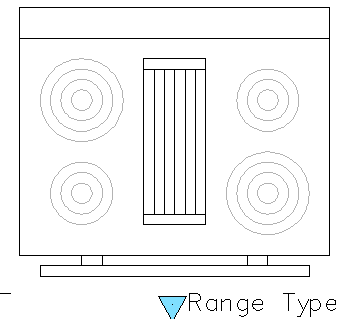


5. Make the electric coils on the range top invisible in the current (Gas) visibility state.

- Click the Make Invisible button on the right side of Block Editor toolbar or enter **bvhide** on the command line.
- Select all of the circles in the drawing that represent the electric coils.
- Notice that the coils are no longer displayed.

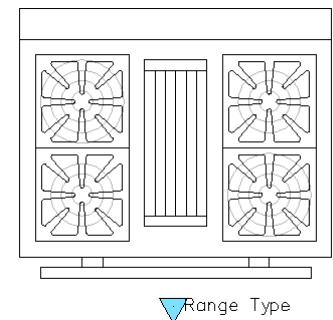
 **Tip:** Objects in a block can be in more than one visibility state, but only objects in the current visibility state are normally visible in the Block Editor. You can control the visibility of objects not in the current visibility state by changing the BVMODE system variable setting.

- Click the Visibility Mode button on the Block Editor toolbar to toggle the visibility of objects in other visibility states on and off. Notice how the electric coils display in a dimmed color when toggling BVMODE on. Leave the electric coils visible for now.



6. Add grids for a gas range top.

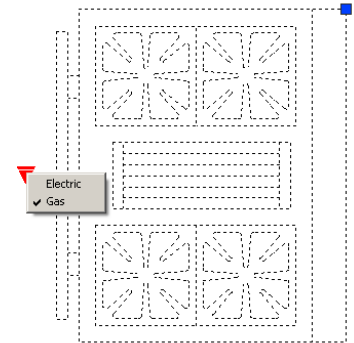
- Enter **insert** on the command line and insert four copies of the "Grille" drawing. Place each grille at the center of one of the electric coils.
- Click the Visibility Mode button to toggle BVMODE off and hide the electric coils.
- Use the Visibility States drop-down to toggle between the Electric and Gas visibility states of the block. Verify that the electric coils are only visible in the Electric state, and the gas grilles are only visible in the Gas state.





7. Save the block and return to the model tab.
 - Enter **bclose** on the command line and save your changes to the block.

8. Change the stove from electric to gas in a drawing.
 - Select the stove block in the drawing. Notice the light blue grip that appears near the stove. Notice the Range Type custom property in the Properties palette.
 - Click on the grip and change the Range Type from Electric to Gas. Notice how the stove block updates to show the grilles instead of the coils.



Appendix A: Parameter and Action Combinations

Parameter Type	Description	Supported Actions
Point	Defines an X and Y location in the drawing. In the Block Editor, looks similar to an ordinate dimension.	Move, Stretch
Linear	Shows the distance between two anchor points. Constrains grip movement along a preset angle. In the Block Editor, looks similar to an aligned dimension.	Move, Scale, Stretch, Array
Polar	Shows the distance between two anchor points and displays an angle value. You can use both grips and the Properties palette to change both the distance value and the angle. In the Block Editor, looks similar to an aligned dimension	Move, Scale, Stretch, Polar Stretch, Array,
XY	Shows the X and Y distances from the base point of the parameter. In the Block Editor, displays as a pair of dimensions (horizontal and vertical).	Move, Scale, Stretch, Array
Rotation	Defines an angle. In the Block Editor, displays as a circle.	Rotate
Flip	Flips objects. In the Block Editor, displays as a reflection line. Objects can be flipped about this reflection line. Displays a value that shows if the block reference has been flipped or not.	Flip
Alignment	Defines an X and Y location and an angle. An alignment parameter always applies to the entire block and needs no action associated with it. An alignment parameter allows the block reference to automatically rotate around a point to align with another object in the drawing. An alignment parameter affects the rotation property of the block reference. In the Block Editor, looks like an alignment line.	None (The action is implied and contained within parameter.)
Visibility	Controls the visibility of objects in the block. A visibility parameter always applies to the entire block and needs no action associated with it. In a drawing, you click the grip to display a list of visibility states available for the block reference. In the Block Editor, displays as text with an associated grip.	None (The action is implied and controlled by visibility states.)
Lookup	Defines a custom property that you can specify or set to evaluate a value from a list or table you define. It can be associated with a single lookup grip. In the block reference, you click the grip to display a list of available values. In the Block Editor, displays as text with an associated grip.	Lookup
Base	Defines a base point for the dynamic block reference relative to the geometry in the block. Cannot be associated with any actions, but can belong to an action's selection set. In the Block Editor, displays as a circle with crosshairs.	None

Appendix B: Dynamic Block Commands

BACTION	BCLOSE	BSAVEAS
BACTIONSET	BCYCLEORDER	BVHIDE
BACTIONTOOL	BEDIT	BVSHOW
BASSOCIATE	BGRIPSET	BVSTATE
BATTORDER	BLOOKUPTABLE	RESETBLOCK
BAUTHORPALETTE	BPARAMETER	
BAUTHORPALETTECLOSE	BSAVE	

Appendix C: Dynamic Block SYSVARS

BACTIONCOLOR	BLOCKEDITLOCK	BPARAMETERSIZE
BDEPENDENCYHIGHLIGHT	BLOCKEDITOR	BTMARKDISPLAY
BGRIPCOLOR	BPARAMETERCOLOR	BVMODE
BGRIPOBJSIZE	BPARAMETERFONT	GRIPDYNCOLOR

Appendix D: Commands and Sysvars disabled in the Block Editor

3DALIGN	HIDE	RENDER
3DARRAY	LAYOUT	RENDERCROP
3DSOUT	LAYOUTWIZARD	REPUBLIC
ACPUBLISHTOWEB	LAYDEL	RTUCS
ALIGN	LAYMRG	RENDER
ARCHIVE	MARKUP	ROTATE3D
ATTEXT	MARKUPCLOSE	SAVE
BASE	MATERIALMAP	SAVEAS
BLOCK	MIRROR3D	SHADE
BLOCKREPLACE	MVIEW	SHEETSET
CAMERA	MVSETUP	SOLDRAW
CHSPACE	NEWSHEETSET	SOLVIEW
CUI	OPENDWFMARKUP	SUPERHATCH
CUIIMPORT	OPENSHEETSET	SHOWURLS
CUIEXPORT	PAGESETUP	TXTEXP
DATAEXTRACTION	PLOT	UCS
DDVIEW	PSETUPIN	UCSMAN
DDVPOINTS	PREVIEW	VIEW
DDUCS	PSOUT	VPORTS
DWGCONVERT	PUBLISH	VIEWPORTS
DXFOUT	PURGE	WBLOCK
EATTEXT	QSAVE	WMFOUT
EDGE	QUICKCUI	WSSAVE
ETRANSMIT	REFEDIT	WORKSPACE
EXPORT	RENAME	