Bonus Chapter 1

Using the Express Tools

You can use a wealth of AutoCAD® features to improve your productivity. But even with these aids to efficiency, you can always automate further in certain situations. In this bonus chapter, we'll introduce you to some ways you can enhance AutoCAD with add-on utilities.

You'll be introduced to customization through the AutoCAD Express tools that are supplied on the AutoCAD distribution DVD. You'll also be introduced to AutoLISP®, the AutoCAD macro language.

Before You Work in This Chapter

Before you go any further, make sure that you are in the Drafting & Annotation workspace. Click the Workspace Switching tool in the status bar, or from the Workspace drop-down menu on the Quick Access toolbar, select Drafting & Annotation.

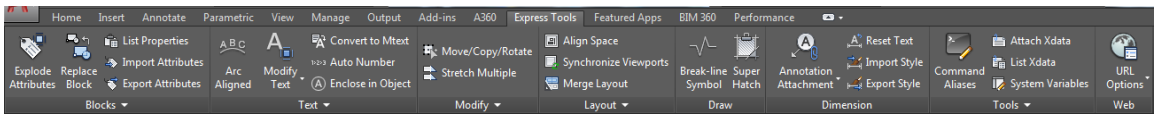
If you're using AutoCAD LT®, you can skip this chapter.

Using Enhancements Straight from the Source

If you've followed the tutorials in this book, you've already used a few add-on programs that come with AutoCAD, perhaps without even being aware that they were not part of the core AutoCAD program. In this section, we'll introduce you to the AutoCAD Express tools: a set of AutoLISP and ARX tools that showcase these powerful customization environments. The best part about the Express tools is that you don't have to know a thing about programming to take advantage of them.

Because so many Express tools are available, we can't provide step-by-step instructions for all of them. Instead, we'll give you details about some of the more complicated tools and provide shorter descriptions of others. You can find the Express tools in the Express Tools tab (see Figure BC1.1).

FIGURE BC1.1
The Express Tools tab on the Ribbon



Loading the Express Tools

If for some reason you do not see the express tools tab on the ribbon, you can install the express tools separately without having to reinstall the entire program. In windows 7, click the start option in the lower-left corner of the windows screen, select control panel, and click uninstall a program. In windows 8 and 10, right-click the Start icon, and then select control panel. When the control panel appears, select uninstall a program.

Choose Autocad 2017 from the list and then click the uninstall/change option at the top of the list. Click the add or remove features option in the autocad installation wizard. Locate express tools in the feature list box and click update. Click finish to close the maintain product dialog box.

You may need access to your autocad 2017 installation media.

Blocks Panel Tools

Every now and then, you'll want to use objects in a block to trim or extend to, or perhaps you'll want to copy a part of a block to another part of your drawing. In these situations, you can use the following tools. They're fairly simple to use, so the descriptions in this section should be enough to get you started.

You'll find these tools on the Blocks panel of the Express Tools tab:

Explode Attributes Explodes blocks containing attributes so that the attribute values are converted into plain single-line text.

Replace Block Replaces one set of block references with another. For example, you can replace the Tub block in the apartment plan with the Door block, turning all the bathtubs into doors. This tool is similar to the Convert Block To Xref tool.

List Properties Displays basic information about an Xref or a block.

Import Attributes Enables you to import changes to the attribute information that has been exported using the Export Attribute Information tool.

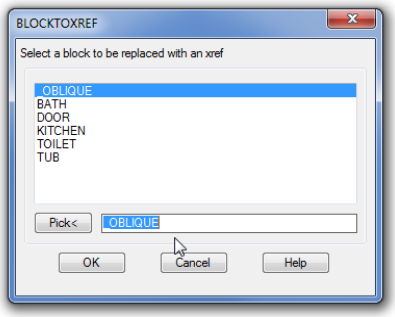
Export Attributes Offers a quick way to extract attribute information from a block to a simple text file. You're prompted to select a file location and name and then select the attributes you want to export. The text file is formatted as a tab-delimited file. You can then edit the exported text file and use the Import Attributes tool (described previously) to update the drawing with the modifications you made to the text file.

Convert Block To Xref Lets you replace block references in your drawing with Xrefs. For example, you can replace the Tub blocks in the apartment plan from earlier tutorials with an Xref of a different tub. When you select this option, the BLOCKTOXREF dialog box opens (see Figure BC1.2).

From here, you can select the block you want to replace. You're then asked to select a file that will be the replacing Xref.

Copy Nested Objects Lets you copy single objects within a block. You're only allowed to select objects individually—one click at a time.

FIGURE BC1.2
The BLOCKTOXREF dialog box



Extend To Nested Objects Extends to objects in a block. This tool also works like its standard counterpart with the exception that you must select the boundary-edge objects you want to extend to individually.

Trim To Nested Objects Trims to objects in a block. This tool works just like the standard Trim command with the exception that you must select the cutting-edge objects individually.

Text Panel Tools

It seems that we can never have enough text-editing features. Even in the realm of word processors, numerous tools let you configure fonts, paragraphs, tabs, and tables. Some programs even check your grammar. Although you may not be trying to write the great American novel in AutoCAD, you're interested in getting your text in the right location, at the right size, and with some degree of style. This often means using a mixture of text- and graphics-editing tools. The following describes some additional tools that will help ease your way through otherwise difficult editing tasks.

Masking Text Backgrounds

One problem AutoCAD users frequently face is how to get text to read clearly when it's placed over a hatch pattern or other graphic. The Hatch command hatches around existing text, leaving a clear space behind it. But what about those situations in which you need to mask behind text that is placed over a non-hatch object, such as a dimension leader or raster image?

The Text Mask tool addresses this problem by masking the area behind text with a special masking object called a Wipeout.

If you want to remove the effects of the Text Mask tool, choose Unmask Text from the expanded Text panel of the Express Tools tab. This option prompts you to select an object. Select the masked text, and press ↵ to delete the mask background.

Using the Mtext Command to Mask Text

The AutoCAD Mtext command offers a Background Mask option that performs a function similar to that of the Text Mask tool. While editing text with the text editor, select the text, right-click, and select Background Mask. You can also turn on Background Mask through the Properties palette of an Mtext object.

Adding Linked Text Documents

One frustrating and time-consuming aspect of drafting is editing lengthy notes. General notes and specifications change frequently during the life of a project, so editing notes can be a large part of what you do in AutoCAD. Frequently, notes are written by someone else, perhaps a specifications writer who doesn't work directly with the drawings.

To help make note-editing easier, AutoCAD supplies the Remote Text object. This special object is linked to an external text document. Remote Text objects automatically update their contents when the source document changes.

Using Remote Text is fairly straightforward. Click the Remote Text tool from the expanded Text panel of the Express Tools tab, or type **Rtext** ↵ at the Command prompt. Press ↵ when you see the `Enter an option[Style/Height/Rotation/File/Diesel] <File>:` prompt, and then locate and select a text file to import.

Other Text Tools

Besides the text tools already described, several others can help to simplify some common text-related operations. Table BC1.1 offers a description of these other tools.

Table BC1.1: Tools on the Text panel

Tool name	Function
Arc Aligned	Draws text along an arc
Modify Text	A flyout that offers tools to explode, change case, rotate, fit, or justify text
Convert To Mtext	Converts single-line text created with Text or Dtext into multiline text
Auto Number	Adds numbers to a text list
Enclose In Object	Encloses text in a circle, slot, or rectangle

Modify Panel Tools

The Express Tools Modify panel seems to be the answer to most AutoCAD users' wish lists. As with many of the Express tools discussed so far, these tools have been floating around in the AutoCAD user community as AutoLISP utilities. Multiple Object Stretch lets you use the crossing polygon selection option to select endpoints and vertices for stretching. The Move/Copy/Rotate tool combines these three functions into one command. Flatten Objects changes the elevation points and thicknesses of selected objects to 0. However, use with caution when selecting blocks, as they will be renamed by the operation.

Interacting with Blocks

In the earlier part of this chapter, you saw the tools on the Block panel. There are two more block-related tools that have a more general use, so they've been placed in the Modify panel.

Extended Clip In Chapter 7, "Mastering Viewing Tools, Hatches, and External References," you saw how to limit the display of an Xref to an L-shaped, rectilinear area. Extended Clip adds the ability to use arcs, circles, and polylines to clip the view of an Xref.

Convert Shape To Block Converts a shape object into a block. You can then explode the block to its component objects if needed.

Using Extended Clip to Clip a Raster Image to a Curved Shape

In Chapter 7, you saw how you can clip an Xref or a raster image so that only a portion is visible. One limitation to the Raster Clip option is that you can clip only areas defined by straight lines. You can't, for example, clip an area defined by a circle or an ellipse.

Extended Clip is designed for those instances when you absolutely need to clip a raster image to a curved area. The following steps show you how it works:

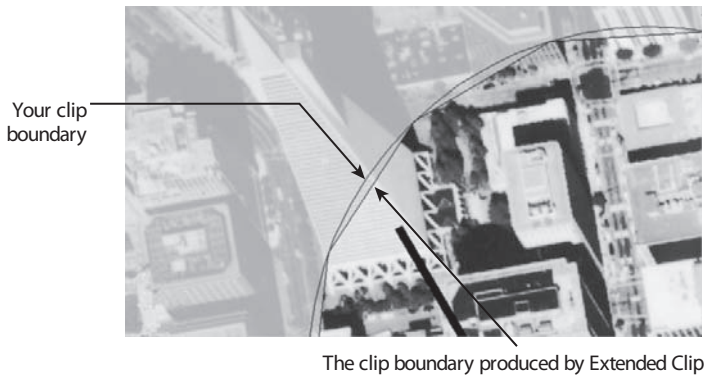
1. Create a clip boundary by using a curved polyline or circle.
2. Choose Extended Clip from the expanded Modify panel of the Express Tools tab.
3. Click the boundary.
4. Click the Xref, block, or image you want to clip.
5. At the following prompt, press ↵ :

   ```
   Enter maximum allowable error distance for
   resolution of arc segments <0.0200>:
   ```

   The Xref, block, or image clips to the selected boundary.
6. You can erase the boundary you created in step 1 or keep it for future reference.

Extended Clip doesn't really clip to the boundary you created but instead approximates that boundary by creating a true clip boundary with a series of very short line segments. The prompt in step 5 lets you specify the maximum allowable distance between the straight-line segments it generates and the curve of the boundary you create (see Figure BC1.3).

FIGURE BC1.3
Extended Clip enables you to set the maximum distance from your clip boundary and the one it generates.



Layout Panel Tools

AutoCAD includes some Express tools that will help make your work with layouts a lot easier. These tools, found in the Layout panel of the Express Tools tab, address some common operations you'll encounter as you work with layouts.

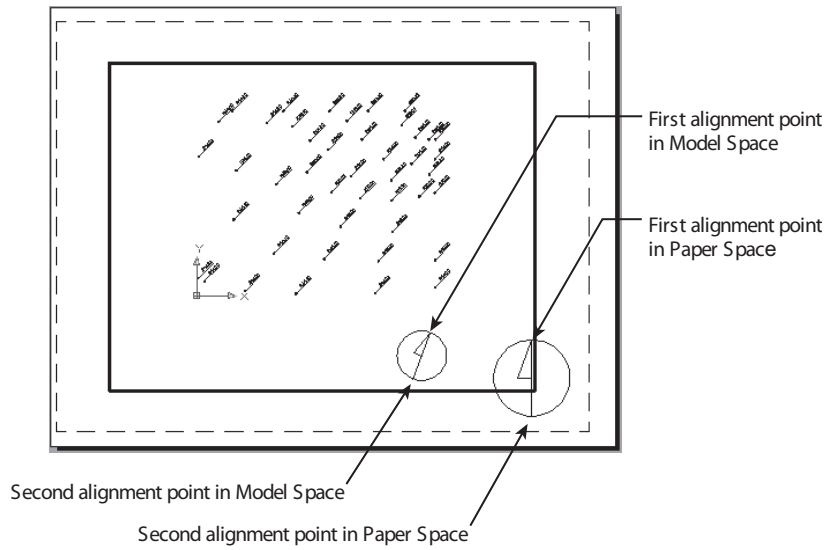
Aligning Model Space Objects with Layout Objects

If you've ever tried to align an object in a layout with objects in a Model Space viewport, you know how difficult it can be. This situation often arises when you accidentally pan or zoom a Model Space viewport and objects drawn in Paper Space (such as break lines or dimensional notations) become misaligned with the underlying view.

The Align Space tool helps you quickly align objects in a Model Space viewport with objects in the layout Paper Space. Align Space can even rotate a viewport view to align objects that are at an angle. To see how it works, try the following exercise. You'll align a plan view of a set of survey data points to a north arrow in Paper Space:

1. Open the `alignspace.dwg` sample file.
2. Choose Align Space from the Layout panel. The viewport automatically becomes active.
3. At the `FIRST alignment point in MODEL space:` prompt, click the upper endpoint of the north arrow in the viewport, as shown in Figure BC1.4.

FIGURE BC1.4
Select these points to align the Model Space north arrow with a Paper Space north arrow.



4. At the `SECOND point in MODEL space or <Return> for none:` prompt, click the endpoint of the bottom end of the north arrow, as shown in Figure BC1.4.
5. At the `FIRST alignment point in PAPER space:` prompt, AutoCAD automatically switches to Paper Space to allow for your next input. Click the upper endpoint of the layout Paper Space north arrow.

6. At the `SECOND alignment point in PAPER space:` prompt, click the lower end of the Paper Space arrow. The two arrows align, and a message tells you the scale of the viewport.

In this exercise, the two north arrows were aligned in both scale and direction. The object to which you're aligning in Paper Space doesn't have to be in the area of the viewport either.

If you prefer, you can align a single point without changing the scale or rotation of the viewport by pressing ↵ in step 4 when you see the `SECOND point in MODEL space or <Return> for none:` prompt.

Aligning Multiple Viewports to a Single Viewport

The Align Space tool lets you align a Model Space object to a Paper Space object, but what if you want to align two Model Space views? For example, say you want to overlap two viewports of the same view with one viewport displaying graphics while the other displays just the power and signal symbols for a small region of the plan.

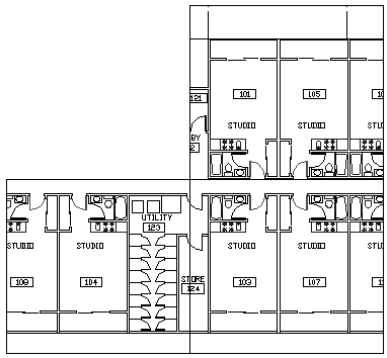
The Synchronize Viewports tool lets you do just that. It aligns one or more viewports to another *master* viewport. The Synchronize Viewports tool aligns the coordinates in one viewport with the coordinates and scale of another so that the views are matched like pieces of a jigsaw puzzle. To get a better idea of what this means, try the following exercise. Suppose you have an enlarged plan showing a portion of a building. You want to include the grid lines in your plan, but you don't want to have to include other portions of the plan or redraw the grids. Synchronize Viewports makes easy work of this project:

1. Open the `synchronize.dwg` file, and then choose Synchronize Viewports from the Layout panel.
2. Click the border of the viewport in the lower-right corner.
3. At the `Select viewports to be aligned to master viewport. Select objects:` prompt, click the other two viewports, and press ↵ .

The two viewports change to show the adjacent areas of the first viewport.

The three views of the layout combine to show a contiguous Plan view instead of three random views (see Figure BC1.5).

FIGURE BC1.5
Synchronizing three viewports

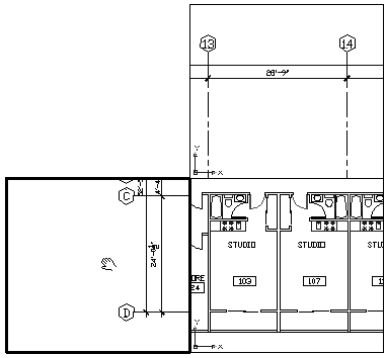


You could use Synchronize Viewports this way to piece together parts of a floor plan in a nonrectangular shape.

To finish adding the grid lines, do the following:

1. Double-click in the top viewport, and then click the Pan tool in the Navigation bar.
2. Shift+click and drag the view downward to bring the grid lines into view. Then Shift+click and drag and keep the pan motion in an exact vertical direction. Pan downward until you see only the grids and dimensions.
3. Press Esc to exit the Pan tool; then double-click the left viewport and use the Pan tool to Shift+click and drag the view toward the right. Keep panning until just the grid lines show (see Figure BC1.6).

FIGURE BC1.6
Pan to see the grid lines.



If you've ever tried to do this operation without the aid of the Synchronize Viewports tool, you can see how helpful a tool it is.

Finding Viewport Scales and Merging Layouts

The Layout panel includes two more fairly simple tools: List Viewport Scale and Merge Layout. List Viewport Scale does just what its name says. Choose List Viewport Scale from the expanded Layout panel, and then click a viewport border to display the viewport scale. Merge Layout combines the contents of one layout with another. This tool is handy if you're exporting files to earlier versions of AutoCAD in which only one layout is possible. Choosing Merge Layouts from the Layout panel opens the LAYOUTMERGE dialog box. This dialog box is a list showing the layouts in the current drawing.

You can select the layout that you want merged with the current layout. After you make your selection and click OK, another dialog box appears that looks identical to the first LAYOUTMERGE dialog box. This time, you select the destination layout for the merged layouts.

That covers the Express layout tools. As with many of the other Express tools, you may find yourself using these tools more than the other standard AutoCAD commands; keep them in mind as you work on the layout of your next set of drawings.

Draw Panel Tools

Two tools offer functions not found in the rest of the AutoCAD program: Break-Line Symbol and Super Hatch. The Break-Line Symbol tool is a very easy-to-use tool that just draws a break line. It is a command-line tool that offers options to use a custom block for the break symbol, adjust the size of the break symbol, or set the extension distance for the break line.

The Super Hatch tool is quite powerful because it allows you to create a custom hatch pattern from just about anything, including image files. This tool is a bit more complicated, so it requires more information to master.

Creating Custom Hatch Patterns with Super Hatch

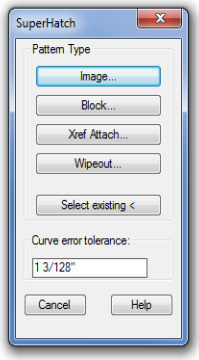
You can access a number of hatch patterns from the AutoCAD Hatch And Gradient dialog box but, at times, none of those patterns will fulfill your needs. This is where the Super Hatch tool comes in. With Super Hatch, you can create virtually any hatch pattern you want. You can use objects in your drawing as a basis for a hatch pattern, or you can import bitmap images and use them to form a hatch pattern, such as tiled wallpaper in the Windows Desktop background.

The following exercise shows you how to use Super Hatch:

1. Open the `superhatch.dwg` file. You see a block of an arrow on the left side of the screen and a rectangular area to the right. In this exercise, you'll turn the arrow into a hatch pattern.

2. Click the Super Hatch tool to open the SuperHatch dialog box (see Figure BC1.7).

FIGURE BC1.7
The SuperHatch dialog box



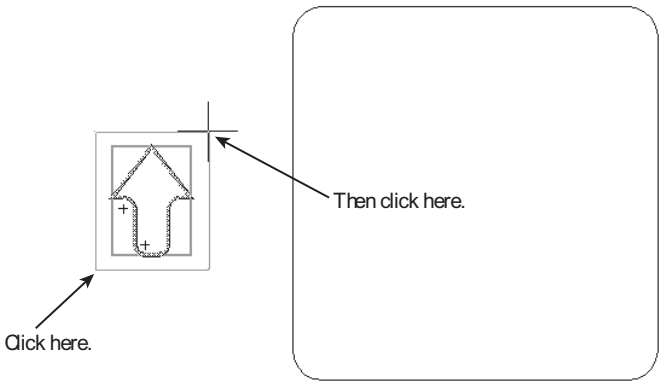
3. Click the Select Existing button to close the SuperHatch dialog box.

4. Click the arrow. It becomes highlighted, and a magenta rectangle encircles it.

   At this point, you can indicate the area you want repeated in your pattern. The default is the extents of the selected item as indicated by the magenta rectangle.

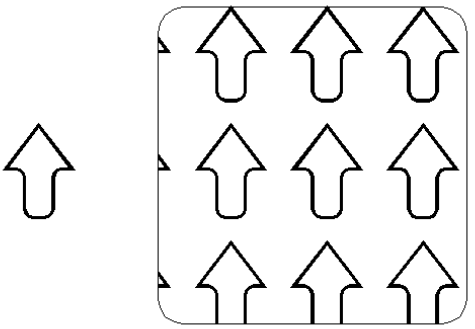
5. Click the two points shown in Figure BC1.8 to indicate the area that you want repeated. The rectangle changes to reflect the new area. You can repeat the area selection as many times as you need to until you get exactly the area you want.

FIGURE BC1.8
Selecting the area to be repeated



6. Press ↵ to move to the next step.
7. Click the interior of the rectangle to indicate the area you want to hatch. If you have multiple hatch areas, you can continue to select them at this step.
8. Press ↵ to finish your selection of hatch areas. The arrow appears repeated as a pattern in the rectangle, as shown in Figure BC1.9.

FIGURE BC1.9
The custom hatch pattern



The object you select by using the Select Existing option in the SuperHatch dialog box must be a block. You can modify that block by using the techniques described in Chapter 7, and the changes will appear in the hatch pattern, as shown in Figure BC1.10.

As you can see from the SuperHatch dialog box, you can incorporate Xrefs, blocks, and even image files into your custom hatch pattern. Each of these options prompts you to insert the object before you convert it into a hatch pattern. You use the usual insertion method for the type of object you select. For example, if you choose the Block option, you're prompted for an insertion point, the X and Y scale factors, and a rota-

tion angle. For image files, you see the same dialog box that you see when you insert an image file offering the options for insertion point, scale, and rotation. Figure BC1.11 shows a sample hatch pattern with an image file used instead of an AutoCAD block.

FIGURE BC1.10
The custom hatch pattern after the arrow block has been modified to include the diagonal hatch pattern

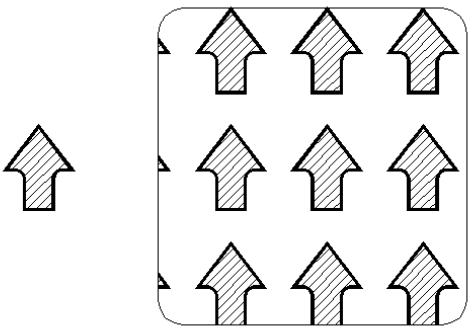
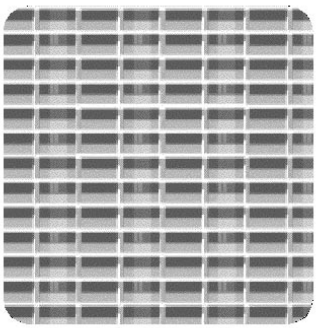


FIGURE BC1.11
A custom hatch pattern using a bitmap image



Dimension Panel Tools

Early in AutoCAD history, the dimension feature was almost like its own program within AutoCAD. A user would have to enter the dimension command, add whatever dimensions were needed, and then exit the dimension command. Dimensioning is much easier now, but it is still a complex feature that can require some additional help from outside the standard dimensioning feature set.

The Dimension panel offers several tools that simplify common editing tasks for dimensions. The Annotation Attachment flyout offers tools that let you add or remove leaders to annotation. The Reset Dim Text Value tool lets you reset the text of a dimension that has been overridden or otherwise modified.

Perhaps the most frequently used dimension-related tools are the Dimstyle Export and Import tools. Dimstyles can take a fair amount of time to set up, and they contain a lot of settings that would be difficult to remember. If you're moving from one computer to another or from one office to another, the dimstyle tools can save a lot of time and effort.

Using Dimstyle Export and Dimstyle Import

Most AutoCAD users need to set up their dimension styles only once and then make minor alterations for drawing scale. You can set up your dimension styles in a template file and then use that template whenever you create new drawings. That way, your dimension styles will already be set up the way you want them.

Frequently, however, you'll receive files created by someone else, and they may not have the same ideas about dimension styles as you do. Normally, this would mean you'd have to re-create your favorite settings in a new dimension style. With the Express tools Dimstyle Export and Dimstyle Import options, you can export and import dimension styles at any time, saving you the effort of re-creating them.

Tools Panel Tools

Besides the tools you've seen so far, there are several that don't fit into a neat category. The Tools panel of the Express Tools tab contains a mix of tools that let you do everything from creating and editing your command aliases to creating new linetypes.

Controlling Shortcuts with the Command Alias Editor

Throughout this book, we've been showing you the keyboard shortcuts to the AutoCAD commands. In Windows, all these shortcuts are stored in a file called `acad.pgp` in the `C:\Users\User Name\AppData\Roaming\Autodesk\AutoCAD 2017\R21.0\enu\Support` folder. (Check the Working Support File Search Path option on the Files tab in the Options dialog box to find the exact location for the support files on your system.) In the past, you had to edit this file with a text editor to modify these command shortcuts (otherwise known as command *aliases*). But to make our lives simpler, Autodesk has supplied the Command Alias Editor, which automates the process of editing, adding, or removing command aliases in AutoCAD.

In addition, the Command Alias Editor lets you store your own alias definitions in a separate file. You can then recall your file to load your own command aliases. Here's how the Command Alias Editor works:

1. Choose Command Aliases from the Tools panel to open the AutoCAD Alias Editor dialog box (see Figure BC1.12).
2. As you can see from the button options, you can add, delete, or edit an alias. Click the Add button to open the New Command Alias dialog box (see Figure BC1.13).

FIGURE BC1.12
The AutoCAD Alias Editor dialog box

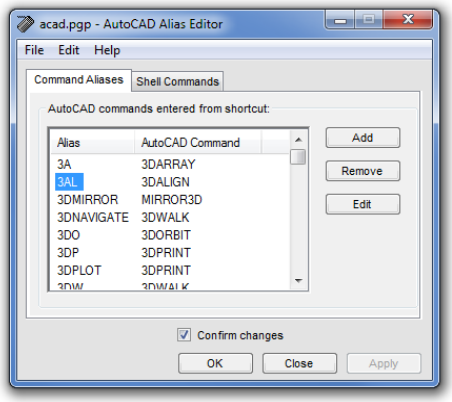
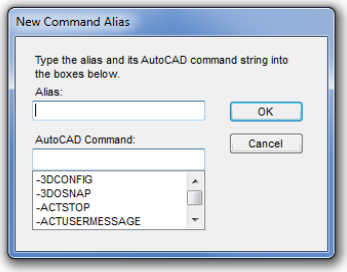


FIGURE BC1.13
The New Command Alias dialog box



In this dialog box, you enter the desired alias in the Alias input box and then select the command from the AutoCAD Command list box. You can also enter a command or macro name, such as **Wipeout**, in the input box. When you click the Edit option in the AutoCAD Alias Editor dialog box, you see a dialog box identical to this one with the input boxes already filled in.

3. After you create or edit an alias, click OK to return to the AutoCAD Alias Editor dialog box.
4. Click OK to exit the dialog box. A message tells you that your aliases have been saved, and the current AutoCAD session has been updated.
5. Click OK.

If you're a veteran AutoCAD user, you may be accustomed to your own set of command aliases. If so, you may want to create your own PGP file containing just your custom aliases. Then, whenever you use AutoCAD, you can open the AutoCAD Alias Editor, choose File α Import, and load your personal PGP file. From then on, the aliases in your file will be included with those of the standard `acad.pgp` file.

Using Make Linetype to Create a Custom Linetype

Most of the time, the linetypes provided by AutoCAD are adequate. But if you're looking for that perfect linetype, you can use the Make Linetype tool to create your own. Here's how it works:

1. Open the `customltype_completed.dwg` sample file. The sample drawing is made up of simple lines with no polylines, arcs, or circles. When you create your own linetype prototype, make sure the lines are all aligned. Draw a single line, and break it to form the segments of the linetype (see Figure BC1.14). Also make sure it's drawn to the actual plotted size.

FIGURE BC1.14 Creating a custom linetype by using Make Linetype

2. Choose Make Linetype from the expanded Tools panel to open the MKLTYPE dialog box. This is a typical save dialog box allowing you to create a new linetype file.
3. Enter **myltype** for the filename, select a location for the file, and then click Save.
4. At the `Enter linetype name:` prompt, enter **MyLinetype** or any name you want to use for the linetype. The name must be a single word.
5. At the `Enter linetype description:` prompt, enter a description for your linetype. This can be a sentence that best describes your linetype.
6. At the `Specify starting point for line definition:` prompt, pick one endpoint of the sample linetype.
7. At the `Specify ending point for line definition:` prompt, pick a point just past the opposite end of the sample linetype. Pick a point past the endpoint of the sample to indicate the gap between the end of the first segment of the linetype and the beginning of the repeating portion, as shown in Figure BC1.14.
8. At the `Select objects:` prompt, select the sample linetype lines. When you're done, press ↵. You now have a custom linetype.

If you send your file to someone else, you need to make sure you include your custom linetype files with the drawing file. Otherwise, anything drawn using your custom linetype will appear as a continuous line, and your recipient will get an error message saying that AutoCAD can't find a linetype resource.

The Make Linetype tool creates a single linetype file for each linetype you create. The linetype file is a simple ASCII text file. If you end up making several linetypes, you can combine your linetype files into one file by using a simple text editor such as Windows Notepad. Don't use WordPad or Word because these programs will introduce special codes to the linetype file.

Creating Custom Shapes as an Alternative to Blocks

Shapes are special types of AutoCAD objects that are similar to blocks. They're usually simple symbols made up of lines and arcs. Shapes take up less memory and can be displayed faster, but they're much less flexible than blocks and they aren't very accurate. You can't use object snaps to snap to specific parts

of a shape, nor can you explode shapes. They're best suited for symbols or as components in complex linetypes.

Shapes have always been difficult to create. In the past, you couldn't create a shape by drawing it. You had to create something called a *shape definition* using a special code. A shape definition is an ASCII file that contains a description of the geometry of the shape. Creating such a file was a tedious, arcane process and few users bothered to do it.

With the introduction of complex linetypes in recent versions of AutoCAD, interest in shapes has revived. To make it easier for users to create shapes, AutoCAD 2017 provides a tool that creates a shape definition file for you, based on a line drawing. Try this simple exercise to learn how to create and use a shape:

1. Open the `makeshape.dwg` sample file from the `Bonus Chapter 1` folder of the sample project files. This file contains a simple drawing of an upward-pointing arrow. It contains lines and arcs.
2. Choose Make Shape from the expanded Tools panel to open the MKSHAPE dialog box. This is a typical save dialog box that enables you to specify a name and location for your shape definition file.
3. In the File Name box, enter **Arrow**; then, locate the `My Documents` folder and place your new file there.
4. Click Save to create your file.
5. At the `Enter the name of the shape:` prompt, enter **Arrow** ↵ .
6. At the `Enter resolution <128>:` prompt, enter **512** ↵ . Shapes are defined with a square matrix of points. All the endpoints of lines and arcs must be on a point in that matrix. At this prompt, you can define the density of that matrix. A higher density will give you a better-looking shape, but you don't want to get carried away with this setting.
7. At the `Specify insertion base point:` prompt, select the tip of the arrow as shown in Figure BC1.15. This will be the insertion point of your shape, which is similar to the insertion point of a block.

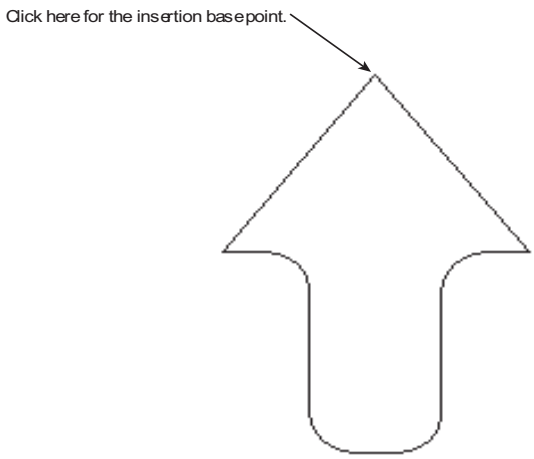


FIGURE BC1.15
Creating a shape from an existing drawing

8. At the `Select objects:` prompt, select the entire arrow and then press ↵ .

9. A series of messages tells you what AutoCAD is doing. The next to last message tells you whether AutoCAD was successful in creating the shape file, and it tells you the location and name of the new shape file:

```
Compilation successful.  Output file C:\Users\User Name\Documents\Arrow.
shx contains 309 bytes.
Shape "ARROW" created.
Use the SHAPE command to place shapes in your drawing.
```

To see how your shape came out, try the following. Here you'll learn how to load and insert a shape:

1. At the Command prompt, type **Load** ↵ to open the Select Shape File dialog box. This is a typical file open dialog box.
2. In the `My Documents` folder, locate the file `Arrow.shx` and click Open to load it.
3. Type **Shape** ↵.
4. At the `Enter shape name or [?]:` prompt, type **Arrow** ↵. If you've forgotten the name of a shape you're loading, you can enter a question mark (**?**) to see a listing of available shapes. Now the arrow follows the cursor as you move it across the drawing area.
5. At the `Specify insertion point:` prompt, click to the right of the original arrow.
6. At the `Specify height <1.0000>:` prompt, press ↵ to accept the default of 1.
7. At the `Specify rotation angle:` prompt, enter **45** ↵. The arrow appears at a 45° angle.

In many ways, a shape acts like a block, but you can't snap to any of its points. It's also less accurate than a block in its representation, although for some applications this may not be a great concern. Finally, you can't use complex shapes such as 3D objects for your shape; you can use only lines and arcs.

Still, you may find shapes useful in your application. As mentioned earlier, you can include shapes in linetype definitions. See "Creating Complex Linetypes" in Chapter 26, "Customizing Toolbars, Menus, Linetypes, and Hatch Patterns," for a description of how to create a linetype that includes shapes as part of the line.

Converting a Shape to a Block

You may also notice a tool that converts shapes into AutoCAD blocks. Choose Convert Shape To Block from the expanded Modify panel, and then select a shape. A prompt asks for a name for the block. You can accept the default name, which is the same name as the shape you're converting.

Attaching Data to Objects

This set of options is less likely to get as much use as the others you've looked at so far, so we've included a brief description of them here without going into too much detail. They're fairly easy to use, and you shouldn't have any trouble trying them. You can access both tools from the Tools panel:

Attach Xdata Lets you attach extended data to objects. Extended data is usually used only by AutoLISP or ARX applications. You're asked to select the object that will receive the data, and then you're asked for an application name that serves as a tag to tell others the name of the person to whom the data belongs. You can then select a data type. After this is done, you can enter your data.

List Object Xdata Displays extended data that has been attached to an object.

Web Panel Tools

AutoCAD enables you to add URL links to objects. This is a great feature that can help you link drawings to other types of data. The Express Web tools on the Web panel add some enhancements to the URL linking features of AutoCAD:

Show URLs Displays the URL link attached to an AutoCAD object.

Change URLs Lets you quickly edit an object's existing URL. You must attach a new URL to an object using the Hyperlink tool on the Data panel of the Insert tab.

Find And Replace URLs Replaces a set of existing URLs with a URL of your specification.

Tools You Won't Find on the Ribbon

In previous versions of AutoCAD, many of the Express tools could only be found in the menu bar under the Express menu. In AutoCAD 2017, many of those tools do not appear in the Ribbon, but you can still use them by entering their keyboard command names. You can also find these tools in the Express Tools menu if you enable the menu bar (click the Customize The Quick Access Toolbar flyout and select Show Menu Bar). The following section describes these tools along with the keyboard commands you'll need to use them.

Using File Management Tools

AutoCAD has always made extensive use of external files for its operation. Everything from fonts to keyboard shortcuts depends on external files. The Express File tools offer options to simplify a few file-related operations. You may find some of these tools, such as Save All Drawings and Close All Drawings, helpful on a daily basis. Others may be useful to know about, such as Edit Image when you need to edit an image. The following is a list of these tools:

Move Backup Files (Movebak) Lets you specify a location for AutoCAD BAK files for the current drawing session.

Convert PLT To DWG (Plt2dwg) Converts Hewlett-Packard Graphics Language (HPGL) plot files to drawing files. You must first set up AutoCAD or Windows for an HPGL plotter and then specify that HPGL plotter in the Plot Or Page Setup dialog box. You must also indicate that you want to plot to a file at the time you produce the plot (select the Plot To File check box in the Printer/Plotter group of the Plot dialog box).

Edit Image (Imageedit) Offers a quick way to open and edit an image file that has been inserted into an AutoCAD drawing. Type **Imageedit** ↵, and then select the image you want to edit. A File dialog box opens, showing the file in a list box. Click Open, and the program associated with the image file type will open the image file.

Redefine Path (Redir) Lets you redefine the path to external files that are referenced from the current drawing. This includes Xrefs, images, shapes, styles, and Rtext. You can strip a path from a referenced file by using the asterisk option (*) when you see the `Enter old directory (use '*' for all), or ? <options>:` prompt. When you see the `Replace "*" with:` prompt, press ↵. If you strip the path in this way, AutoCAD will use the support file search path specified in the Files tab of the Options dialog box. You can specify the type of external file you want to redefine by pressing ↵ at the first prompt to open the REDIRMODE dialog box. This dialog box contains a simple check box list of the types of support files whose path you want to redefine.

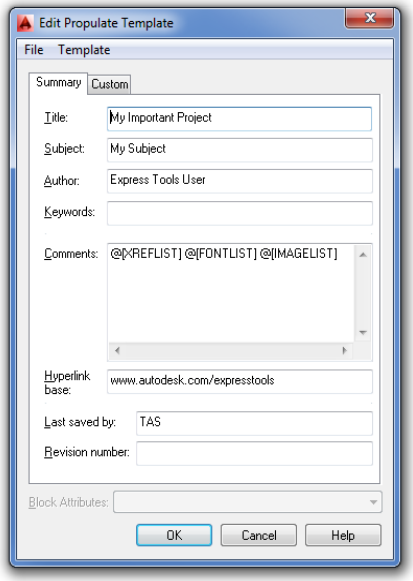
Update Drawing Property Data (Propulate) Drawing property data can be a handy feature of AutoCAD, but using it requires some discipline. (See Chapter 20, "Getting and Exchanging Data from Drawings," for more on drawing property data.) For one thing, the amount of data you must enter can be a bit daunting. The Update Drawing Property Data Express tool offers a way to let you add draw-

ing property data quickly by utilizing property data templates. Drawing property data is often the same for a set of drawings, so you can create a template and apply it to similar drawings in a set by using the Update Drawing Property Data tool.

To create a drawing property data template, type Propulate ↵. At the `Enter an option [Active template/Edit template/List/Remove/Update] <Update>:` prompt, enter E ↵ to open the Edit Propulate Template dialog box (see Figure BC1.16).

Fill in the data, click OK, and then choose Save As from the Application menu or the Quick Access toolbar. Use the Update option in the Update Drawing Property Data Command prompt to apply the template to a drawing or to a set of drawings in a folder.

FIGURE BC1.16
The Edit Propulate Template dialog box



Save All Drawings (Saveall) Saves all currently open files. The files remain open for additional editing.

Close All Drawings (Closeall) Closes all currently open drawings. AutoCAD remains open.

Quick Exit (Qquit) Closes all currently open drawings and exits AutoCAD. You're asked whether you want to save changes to each file before it's closed.

Revert To Original (Revert) Causes a drawing to revert to its last saved state. AutoCAD does this by closing the file without saving any changes (since the last Save) and then reopening the file.

Using Selection Tools

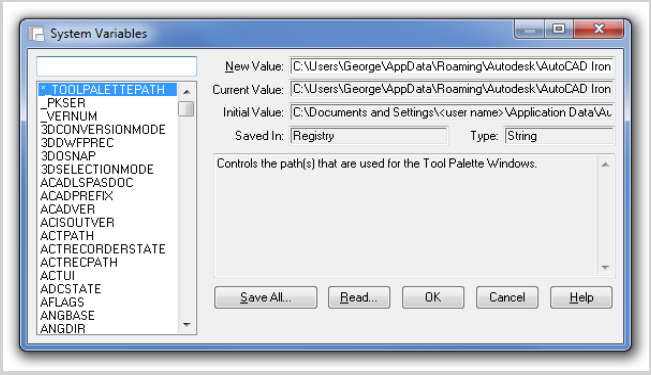
Sometimes it seems that there aren't enough selection tools available in AutoCAD. In Chapter 2, "Creating Your First Drawing," you learned about the various methods you can use to select groups of objects (thereby building a *selection set*, which is a set of objects selected for an operation such as a move or copy). The Express tools offer a few more ways to select objects.

The Get Selection Set tool (Getsel) sets up a selection set based on layers or types of objects. When you type **Getsel** ↵ , you're prompted to select an object whose layer contains all the objects you want to select. You can press ↵ to create a selection set of all the objects in the drawing. Next, you're prompted to select an object of the type you want. If you press ↵ at the first prompt and then select a line at the second prompt, all the lines in the drawing will be included in a new selection set. You won't see anything happen on the screen, but the next time you use a command that asks you to select objects, you can enter **P** ↵ to select the lines.

Another selection tool is Fast Select (Fastsel). When you type **Fastsel** ↵ in the Command prompt, you're prompted to select an object. After you do so, the object you select plus any object touching it will be selected.

Controlling and Saving System Variable Settings

With the menu bar open, you can choose Express α Tools α System Variable Editor or enter **Sysvdlg**↵ to open the System Variables dialog box. This dialog box gives you control over system variables, which are settings that control nearly all of the options you find in AutoCAD.



The System Variables dialog box can help you understand what a system variable does by giving you a description in a text panel. You can change the value of system variables, and perhaps more important, you can save settings to an external file using the Save All button. This opens a Save As dialog box that allows you to determine the location and name of your file. AutoCAD adds the `.svf` filename extension. You can later retrieve system variable settings using the Read button. This can be helpful if you are switching from one PC to another and you want to make sure your AutoCAD settings are the same on the next PC you use.

In addition, you can use the System Variables dialog box to restore all of the default system variable settings. To do this, open the System Variables dialog box and click Read. Using the Open dialog box, navigate to the `Express` folder, typically found in the `C:\Program Files\Autodesk\AutoCAD 2017\` folder, and select the `defaults.svf` file. This contains the default system variable settings. AutoCAD may take a few seconds to load the file. When finished, click OK.

Putting AutoLISP to Work

Most high-end CAD packages offer a macro or programming language to help users customize their systems. AutoCAD has *AutoLISP*, which is a pared-down version of the popular LISP artificial intelligence language.

Don't let AutoLISP scare you. In many ways, an AutoLISP program is just a set of AutoCAD commands that help you build your own features. The only difference is that you have to follow a different set of rules when using AutoLISP. But this isn't so unusual. After all, you had to learn some basic rules about using AutoCAD commands too—how to start commands, for instance, and how to use command options.

If the thought of using AutoLISP is a little intimidating, bear in mind that you don't need substantial computer knowledge to use this tool. In the following sections, you'll see how to get AutoLISP to help out in your everyday editing tasks without having to learn the entire programming language.

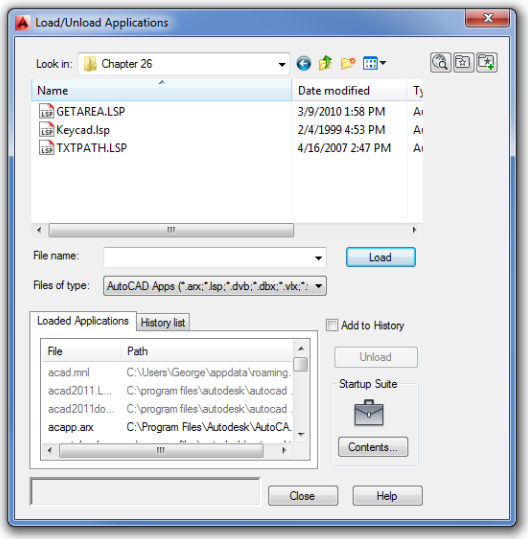
Loading and Running an AutoLISP Program

Many AutoCAD users have discovered the usefulness of AutoLISP through the thousands of free AutoLISP utilities that are available from websites and online services. It's common for users to maintain a toolbox of their favorite utilities. But before you can use these utilities, you need to know how to load them into AutoCAD. In the following exercise, you'll load and use a sample AutoLISP utility:

1. Start AutoCAD, and open the `BC1-unit.dwg` file.
2. 

Click the Load Application tool in the Manage tab's Applications panel to open the Load/Unload Applications dialog box (see Figure BC1.17).
3. Locate and select the `GETAREA.LSP` file that is included with the Bonus Chapter 1 sample files.
4. Click the Load button. The message `GETAREA.LSP successfully loaded` appears in the message box at the bottom of the dialog box. If you scroll down the list in the Loaded Applications tab, you also see `GETAREA.lsp` listed there, which tells you that it's loaded.

FIGURE BC1.17
The Load/Unload Applications dialog box



5. Click Close to close the Load/Unload Applications dialog box.
6. Enter **getarea** ↵ .
7. At the `Pick point inside area to be calculated:` prompt, click inside the unit plan.
8. At the `Select location for area note:` prompt, pick a point just above the door to the balcony.
9. At the `Select location for area note:` prompt, click to place the area note. A label appears, displaying the area of the room in square feet.

You've just loaded and used an AutoLISP utility. As you saw in the Load/Unload Applications dialog box, you can load and try several other utilities. Next, you'll look more closely at the Load/Unload Applications dialog box.

Managing Your AutoLISP Library

The Load/Unload Applications dialog box gives you plenty of flexibility in managing your favorite AutoLISP utilities. You can also manage your ARX applications. As you saw in the previous exercise, you can easily find and select utilities by using this dialog box. If you often use a custom application, you can include it in the History List tab of the Load/Unload Applications dialog box, as you'll see in the following steps:

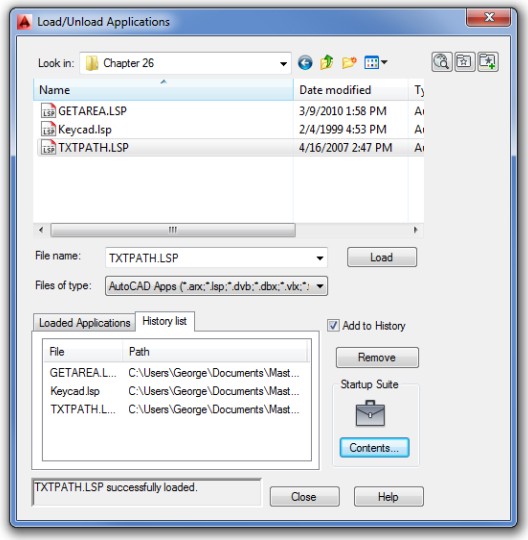
1. Click the Load Application tool in the Manage tab's Applications panel to open the Load/Unload Applications dialog box.
2. Select the Add To History check box.
3. Click the History List tab.
4. Select `GETAREA.LSP` from the list of applications at the top of the dialog box.

5. Click Load. `GETAREA.LSP` now appears in the History List tab (see Figure BC1.18).

6. Click Close to close the Load/Unload Applications dialog box.

Now when you exit AutoCAD, the dialog box retains the name of the `GETAREA.LSP` utility in the History List tab. When you want to load `GETAREA.LSP` in a future session, you won't have to hunt it down. You can highlight it in the History List tab and then load it from there. You can add as many items as you want to your History List tab or remove items by highlighting them and clicking the Remove button. The History List tab works with all types of applications that AutoCAD supports.

FIGURE BC1.18
The utility now shows up in the list.



Loading AutoLISP Programs Automatically

As you start to build a library of AutoLISP applications, you may find that you use some of them all the time. You can set up AutoCAD to load your favorite applications automatically. To do this, you use the Startup Suite in the Load/Unload Applications dialog box:

1. Choose Load Application in the Manage tab's Applications panel to open the Load/Unload Applications dialog box.
2. Click the Contents button or the suitcase icon in the Startup Suite group to open the Startup Suite dialog box. This dialog box contains a list box that shows any applications that are to be started whenever AutoCAD starts. You add applications with the Add button at the bottom. If there are applications in the list, you can use the Remove button to remove them.
3. Click the Add button to open the Add File To Startup Suite dialog box. This is a typical file open dialog box that enables you to search for and select a file.
4. Locate and select the `GETAREA.LSP` file in the `Bonus Chapter 1` folder and click Open. The Startup Suite dialog box reappears and `GETAREA.LSP` is listed.
5. Click Close, and then click Close again in the Load/Unload Applications dialog box.

From now on, `GETAREA.LSP` will be loaded automatically whenever you start AutoCAD. You can add several files to the Startup Suite list.

Creating Keyboard Macros with AutoLISP

You can write simple AutoLISP programs of your own that create what are called keyboard macros. *Macros*—like script files—are strings of predefined keyboard entries. They're invaluable for shortcuts to commands and options you use frequently. For example, you might often use the Break command to break an object at a single point while editing a particular drawing. Here's a way you can turn this operation into a macro:

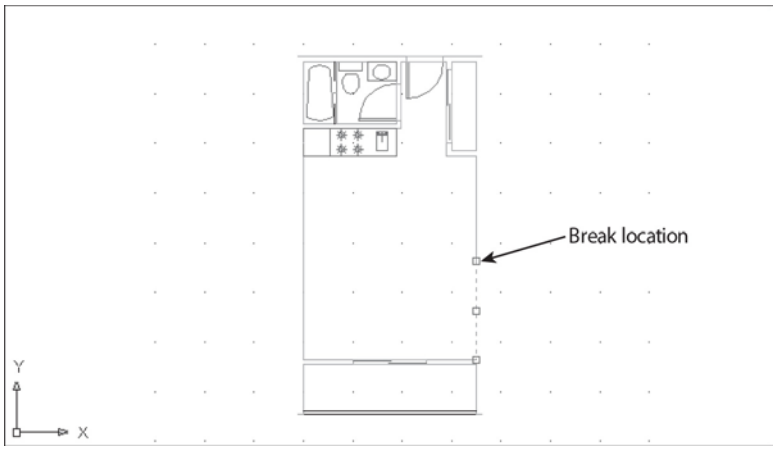
1. Close the `BC1-unit.dwg` file without saving it, and then open it again and enter the following text at the Command prompt. Be sure you enter the line exactly as shown here. If you make a mistake while entering this line, you can use the I-beam cursor or arrow keys to go to the location of your error to fix it:

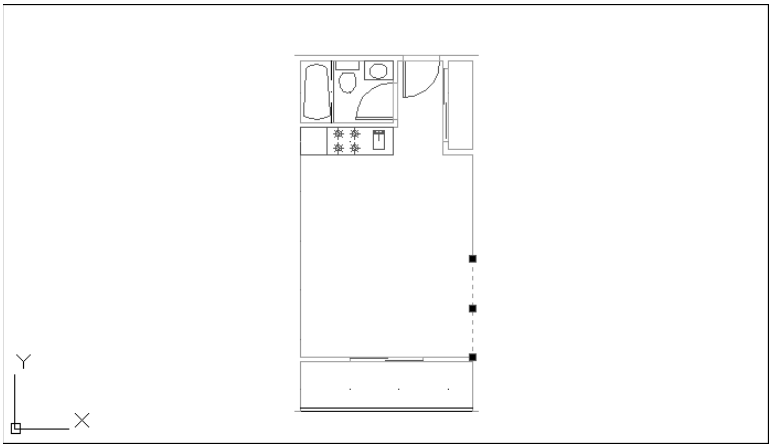
   ```
   (defun C:breakat () (command "break" pause "f" pause "@"))↵
   ```

2. Enter **breakat ↵** at the Command prompt. The Break command starts, and you're prompted to select an object.
3. Click the wall on the right side of the unit.
4. At the `Specify first break point:` prompt, click a point on the wall where you want to create a break, and make sure osnaps are turned off.
5. To see the result of the break, click the wall again. It's been split into two lines, as shown in Figure BC1.19.

You've just written and run your first AutoLISP macro! Let's take a closer look at this simple program (see Figure BC1.20). It starts with an opening parenthesis, as do all AutoLISP programs, followed by the word `defun`. `defun` is an AutoLISP function that lets you create commands; it's followed by the name you want to give the command (`breakat`, in this case). The command name is preceded by `C:`, telling `defun` to make this command accessible from the Command prompt. If the `C:` were omitted, you would have to start `breakat` by using parentheses, as in `(breakat)`.

FIGURE BC1.19
With the grips exposed, you can see that the wall is split into two lines.





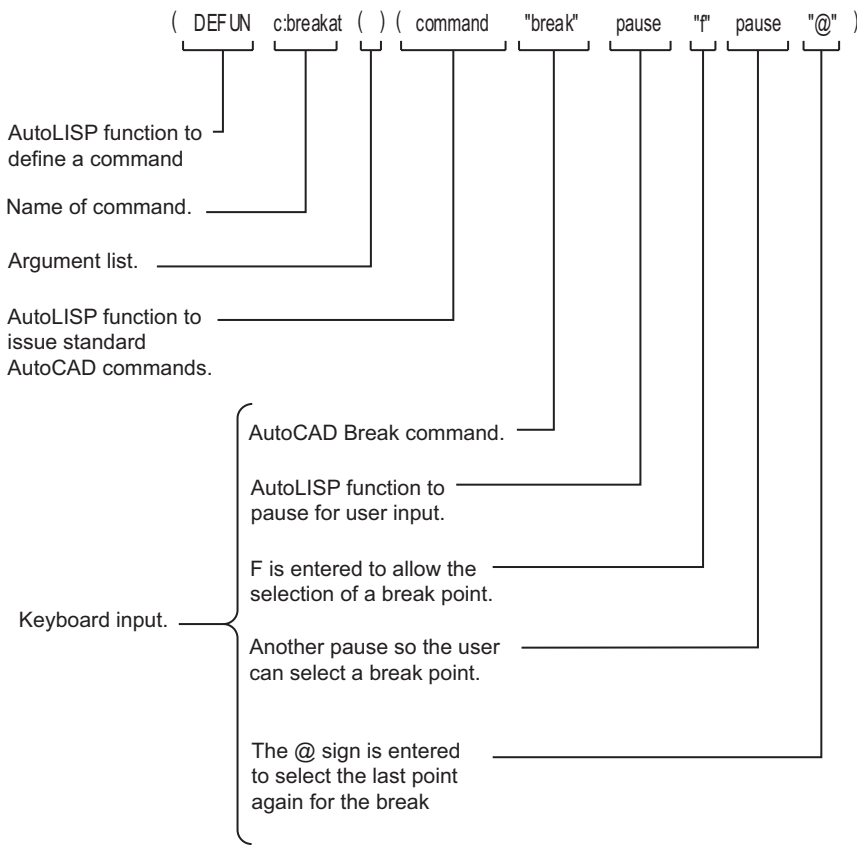


FIGURE BC1.20
Breakdown of the `Breakat` macro

After the command name is a set of opening and closing parentheses. This set encloses what is called the *argument list.* The details aren't important; just be aware that these parentheses must follow the command name.

Finally, a list of words follows enclosed by another set of parentheses. This list starts with the word `command`. `command` is an AutoLISP function that tells AutoLISP that whatever follows should be entered just like regular keyboard input. Only one item in the `Breakat` macro—the word `pause`—isn't part of the keyboard input series. `pause` is an AutoLISP function that tells AutoLISP to pause for input. In this particular macro, AutoLISP pauses to let you pick an object to break and the location for the break.

Most of the items in the macro are enclosed in quotation marks. Literal keyboard input must be enclosed in quotation marks this way. The `pause` function, on the other hand, doesn't require quotation marks because it's a proper function, one that AutoLISP can recognize.

The program ends with a closing parenthesis. All parentheses in an AutoLISP program must be in balanced pairs, so these final two parentheses close the opening parenthesis at the start of the `command` function as well as the opening parenthesis back at the beginning of the `defun` function.

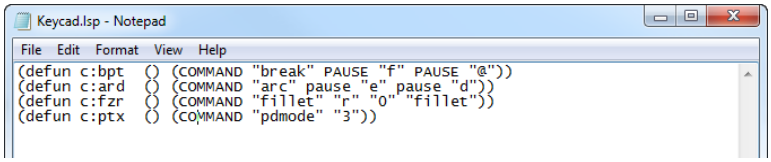
Your Portable Toolkit

We've mentioned in earlier chapters that AutoCAD users tend to be quite attached to their keyboard shortcuts. One of the most popular methods we've seen for transporting keyboard shortcuts is to store them in an AutoLISP file that can be easily installed on a PC. An AutoLISP file is compact and easily stored in a USB flash drive or media player. If you use this method, just make sure your IT manager is okay with it.

Storing AutoLISP Macros as Files

When you create a program at the Command prompt, as you did with the `Breakat` macro, AutoCAD remembers it only until you exit the current file. Unless you want to re-create this macro the next time you use AutoCAD, save it by copying it into an ASCII text file with an `.lsp` filename extension using the Windows Notepad application. Figure BC1.21 shows a file named `Keycad.lsp`, which contains the saved `Breakat` macro along with some other macros we use often.

FIGURE BC1.21
The contents of `Keycad.lsp`



The other macros are commands that include optional responses. For example, the third item, `defun c:fzr`, causes AutoCAD to start the Fillet command, enter an **R** ↵ to issue the Radius option, and finally enter **0** for the fillet radius. Use the Windows Notepad application and enter the macros listed in Figure BC1.21. Give this file the name **`Keycad.lsp`**, and be sure you save it as an ASCII file. Then, whenever you want to use these macros, you don't have to load each one individually. Instead, you load the `Keycad.lsp` file the first time you want to use one of the macros, and they're all available for the rest of the session.

After the file is loaded, you can use any of the macros in it by entering the macro name. For example, entering **ptx** ↵ sets the point style to the shape of an X.

Macros loaded in this manner are available to you until you exit AutoCAD. Of course, you can have these macros loaded automatically every time you start AutoCAD by including the `Keycad.lsp` file in the Startup Suite of the Load/Unload Applications dialog box. That way, you don't have to remember to load it in order to use the macros.

Now that you have some firsthand experience with AutoLISP, we hope these examples will encourage you to try learning more about this powerful tool.