Organizing Drawings with Layers, Colors, Linetypes, and Lineweights

Until now, you have drawn everything in black or white. Drawing everything in one color is not a very good way to draw—besides, it's boring! If everything is the same color, it's hard to distinguish the various elements of a drawing. If you've followed the exercises throughout this book, you've opened some drawings from the CD-ROM that used various colors and linetypes (such as dashed lines). For example, in some of the architectural drawings, you may have noticed that the walls are a different color than the fixtures (refrigerator, sink, and so on) in the kitchen. When you start to create text and dimensions, covered in Chapters 13, 14, and 15, you will almost always use a color that stands out from the main model you're drawing. You can also create objects with varying widths, called *lineweights*. This use of color, linetype, and lineweight helps to organize your drawings, making them easier to understand.

In AutoCAD and AutoCAD LT, black and white are the same color. If you use the default background of black, the default color is white. If you change the background to white, the same objects appear as black.

Most often, you assign color, linetype, and lineweight to a layer. A layer is simply an organizational tool that lets you organize the display of objects in your drawing. Every object must have a layer, and every layer must have a color, a linetype, and a lineweight. You define layers that meet your drawing needs. Layers, colors, linetypes, and lineweights are called *object properties*. You can easily change any object's properties. This chapter explains how to create and change these object properties to organize your drawing.



In This Chapter

Organizing your drawing

Working with layers

Changing object color, linetype, and lineweight

Working with linetype scales

Importing layers and linetypes from other drawings

Matching properties

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Working with Layers

The best way to organize your drawing into colors, linetypes, and lineweights is to use layers. Layers offer powerful features that enable you to distinguish all the various elements of your drawing. In an architectural drawing, for example, common layers are walls, doors, windows, plumbing, electrical, fixtures, structural elements, notes (text), dimensions, and so on. Mechanical drawings might use center, hidden, hatch, object, and title block layers. Each discipline has its own conventions, and you might have specific conventions where you work.

Creating layers is an important part of setting up a drawing, in addition to the setup features covered in Chapter 5. Layers should be created and saved in your templates so that they're available to you when you start to draw.

Layers give you many ways to organize your drawing. For example, you can

- ♦ Assign different colors, linetypes, and lineweights to layers.
- ★ Assign the various colors to different pens in a pen plotter, resulting in a drawing with varying colors or line widths.
- Control the visibility of layers. Making a layer invisible lets you focus on just the objects that you need to draw or edit.
- ✦ Control which objects are plotted.
- ♦ Lock a layer so that objects on that layer cannot be edited.



You can also assign a plot style to a layer. A *plot style* is a group of settings that affects how your drawing is plotted. Chapter 17 covers plot styles.

Understanding layers

Besides having a color, linetype, and lineweight, every layer must have a name. All drawings come with a default layer, called layer 0 (zero). Its color is Black/white, its linetype is Continuous, and its lineweight is Default. (The lineweight for Default is 0.010 inch or 0.25 mm.) All the exercises in this book up to this point have used layer 0. To create a new layer, you must give it a name, a color, a linetype, and a lineweight. You can then start drawing on that layer.

Layers also have four *states*. These states control visibility, regeneration, editability, and plottability of layers:

- ♦ On/Off: On layers (the default) are visible. Off layers are invisible and are regenerated with the drawing.
- Thawed/Frozen: Thawed layers (the default) are visible. Frozen layers are invisible and are not regenerated with the drawing. However, when you thaw a frozen layer, the drawing regenerates. If you have floating viewports (covered in Chapter 17), you can also freeze a layer just in the current viewport, or only for new viewports that you create.
- ◆ Unlocked/Locked: Unlocked layers (the default) are visible and editable. Locked layers are visible but cannot be edited.
- ◆ Plottable/Not Plottable: Plottable layers are plotted. Not plottable layers are not plotted. This setting affects only layers that are on or thawed because off and frozen layers are not plotted anyway.

Creating new layers

To create a new layer, choose Layer Properties Manager from the Layers toolbar. The Layer Properties Manager dialog box opens, as shown in Figure 11-1. From this point on, I'll just call this dialog box, the Layer Properties Manager. This dialog box lists all current layers and their properties. You can also create new layers and modify current ones. The left panel allows you to filter the list of layers. For more information, see "Filtering the layer list" later in this chapter.

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Figure 11-1: The Layer Properties Manager is the place to manage all your layers.

Table 11-1 explains the columns in the dialog box. For a description of the icons in most of the columns, see Table 11-2.

Column Name	Description
Status	Shows the status of each layer.
	Used layer.
	Unused layer.
	Current layer.
Name	Shows the name of the layer. To change the layer, click once to display a border and click again to type a new name.
On	Shows the current on/off state of a layer. Click to turn the layer on or off.
Freeze	Shows the current freeze/thaw state of a layer. Click to freeze or thaw a layer.
Lock	Shows the current locked/unlocked state of a layer. Click to lock or unlock a layer.
Color	Shows the current color of the layer. Click to change the color.

Table 11-1: Columns in the Layer Properties Manager

Continued

Column Name	Description		
Linetype	Shows the current linetype of the layer. Click to change the linetype.		
Lineweight	Shows the current lineweight of the layer. Click to choose a new lineweight.		
Plot Style	Shows the current plot style of the layer. Click to select a new plot style. (Chapter 17 covers plot styles).		
Plot	Shows the current plottable/not plottable state of the layer. Click to make the layer plottable or not plottable.		
Current VP Freeze	Shows the freeze/thaw state of the layer in the current floating viewport. Click to freeze or thaw the layer in active floating viewports. This column is displayed only if you have floating viewports and a layout tab is active. (Chapter 17 covers floating viewports.)		
New VP Freeze	Shows the current freeze/thaw state of the layer in new floating viewports that you create. Click to freeze or thaw the layer in new viewports. This column is displayed only if you have floating viewports and a plot layout is active. (Chapter 17 covers floating viewports.)		
Description	Provides a place to enter a description of a layer.		

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To adjust the display in the Layer Properties Manager, you can do the following:

- Change the width of any column in the Layer Properties Manager by placing the cursor over the line dividing two column headings and dragging.
- ◆ Double-click the line dividing two columns to minimize the column width.
- Click any column head to sort the layers by that column. Click again to sort in the
 opposite order.
- ♦ Resize the entire dialog box by dragging on any side.

Naming the layer

Click the New Layer icon. A new layer appears, named Layer1, as shown in Figure 11-2. The name is highlighted so that you can immediately type in a new name for the layer. Press Enter after you type the name.

Tip

To create several new layers at once, click New and type all the layer names you want, separated by commas. Press Enter after the last layer that you want. If you want a new layer to have the same color and/or linetype as an existing layer – which is very common – choose that existing layer and click New. The new layer inherits the properties of the selected layer. You can then make any changes you want.

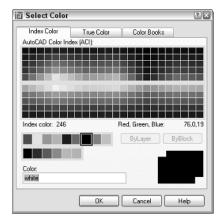
Layer names can be up to 255 characters long and may include spaces. Layer names retain the uppercase/lowercase characters that you type. Layer names may not include the following symbols: $\langle \rangle / \rangle$ "; ? * | , `.

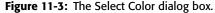
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) 🔳 white Continuous		
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Figure 11-2: The new layer appears as Layer1 and is highlighted so that you can enter the new layer name.

Assigning a color

To change the default color, move the cursor to the color box in the same row as the new layer. Click to open the Select Color dialog box, as shown in Figure 11-3 with the Index Color tab displayed. (The AutoCAD LT Select Color dialog box doesn't have any other tabs.)





Click the color that you want. At the bottom of the dialog box, the color's name or number appears along with a sample of the color. Click OK to close the dialog box and return to the Layer Properties Manager.

Note that the Index Color tab offers you a choice of standard colors, gray shades, and a fuller palette of colors. The standard colors are the original colors that AutoCAD (and then AutoCAD LT) offered, and they're the ones most often used, even today. Their advantage is that each color is easily distinguishable from the others. These colors have both a name and a number, whereas other colors have only a number (an *index*). The standard colors are red (1), yellow (2), green (3), cyan (4), blue (5), magenta (6), and white (7).

You have the choice of using many different colors for the background color of a drawing, but commonly it is a black or a white screen. The default screen is black and the default color for 7 is white. When you work on a white screen, the default color for 7 appears black, but it is still called white. Therefore, if you choose the black color tile in the Select Color dialog box, the color is listed as white. To change the screen color, choose Tools r Options r Display r Colors.



AutoCAD offers two other tabs in the Select Color dialog box. The True Color tab lets you define any color and the Color Books tab lets you use special files that define colors.

Installing color books

You can install additional color books. Color book files must have an .acb file extension. In addition to Pantone color books, you may be able to find DIC or RAL color specification files.

The default location for color books is in the Support\Color subfolder of your AutoCAD 2005 program folder. If you copy color-book files there, you can find them on the Color Books tab of the Select Color dialog box. Another default location is in the Documents and Settings\username\Application Data\AutoCAD 2005\R16.0\enu\Support\Color folder. You use this folder for color books that you install. To use color books from another location, follow these steps:

- 1. Choose Tools ↔ Options to open the Options dialog box.
- Choose the Files tab.
- 3. Double-click the Color Book Locations item.
- 4. Click Add and then click Browse. Locate the color book file and click OK.

If you have the Select Color dialog box open while you copy a new color-book file to a location, close the dialog box and re-open it to access the new colors.

For more color choices, click the True Color tab, shown in Figure 11-4.

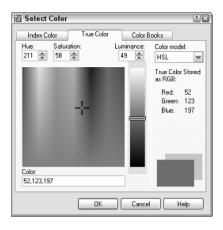


Figure 11-4: The True Color tab of the Select Color dialog box offers a more precise way to define color.

To define a color, first choose the color model from the Color Model drop-down list. You have two choices:

- ✦ HSL (Hue, Saturation, Luminance): Hue is the actual wavelength of light that defines the color. Saturation is the purity or intensity of the color. Luminance is the brightness of the color.
- ◆ RGB (Red, Green, Blue): Defines a color according to the intensity of red, green, and blue in the color.

If you choose the HSL color model, specify the color as follows:

- 1. Specify the hue by dragging the crosshairs horizontally across the colors or type a value from 0° to 360° in the Hue text box.
- **2.** Specify the saturation by dragging the crosshairs vertically over the colors or type a value from 0% to 100% in the Saturation text box.
- **3.** Specify the luminance by dragging the bar on the color slider or type a value from 0% to 100% in the Luminance text box.

Note

When you define a color using the HSL color model, you also see the RGB values displayed in the Select Color dialog box.

If you choose the RGB color model, specify the red color by dragging the color bar or type a value from 1 to 255 in the Red text box. Do the same for the green and blue color values.

You can also choose a color using the Color Books tab, shown in Figure 11-5.

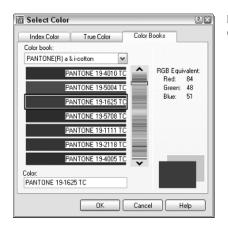


Figure 11-5: The Color Books tab of the Select Color dialog box.

The Color Books tab of the Select Color dialog box displays colors in *color books*. Color books are files that define colors. AutoCAD includes several Pantone color books. Pantone is a commonly used system of matching colors often used for printing on paper and fabric.

To use a color from a color book, follow these steps:

- 1. On the Color Books tab of the Select Color dialog box, choose a color book from the Color Book drop-down list.
- **2.** Drag the color slider or use the up and down arrows to choose a "page" of the color book. On the left, you see the colors for that page. A page can hold up to ten colors.
- 3. Choose one of the colors on the left side of the dialog box.
- 4. Click OK.

Assigning a linetype

The default linetype is a continuous line, but you can also use many other linetypes, which are repeating patterns of dashes and/or dots and spaces. Linetypes can also include text and shapes. Linetypes are covered more fully later in this chapter.

To change the default linetype, move the cursor to the linetype in the new layer's row. Click to open the Select Linetype dialog box, as shown in Figure 11-6.

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.oaded linetypes Linetype	Appearance	Description	
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			- C.
ОК	Cancel L	.oad Help	

Figure 11-6: The Select Linetype dialog box as it appears before you have loaded any linetypes.

If the linetype that you want appears on the list, click the linetype and choose OK to close the dialog box. If the linetype does not appear, you need to load the linetype. Click Load to open the Load or Reload Linetypes dialog box, shown in Figure 11-7.

Linetypes are stored in text (or ASCII) files with the filename extension .lin. The standard linetypes are stored in acad.lin in AutoCAD and in aclt.lin in AutoCAD LT. You can create your own linetypes and store them in acad.lin or aclt.lin. You can also store them in another file that you create with the extension .lin. Click File at the top of the dialog box if you want to load a linetype from a file that you created. Choose the linetype that you want to load and click Open.

🛅 Load or Reload Line	types	? ×
File acad.lin		
Available Linetypes		
Linetype	Description	^
ACAD_IS002w100	ISO dash	
ACAD_IS003W100	ISO dash space	
ACAD_IS004W100	ISO long-dash dot	
ACAD_IS005w100	ISO long-dash double-dot	
ACAD_IS006W100	ISO long-dash triple-dot	
ACAD_IS007w100	ISO dot	
ACAD_IS008w100	ISO long-dash short-dash	
ACAD_IS009w100	ISO long-dash double-short-dash	_
ACAD_IS010W100	ISO dash dot	
ACAD IS011W100	ISO double-dash dot	~
<	111	>
OK	Cancel Help	

Figure 11-7: The Load or Reload Linetypes dialog box.



See Chapter 31 for a full discussion of creating your own linetypes.

To choose a range of linetypes to load, click the first linetype in the range, press Shift, and click the last linetype in the range. To choose more than one noncontiguous linetype, press Ctrl for each additional linetype you choose. To select all or clear all of the linetypes, right-click in the dialog box and choose the desired option from the shortcut menu.

As soon as you load a linetype and click OK, you return to the Select Linetype dialog box. The loaded linetype now appears on the list. Choose it and click OK. You're now back in the Layer Properties Manager dialog box.

Assigning a lineweight

A lineweight assigns a width to a line. When you give a layer a lineweight, every object on that layer has the same lineweight. A lineweight can help to distinguish various elements of your drawing, both on-screen and on paper. For example, you could use a thicker lineweight to indicate planned construction changes, for dimension lines, or to represent the true width of an object. The LWT button on the status bar turns on and off the display of lineweights. By default, LWT is off.

To set a lineweight for a layer, click the Lineweight column of that layer to open the Lineweight dialog box, shown in Figure 11-8. Choose a lineweight and click OK.

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0.13 mm	
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0.20 mm	
0.25 mm	
0.30 mm	
0.35 mm	~
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Original: Default	
New: Default	
OK Cancel Hel;	

Figure 11-8: When you click the Lineweight column of the Layer Properties Manager, the Lineweight dialog box opens so that you can choose a lineweight.

Lineweights have the following features:

- ◆ The default lineweight value for layers and objects is called DEFAULT, which has a value of 0.010 inch or 0.25 mm.
- ♦ On the Model tab, where you draw, lineweights are displayed in relation to pixels, the unit of measurement for computer screens. A lineweight of 0 is displayed with a width of one pixel. Wider lineweights are calculated proportionally to the actual width of the lineweight. The lineweight display on the Model tab does not change as you zoom in or out.

- On Layout tabs (covered in Chapter 17), lineweights are displayed in real-world units as they will be plotted. Lineweights act like other objects in your drawing and look bigger or smaller as you zoom in and out.
- ◆ By default, lineweights are measured in millimeters. You can format lineweights by choosing Format ⇔ Lineweight. The Lineweight Settings dialog box opens, shown in Figure 11-9. The Lineweights section lists available lineweights. Choose a default lineweight from the Default drop-down list. The default is 0.01 inch or 0.25 mm. The Adjust Display Scale slider determines how lineweights are displayed on the Model tab. Adjust this setting if you use several closely related lineweights but can't distinguish them on your screen. The Display Lineweight check box turns the display of lineweights on and off. (See the next bullet for an easier way to do this.)
- ◆ You can turn the display of lineweights on and off just click the LWT button on the status bar.

If you don't want to use lineweights, you can just ignore them and display every object using the default lineweight.

🛅 Lineweight Settings		? ×
Lineweights ByLayer ByBlock ByBlock Default 0.00 mm 0.05 mm 0.09 mm 0.13 mm	Units for Listing Millimeters (mm) Inches (in) Display Lineweight Default - 0.25 mm Adjust Display Scale Min N	Y fax
Current Lineweight By	Layer	
ОК	Cancel Help	

Figure 11-9: The Lineweight Settings dialog box lets you format how lineweights are measured and displayed.

After you've set your new layer's color, linetype, and lineweight in the Layer Property Manager, you're ready to use the layer. You can click Apply after any change to apply the change without closing the dialog box. Click OK to close the Layer Properties Manager.



The drawing used in the following Step-by-Step exercise on creating layers, ab11-a.dwg, is in the Drawings folder on the CD-ROM.

STEP-BY-STEP: Creating a New Layer

- 1. Open ab11-a.dwg from the CD-ROM.
- 2. Save the file as ab11-01.dwg in your AutoCAD Bible folder.
- **3.** Schoose Layer Properties Manager from the Layers toolbar to open the Layer Properties Manager.
- 4. Click the New Layer icon. A new layer named Layer1 appears, highlighted. Type **Walls** \dashv as the name for the new layer.

- **5.** Click the color square in the Color column to open the Select Color dialog box. Choose the blue square from the Standard Colors and click OK.
- 6. Choose the New Layer icon again to create another new layer. Type Hidden
- 7. Click the color square in the Color column to open the Select Color dialog box.
- 8. If you have AutoCAD, do the following:

In the Select Color dialog box, click the True Color tab. From the Color Model drop-down list, choose RGB. In the Color text box, type **141, 218, 189.** Press Tab. You should see a teal (blue-green) color. Click OK.

If you have AutoCAD LT, do the following:

Find Index Color 121 (a teal color) and click. Then click OK.

- **9.** In the main layer listing, click Continuous in the same row as the Hidden layer to open the Select Linetype dialog box. Click Load to open the Load or Reload Linetypes dialog box. Scroll down until you see the HIDDEN linetype. Choose it and click OK. In the Select Linetype dialog box, choose HIDDEN and click OK.
- **10.** Click the Description column for the Hidden layer. Click again so that a text cursor appears. Type **teal**, **hidden lines** *⊢*.
- 11. Click OK to close the Layer Properties Manager.
- **12.** Click the Layer Control drop-down box on the Layers toolbar to see the two layers you just created listed there. Click again to close the box.
- **13.** Save your drawing.

Using layers

To use a layer you have just created, click the Set Current icon in the Layer Properties Manager or double-click the layer's name. Then click OK to return to your drawing. Objects you create now are drawn on that layer and display with the layer's color, linetype, and lineweight. (The lineweight only shows if the LWT button on the status bar is on.)

All objects that you draw go on the current layer. After you have the layers you need, you need to switch from layer to layer as you draw. You can continue to choose Layers in the Layer Properties Manager, click the name of a layer, click Set Current, and then click OK. But there is an easier way — the Layer Control drop-down list on the Layers toolbar, shown in Figure 11-10.

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Figure 11-10: The Layer Control drop-down list.

The Layer Control drop-down list has two display modes:

- ✦ If no object is selected, it displays the current layer.
- ♦ If one or more objects are selected, it displays the layer of the selected object(s).

To check the current layer, make sure no object is selected. If necessary, press Esc to deselect any objects.

Note

When objects on varying layers are selected, the Layer Control list goes blank, indicating that more than one layer is included in the selection.

To open the Layer Control drop-down list, click its arrow. You see a list of all your layers, including their states and colors. Pass the mouse over the items, and a tooltip tells you what they mean. The Layer Control drop-down list has three functions:

- ◆ It switches the current layer so that you can draw on a new layer.
- It changes the following states of any specific layer on the list:
 - On/Off
 - · Frozen/Thawed
 - Frozen in Current Viewport/Thawed in Current Viewport
 - Locked/Unlocked
- ✦ It changes the layer of a selected object.

Take the time to learn how to use this drop-down list; it can save you a great deal of time. To change other states of a layer (such as plottable/not plottable), click Layers Properties Manager on the Layers toolbar to open the Layer Properties Manager.

Switching the current layer

To switch the current layer, make sure that no object is currently selected, click the Layer Control drop-down list arrow and click the name of the layer that you want to be current. Be careful to click only the name — otherwise, you may change the layer's state. You may need to press Esc first to deselect all objects. After you click a new layer name, the drop-down list automatically closes.

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On	y

The Layer Previous button on the Layers toolbar switches you to the last layer you used. Click it another time and you're in the layer before that. Use Layer Previous as a shortcut to finding and choosing the last layer you used on the Layer Control drop-down list.

Changing a layer's state

After you create a layer, you can manage that layer — and all the objects on that layer — by changing its states. You can change some layer states through the Layer Control drop-down list; others must be changed in the Layer Properties Manager. The layer states each have different properties and uses:

◆ On/Off: Turn layers off when objects on those layers interfere with the drawing process. For example, if you want to edit only objects on your Object layer, but objects exist on other layers nearby, you can turn off the other layers and easily select the objects on the Object layer with a window. Then turn the other layers back on. The on/off state is available on the Layer Control drop-down list.

- Thaw/Freeze: You can freeze layers for reasons similar to those that lead you to turn off layers. In general, freeze layers when you want to work without those layers for a longer period of time. The thawed/frozen state is available on the Layer Control dropdown list.
- Thaw/Freeze in Current Viewport: You may want to freeze or thaw layers in some floating viewports but not in others. For example, you may want to display dimensions in one viewport but not in others; to do so, freeze your dimensions layer in all the viewports except one. You can change this state on the Layer Control drop-down list if you're working on a layout. You can also click the Current Viewport Freeze icon in the Layer Properties Manager.
- Thaw/Freeze in New Viewports: You can also freeze or thaw layers in future viewports that you create. For example, after you display dimensions or text in one viewport, you may want to make sure they won't appear in any new viewports that you create. This state is available in the New Viewport Freeze column of the Layer Properties Manager.



See Chapter 17 for an explanation of floating viewports and layouts.

- Unlock/Lock: Lock a layer when you want to ensure that objects on that layer are not changed. You can still use objects on locked layers for reference (for example, you can use their object snaps). Click the lock/unlock icon on the Layer Control drop-down list.
- ◆ Plot/No Plot: Make a layer not plottable when you want to create reference text or revision marks on your drawing but don't want to plot them. Another example: If you have a drawing that contains both actual and planned structures, you could plot showing only the actual structures. Being able to change a layer's plottable state makes it possible for you to create variations on your drawing, perhaps for different users, such as electricians, plumbers, and roofers. The plot/no plot state is available in the Plot column of the Layer Properties Manager.

Both the off and frozen states make layers invisible. The purpose of frozen and thawed layer states is to reduce regeneration time – and that's the main difference between On/Off and Thawed/Frozen layer visibility options. However, today's computers are faster, and recent releases of the software have reduced the need for regeneration. Also, remember that thawing a layer causes a regeneration, whereas turning a layer back on only causes a redraw. As a result, you might actually save a regeneration by using On/Off instead of Thawed/Frozen.

Click any of the state icons to toggle a layer's state. For example, if you want to freeze a layer, click its sun and it switches to a snowflake. Table 11-2 shows the icons for each state.

Table 11-2: Layer State Icons				
State	lcon	State	Icon	
On	Ŷ	Off	9	
Thawed (in all viewports)	Q	Frozen (in all viewports)	0	
Thawed (in current viewport)	(O)	Frozen (in current viewport)	\$	

Tip

Continued

Table 11-2 (continued)				
State	Icon	State	Icon	
Thawed (in new viewports)	Q	Frozen (in new viewports)	®1	
Unlocked	73	Locked	B	
Plottable	2	Not plottable	Z	

When you change a layer's state, the drop-down list stays open so that you can change the state of more than one layer at a time. Click the top of the list to close it.



Be careful when editing a drawing with frozen or off layers – it's easy to forget about them. For example, you could move a whole section of your drawing and inadvertently leave the frozen objects in that section behind.

Saving layer states

Often you work with sets of layer states. For example, you may lock certain layers during part of the editing process to avoid changing objects on those layers. You may also set some layers as not plottable just before final plotting but want them plotted for a draft plot. You may also want to temporarily change the properties of certain layers — color, linetype, lineweight, and plot style — and then change them back.

You could spend a lot of time adjusting all these layer states and properties over and over. Instead, you can save and restore sets of layer states — the properties and states of all the layers in a drawing. You can save layer states to automate the process of restoring layer states and properties by saving the set of all layer states and properties. After you save this set, you can restore it at any time. The term *layer states* includes the set of all layer states as well as their properties.

You can also export layer-state settings to a file. You can then use the layer-state settings in another drawing with the same or similar layers.

To save a layer state, follow these steps:

- 1. Set all the layer states and properties the way you want them. Usually, you've already done this and should save the state before making changes that you plan to reverse later on.
- 2. Choose Layer Properties Manager from the Layers toolbar.
- **3.** In the Layer Properties Manager, click the Layer States Manager icon to open the Layer States Manager dialog box, shown in Figure 11-11.
- **4.** Click New and type a name for your layer state in the New Layer State Name text box of the New Layer State to Save dialog box. If you want, type a description. Click OK.

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	🗹 Locked / Unlocke	d	🗹 Lineweight	
Current VP Frozen / Thawed New VP Frozen / Thawed	Plot / No Plot		Plot style	
	Current VP Frozen	/ Thawed	New VP Frozen	/ Thawed

Figure 11-11: The Layer States Manager dialog box.

5. Back in the Layer States Manager, choose which of the layer states and properties you want to save in the Layer Settings to Restore section.

States and properties that you do not save are not affected later when you restore the layer state. For example, if you save only the on/off state and then change both a layer's on/off state and its color, when you restore the layer state, only the on/off state is returned to its original setting; the layer retains its new color.

- **6.** If you want your drawing to look exactly as it did when you saved the layer state (in terms of layers), check the Turn Off Layers Not Found in Layer State check box. Any new layers that you create after saving the layer state are then turned off when you restore your layer state.
- 7. Click OK.

Caution

To restore a layer state, open the Layer Properties Manager and click the Layer States Manager button to open the Layer States Manager. Choose the layer state and click Restore. Then click OK to close the Layer Properties Manager.

The Layer States Manager enables you to manage layer states in the following ways:

- ✦ Restore: Restores a saved layer state.
- ✦ Delete: Deletes the layer state.
- Import: Imports a layer state that has been previously exported as a .las file. Importing a layer state gives you access to layer states that others have saved.
- Export: Saves the settings of a layer state in a .las file. Exporting a layer state gives others access to your layer state settings.

You can also change the properties and states that you save by checking or unchecking any of the check boxes at the bottom of the Layer States Manager. To rename a layer state, click its name, type a new name, and press Enter. After you finish using the Layer States Manager, click Close to close the dialog box.



The Express Tools contains many layer-related tools that you can add to your arsenal. Many of these layer tools can save you considerable time over the course of creating a drawing. Table 11-3 explains them briefly. See Appendix A for information on installing Express Tools.

Layer Name	Menu Description	
LAYWALK	Express 다 Layers 다 Layer Walk	A full-featured command that helps you see which objects are on which layers. You can list the number of objects on each layer, count the total number of layers, save layer states, and purge unused layers, using the dialog box and the shortcut menu.
LAYMCH	Express 🕆 Layers 🕆 Layer Match	Changes the layer of selected objects to match that of a selected object.
LAYCUR	Express ➪ Layers ➪ Change to Current Layer	Changes the selected object's layer to the current layer.
COPYTOLAYER	Express ➪ Layers ➪ Copy Objects to New Layer	Copies objects while changing the copy to the layer you specify.
LAYISO	Express ⇔ Layers ⇔ Layer Isolate	Turns off all layers except the layer of an object you select, so that you can isolate a specific layer.
LAYVPI	Isolate Layer to Current Viewport	Freezes all layers except the layer of an object you select in all viewports except the current one, isolating the selected layer in the current viewport.
LAYOFF	Express 🕁 Layers 🕁 Layer Off	Turns the layer of the selected object(s) off.
LAYON	Express ➪ Layers ➪ Turn All Layers On	Turns all layers on.
LAYFRZ	Express 🕏 Layers 🕫 Layer Freeze	Freezes the layer of the selected object(s).
LAYTHW	Express 🕫 Layers 🕏 Thaw All Layers	Thaws all layers.
LAYLCK	Express 🕏 Layers 🕏 Layer Lock	Locks the layer of the selected object(s).
LAYULK	Express 🕫 Layers 🕫 Layer Unlock	Unlocks all layers.
LAYMRG	Express ⇔ Layers ⇔ Layer Merge	Changes the layer of all objects on the first layer selected to the second layer selected. The first layer is purged.
LAYDEL	Express 🕫 Layers 🕫 Layer Delete	Deletes objects from the specified layer and purges that layer.

Table 11-3: Express Tools Layer Commands

Changing an existing object's layer

Sometimes you need to change the layer of an object or objects you've already drawn. You can do this easily by selecting one or more objects and clicking the layer name that you want for the object in the Layer Control drop-down list. The list automatically closes.

If you turn off Noun/verb selection, as I explain in "Customizing the selection process" in Chapter 9, you cannot select an object and change its layer from the Layer Control drop-down list. Instead, you can change the layer in the Properties palette.

You can also change an object's layer in the Properties palette. Choose Properties on the Standard toolbar. Use the Properties palette if you want to change more than one property of an object at one time.

Caution

Note

It's easy to inadvertently change an object's layer. Make sure objects are not selected (press Esc) if you're about to use the Layer Control drop-down box just to change the current layer.

Making an object's layer current

If you're adding an object, you usually want to draw on the same layer as an existing object. You could select the object to see what layer it's on, press Esc to deselect the object, and then choose that layer from the Layer Control drop-down list to make it current. However, this process is easier with the Make Object's Layer Current button on the Layers toolbar. Simply select an object and click the button. That object's layer is now current.



The drawing used in the following Step-by-Step exercise on working with layers, ab11-b.dwg, is in the Drawings folder on the CD-ROM.

STEP-BY-STEP: Working with Layers

- 1. Open ab11-b.dwg from the CD-ROM.
- **2.** Save the file as ab11-02.dwg in your AutoCAD Bible folder. This drawing is shown in Figure 11-12. The current layer is 0. Make sure OSNAP is on. Set running object snaps for endpoint and quadrant.
- **3.** Click the Layer Control drop-down list and click Pipes to change the current layer to Pipes.
- **4.** Start the LINE command. Draw a line from **1** to **2** in Figure 11-12, using the Quadrant running object snap.
- **5.** Click the Layer Control drop-down list and click Object to change the current layer to Object.
- **6.** Click the Layer Control drop-down list and click the On/Off icon of the Dim layer. Click again at the top of the list to close it.
- 7. Start the CIRCLE command. Right-click and choose 2p to use the two-point option. Draw a circle from the endpoint of (3) to (4) in Figure 11-12 using the Endpoint running object snap.
- 8. Without changing the layer, start the CIRCLE command and again use the 2p option. Draw a circle between the endpoints at **(5)** and **(6)**.

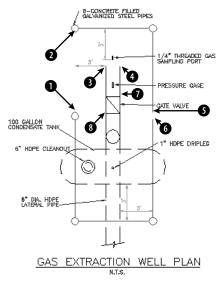


Figure 11-12: This gas extraction well plan drawing needs to be completed. Thanks to the Army Corps of Engineers for this drawing.

- **9.** The last circle was drawn on the wrong layer. To change its layer, select the circle. Then click the Layer Control drop-down list and choose Pipes. Press Esc to remove the grips and see the result. The circle is now on the Pipes layer. Notice that the current layer is still Object in the Layer Control display.
- 10. Pick any red object (the Pipes layer). Choose Make Object's Layer Current from the Layers toolbar. The Pipes layer is now the current layer. Draw a line from the right quadrant of the circle at 1 to the left quadrant of the circle at 3 and 6 in Figure 11-12.
- **11.** You want to draw a line on the Object layer.
 - If you have AutoCAD: Because that is the previous layer you used, click Layer Previous on the Layers toolbar. The Object layer is now the current layer.
 - If you have AutoCAD LT: Choose the Object layer from the Layer Control dropdown list.
- 12. Draw a line from the endpoint at 7 to the endpoint at 8.
- **13.** Pick any text to see what layer it is on. The Layer Control drop-down box changes to show the Text layer. Press Esc to deselect the text. Now choose the words GAS EXTRAC-TION WELL PLAN at the bottom of the drawing. Click the Layer Control drop-down box and choose Text. Press Esc to remove the grips.
- 14. Save your drawing. It should look like Figure 11-13.

Later in this chapter, I explain how to import layers from other drawings and translate layers from one drawing to another.

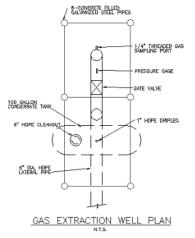


Figure 11-13: The completed drawing.

Modifying layers

Sometimes you need to change the properties of a layer, such as its color or linetype. Changing a layer's properties is a powerful tool because every object on that layer is automatically regenerated with the new properties. Other layer housekeeping tasks are renaming and deleting layers. You use the Layer Properties Manager for these functions.

Sorting columns

If you have many layers in a drawing, sorting can help you find the layers you need to work on. You can sort the layer listing in a drawing by any column, by clicking once on the column title. Click again to see the list in reverse order. Long layer names display a tooltip with the entire layer name.

Tip

If sorting by layer name does not appear to be working, increase the value for the MAXSORT system variable, which determines the maximum number of symbols that AutoCAD or AutoCAD LT sorts. Type **maxsort** \rightarrow on the command line and enter a larger number. Press Enter.

Filtering the layer list

Some complex drawings may have dozens of layers and you may have a hard time finding the layer that you want to change in the Layer Properties Manager. You can filter the layer list so that you only see the layers you want. This makes it easy to change a group of layers at once. The filter tree panel on the left side of the Layer Properties Manager contains one filter, All Used Layers, as well as the default that displays all layers. To display only used layers, click the All Used Layers filter in the filter tree panel.

Note

If you don't see the filter tree panel, right-click in the Layer Properties Manager and choose Show Filter Tree.

You can create your own filters. There are two types of filters:

- ◆ Properties filter: Defines a filter by the properties of the layer. For example, you can create a filter that displays only green layers or layers that start with the letter A.
- ◆ Group filter: Defines a filter by selecting layers that go into a filter. A group filter offers complete flexibility to filter layers. For example, you might want to create a group filter that contains all your text, annotation, and dimension layers.

To create a properties filter, click the New Property Filter button to open the Layer Filter Properties, shown in Figure 11-14. Notice that the Filter Definition pane at the top has the same columns as the Layer Properties Manager.

Name the filter in the Filter Name text box. To choose a property, click in that property's column. Then do one of the following:

- If a drop-down arrow appears, click the arrow and choose one of the options from the drop-down list. (To remove a property, choose the blank line at the top of the drop-down list.)
- ✦ If an ellipsis button appears, click the button and choose a property from the dialog box that opens. For example, you can choose a layer color from the Select Color dialog box. (To remove a property, select the text, press Del, and click anywhere outside the column.)
- ◆ To specify a filter for a named property, such as the name or linetype of a layer, you can use wildcards. The two most common wildcard characters are * (asterisk), which replaces any number of characters, and ?, which replaces any single character. Figure 11-14 shows the layer name filter set to e*. The color is also specified as green. Therefore, the filter includes only layers whose names start with the letter *E* and are green.

As you work, the Filter Preview pane shows the results of your filter. When you're done, click OK. The Layer Properties Manager shows only the layers that match your filter specifications.

To display all layers except the ones specified by the filter, click Invert Filter. If you want to filter the Layer Control listing on the Layers toolbar in the same way, check Apply to Layers toolbar. Click OK to close the Layer Properties Manager and return to your drawing.

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Figure 11-14: The Layer Filter Properties dialog box.

When you work with a large number of layers, think carefully about how you name them. Naming layers in groups is common. For example, if you have several text layers, you could name them Text Title, Text Notes, and Text Schedule. A systematic layer-naming scheme makes it easy to filter the layers you need, which in turn makes it easy to make changes to groups of layers.

Changing a layer's color, linetype, and lineweight

To change a layer's color, choose Layer Properties Manager from the Layers toolbar to open the Layer Properties Manager. Choose the color swatch of the layer that you want to modify. The Select Color dialog box opens. Choose a color and click OK twice to return to your drawing. For more information about choosing colors, see "Assigning a color" earlier in this chapter.

To change a layer's linetype, follow the same procedure as for changing the color. If you need to choose a linetype that is not on the list, click the linetype of the layer to open the Select Line-type dialog box. There you can either choose a loaded linetype or load a linetype if necessary.

To change a layer's lineweight, open the Layer Properties Manager and click the lineweight for any layer. Choose a new lineweight from the Lineweight dialog box.

You can modify more than one layer at a time. In the Layer Properties Manager, right-click and choose Select All to choose all the layers. Choose Clear All to deselect all layers. You can choose a range of layers by clicking the first in the range, pressing Shift, and clicking the last in the range. Finally, you can choose individual layers by pressing Ctrl for each additional layer. Changes you make to color, linetype, or lineweight affect all the selected layers.

Renaming layers

Thinking out your layer naming scheme in advance is best. Many disciplines and organizations have layer naming standards. However, sometimes you simply need to rename a layer.

To rename a layer, choose Layer Properties Manager from the Layers toolbar to open the Layer Properties Manager. Click the name of the layer, and then click a second time. A border appears, and the name is highlighted. Type the new name and press Enter.

Note

Note

You cannot rename layer 0. Layer 0 is the default layer and always remains the same.

Deleting layers

To delete a layer, choose Layer Properties Manager from the Layers toolbar to open the Layer Properties Manager. Click the name of the layer. Choose Delete and click OK.

You cannot delete the current layer or any layer that has objects on it. (Where would those objects go?) You also cannot delete layer 0, which is the default layer. Finally, you cannot delete layers from external references (covered in Chapter 19).

Purging layers and linetypes

Layer and linetype definitions add to the size of your drawing because they're kept in the drawing's database. Therefore, eliminating layers and linetypes that you aren't using is worth-while. You can delete them, but sometimes it's hard to know which layers contain no objects. The PURGE command lets you delete many types of unused definitions, including layers and linetypes.

Tip

To purge layers and linetypes, choose File \Rightarrow Drawing Utilities \Rightarrow Purge. The Purge dialog box opens, shown in Figure 11-15.

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Confirm each item to be purged	
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Purge Purge All Close Help	

Figure 11-15: The Purge dialog box.

Note

The Incremental Save Percentage option may prevent a purge during a drawing session from removing all unreferenced layers or linetypes from the drawing. To avoid this, you can either set incremental save to zero or save the drawing and reopen it and then immediately use the PURGE command. To set this option, choose Tools 🗘 Options 🗘 Open and Save tab.

At the top of the dialog box, you can choose to view objects that you can purge or objects that you cannot purge. Why would you want to view objects that you cannot purge? Sometimes it's hard to figure out why you can't purge a certain object, and the dialog box has a handy feature that lets you select an object and view possible reasons why it cannot be purged.

To start purging, choose View Items You Can Purge. A plus sign (+) next to each type of object indicates that it contains purgeable objects. For example, Figure 11-15 indicates that you can purge blocks, dimension styles, layers, and shapes. Click the plus sign to display the specific items.

To purge an individual item, select it and click Purge. Check Confirm Each Item to Be Purged if you want to see a dialog box asking you to confirm each purge. Click Purge All to purge all possible items. Check Purge Nested Items to purge items within other named objects. Usually, these are layers, linetypes, and so on inside blocks.

You can select more than one item at a time to purge. To select an additional item, press Ctrl as you click. To select a contiguous group of items, click the first item, press and hold Shift, and select the last item in the group.

After you're done purging, click Close to close the Purge dialog box.

Tip

On the CD-ROM The drawing used in the following Step-by-Step exercise on modifying layers, ab11-c.dwg, is in the Drawings folder on the CD-ROM. (*Thanks to Michael J. Lemmons of Winston Products Company in Louisville, Kentucky, for this drawing.*)

STEP-BY-STEP: Modifying Layers

- 1. Open ab11-c.dwg from the CD-ROM.
- 2. Save the file as ab11-03.dwg in your AutoCAD Bible folder.
- 3. Choose Layer Properties Manager from the Layers toolbar.
- 4. Click the New Property Filter button.. In the Filter Name text box, type **M layers.** In the Name column, type **m*** (the asterisk is already there, so just type **m** before the asterisk) to list all layers starting with the letter *M*. Click OK. The layer list now looks like Figure 11-16.
- **5.** In the Layer Properties Manager, click the top layer. Press Shift and click the next-tolast layer. All the layers except for Mydims are selected. Click anywhere in the Linetype column to open the Select Linetype dialog box and choose Dashed. Click OK. Notice that all the selected layers now have a dashed linetype. Click OK to return to the drawing. The layers you selected now have the dashed linetype.

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Figure 11-16: The Layer Properties Manager now shows only layers starting with the letter *M*.

- 6. Choose Layer Properties Manager from the Layers toolbar to open the Layer Properties Manager again. Choose Mydims. Click it a second time so that a the name of the layer is highlighted. Type **Titles** →. The name of the layer is changed. Click OK.
- **7.** Start the ERASE command and pick anywhere on the title block (it is all one object) and the three labels FRONT, TOP, and RIGHT SIDE. Press Enter to end the command.
- 8. Choose Layer Properties Manager from the Layers toolbar again. Notice that the Titles layer is not on the list because this layer no longer starts with the letter M. In the Filter Tree panel, click All to display all the layers.
- **9.** Scroll down the list of layers and choose Titles. You can see that its Status icon is off, indicating that the layer contains no objects. Click the Delete button. Click OK to close the dialog box.
- 10. Save your drawing.

Changing Object Color, Linetype, and Lineweight

The properties of layers — color, linetype, lineweight — can also apply directly to objects. You can assign a color, linetype, and lineweight to an object. You can also set a current color, linetype, and lineweight so that all future objects you draw have those properties regardless of the properties assigned to their layer. In most cases, you should avoid assigning properties directly to objects because the organizational value of layers is lost.



You can also assign plot styles to objects. See Chapter 17 for more information.

Changing an object's color

You can control an object's color by using the Color Control drop-down list on the Properties toolbar, as shown in Figure 11-17. For more information about choosing colors, see "Assigning a color" earlier in this chapter. As with the Layer Control drop-down list, the Color Control drop-down list shows the color of any selected object. When you create a layer, assign it a color, and draw with that layer, the color is displayed as ByLayer.



Figure 11-17: The Color Control drop-down list on the Properties toolbar.

The ByLayer color means that the color of the object is taken from the color of the object's layer. At the same time that you see the selected object's color in the Color Control drop-down list, you can look over to the Layer Control drop-down list and confirm the color assignment of the object's layer.

The ByBlock color creates objects by using color 7 (white or black, depending on the screen color), but if the objects are placed in a block, the block takes on the current color when inserted. (For information about blocks, see Chapter 18.)

The best way to organize a drawing is to assign colors by layer. It can be confusing if related elements, such as centerlines in a mechanical drawing, appear in different colors. Also, if you see another line with the same color and linetype as most centerlines, you may assume it's a centerline in the wrong place. It is standard practice to organize colors by layer.

Colors have a special significance because when you plot, you can assign colors to pens — although you can also use plot styles (see Chapter 17). If you use a color-based system, color is the basis you use for plotting with various width pens or colors. You may want to temporarily change the color of an object to emphasize it in a plot or for some other reason. However, you should generally refrain from directly changing the color of objects.

If you need to change the color of an object, here are two ways to do it:

 To change just an object's color, select the object. Click the Color Control drop-down list and choose the color that you want. ◆ If you want to change other properties at the same time, select the object and choose Properties from the Standard toolbar. The Properties palette opens, shown in Figure 11-18. In this window, you can change all the properties of the object. To change the color, choose Color and click the drop-down arrow that appears. Choose the color that you want.

You can always change an object's color back to ByLayer, using the same Color Control dropdown list.

Changing the current color

When you change the current color, all future objects are drawn using that color, regardless of their layer. In general, you should do this only when you have a special need for two objects to be on one layer but have different colors. An example might be text in a title block. You might want the text to have the same layer so that you can freeze it and thaw it (or turn it on and off) easily without having to remember that the text and title block are on two separate layers. If you also want part of the text to have a different color, change the current color before typing in that part of the text. Remember to change the current color back to ByLayer before drawing anything else.

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Figure 11-18: The Properties palette.

To change the current color, make sure no object is selected. Then click the Color drop-down list and choose the color you want. To use a color not on the list, choose Select color to open the Select Color dialog box. (See the section "Assigning a color" earlier in this chapter for more information on assigning colors.) To change the current color back to ByLayer, click the Color drop-down list, and choose ByLayer. You have an opportunity to do an exercise on changing colors after the "Changing the current lineweight" section.

Changing an object's linetype

Linetypes work according to the same principles as colors. You can change the linetype of an existing object or objects. You can control an object's linetype by using the Linetype Control drop-down list on the Properties toolbar, shown in Figure 11-19. The Linetype Control drop-down list shows the linetype of any selected object. When you create a layer, assign it a linetype, and draw with that layer, the linetype is displayed as ByLayer.

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Other	V

Figure 11-19: The Linetype Control drop-down list on the Properties toolbar.

The ByLayer linetype simply means that the linetype of the object is taken from the linetype of the object's layer.

The best way to organize a drawing is to assign linetypes by layer. It can be confusing if similar elements, such as plat borders in a surveyor's drawing, appear in different linetypes. Also, if you see another line with the same color and linetype as most plat borders, you may assume it's a plat border in the wrong place. It is common practice to organize linetypes by layer.

If you need to change the linetype of an object, you have two options:

- To change an object's linetype, select the object. Click the Linetype Control drop-down list and choose the linetype that you want.
- Select the object and choose Properties from the Standard toolbar. The Properties palette (refer to Figure 11-18) opens. To change an object's linetype, click Linetype, and then click the drop-down arrow that appears. Choose from one of the linetypes.

You can always change an object's linetype back to ByLayer, using the same Linetype Control drop-down list.

As discussed in the "Assigning a linetype" section, earlier in this chapter, you may need to load a linetype before you can use it. To load a linetype, choose Linetype Control from the Properties toolbar. Scroll down to the bottom of the list and choose Other to open the Linetype Manager. Choose Load to open the Load or Reload Linetypes dialog box, choose the linetype file (if not the default), and choose the linetype that you want to load. Click OK. Choose the linetype again in the Linetype Manager and click OK to return to your drawing.

To filter the list of Linetypes, choose from the Linetype Filters drop-down list box in the Linetype Manager.

Changing the current linetype

You can also change the current linetype. When you change the current linetype, all future objects you draw have that linetype and are not drawn according to their layer's assigned linetype. In general, you should do this only when you have a special need for two objects to be on one layer but have different linetypes. An example might be a table containing notes in one corner of a drawing. You might want the lines that make up the table to have the same layer so that you can freeze it and thaw it (or turn it on and off) easily without having to remember that the table is on two separate layers. If you also want some of the lines to have a different linetype, change the current linetype before adding those lines. Remember to change the current linetype back to ByLayer before drawing anything else.

To change the current linetype, click the Linetype drop-down list and choose the linetype you want, first making sure no objects are currently selected. To change the current linetype back to ByLayer, click the Linetype drop-down list and choose ByLayer.

Changing an object's lineweight

Lineweights let you represent objects with varying line widths. The widths can represent the width of a pen in a pen plotter that will be used to plot that object. Lineweights can also be used as an organizational tool, to distinguish certain types of objects just as colors and line-types do. Finally, you can use lineweights to represent the actual properties of objects, such as the width of wires in an electrical schematic.

Lineweights work according to the same principles as colors and linetypes. You can control an object's lineweight by using the Lineweight Control drop-down list on the Properties toolbar, as shown in Figure 11-20. The Lineweight Control drop-down list shows the lineweight of any selected object. When you create a layer, assign it a lineweight, and draw with that layer, the lineweight is displayed as ByLayer.

		_
	ByLayer	1
	ByLayer	1
	ByBlock	
	Default	
	0.00 mm	
	0.05 mm	
	0.09 mm	
	0.13 mm	
	0.15 mm	
	0.18 mm	
—	0.20 mm	
	0.25 mm	
	0.30 mm	
—	0.35 mm	
	0.40 mm	
	0.50 mm	
	0.53 mm	
	0.60 mm	
	0.70 mm	
	0.80 mm	
	0.90 mm	
	1.00 mm	
	1.06 mm	
	1.20 mm	
	1.40 mm	
	1.58 mm	
	2.00 mm	
	2.11 mm	1

Figure 11-20: The Lineweight drop-down list on the Properties toolbar.

As with colors and linetypes, the best way to organize a drawing is to assign lineweights by layer. If you need to change the lineweight of an object, do one of the following:

- Select the object. Click the Lineweight Control drop-down list and choose the lineweight that you want.
- Select the object and choose Properties from the Standard toolbar. The Properties
 palette opens. To change an object's lineweight, click Lineweight, and then click the
 drop-down arrow that appears. Choose from one of the lineweights.

Changing the current lineweight

You can also change the current lineweight. When you change the current lineweight, all future objects you draw have that lineweight and are not drawn according to their layer's assigned lineweight.

To change the current lineweight, click the Lineweight drop-down list and choose the lineweight that you want, first making sure no objects are currently selected. To change the current lineweight back to ByLayer, click the Lineweight drop-down list and choose ByLayer.



The drawing used in the following Step-by-Step exercise on changing colors, linetypes, and lineweights, ab11-d.dwg, is in the Drawings folder on the CD-ROM.

STEP-BY-STEP: Changing Colors, Linetypes, and Lineweights

- 1. Open ab11-d.dwg from the CD-ROM.
- **2.** Save the file as ab11-04.dwg in your AutoCAD Bible folder. This is an elevation view of a lavatory cabinet, shown in Figure 11-21.
- **3.** Pick one of the reflection lines in the mirror. Notice that the color is red but the layer's color, as shown in the Layer Control drop-down list, is Magenta. Select all the reflection lines. Click the Color Control drop-down list and choose ByLayer from the top of the list. Press Esc to remove the grips.
- **4.** Select the green dimension at the bottom of the cabinet. (The dimension is all one object.) To make it more visible, click the Color Control drop-down list and choose Red. Press Esc to see the result.
- 5. Pick the lines at 1 and 2 in Figure 11-21. Click the Linetype Control drop-down list and choose the Hidden linetype. Press Esc so that the hidden lines are no longer selected.
- **6.** Select the dashed arc that represents the bottom curvature of the sink. Click the Lineweight Control drop-down list and choose 0.30 mm. Press Esc. Click LWT on the status bar to turn on the display of lineweights and see the result.
- 7. Click the Color Control drop-down list box and choose Cyan to make it the current color.
- 8. Start the RECTANG command. Draw a rectangle inside the left cabinet. Use the COPY command to copy the rectangle to the right cabinet. (To copy, use an intersection object snap at point 3 as the base point and 4 as the second point of displacement.) The rectangles are drawn in Cyan.
- 9. Save your drawing. It should look like Figure 11-22.

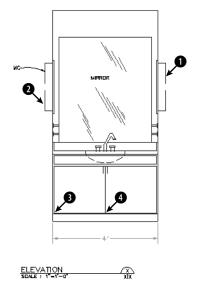


Figure 11-21: A lavatory cabinet. Thanks to the Army Corps of Engineers for this drawing.

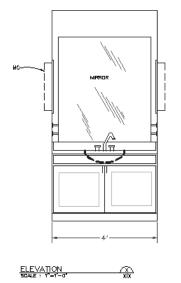


Figure 11-22: The finished cabinet.

Working with Linetype Scales

A noncontinuous linetype is a repeating pattern of dots, dashes, and spaces. Linetypes can also include repeating text or shapes. You may find that the linetype patterns in your drawing are too long or short for clarity. The linetype scale may even be so big or so small that the line looks continuous. How often the pattern is repeated is affected by three factors:

- The linetype definition
- ♦ The global linetype scale
- ♦ The individual object's linetype scale

Changing linetype spacing by using a different linetype

One choice is to change the linetype. A number of linetypes come in short, medium, and long variations, such as Dashedx2, Dashed, and Dashed2, as shown in Figure 11-23.

	edx2
Dash	ed
Dash	ed2

Figure 11-23: A number of the standard linetypes come in three variations, such as Dashedx2, Dashed, and Dashed2.

AutoCAD's acad.lin and AutoCAD LT's aclt.lin contain a number of ISO linetypes that meet the specifications of the International Standards Organization. Your organization or field of specialty may require the use of these linetypes. If so, you should know that the ISO linetype pattern definitions are much longer than the other linetype definitions. Figure 11-24 shows the ISO dash linetype and the regular dashed linetype. You may need to make adjustments to the linetype scale as a result.

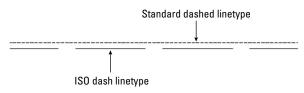


Figure 11-24: A comparison of the regular dashed linetype and the ISO dash linetype.

Changing linetype spacing by changing the global linetype scale

Another choice is to change the global linetype scale, which affects all noncontinuous linetypes in your drawing. AutoCAD and AutoCAD LT multiply the linetype definition by the global linetype scale to calculate the length of each repetition of the linetype:

- ★ Linetype scales larger than 1 result in longer sections and fewer repetitions of the linetype definition per unit.
- ★ Linetype scales smaller than 1 result in shorter sections and more repetitions of the linetype definition per unit.

When you change the linetype scale, the drawing regenerates to change all the linetypes. Figure 11-25 shows three versions of a drawing with linetypes at linetype scales of 0.5, 1, and 2. As you can see, a scale of 2 is too large and a scale of 0.5 is too small. A scale of 1 is just right. (Goldilocks would have been happy with it.)

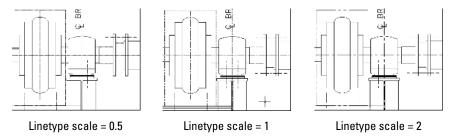


Figure 11-25: Three versions of a drawing, using linetype scales of 0.5, 1, and 2.

For purposes of drawing, you simply want to make sure that you can distinguish the linetype both when you can see the entire drawing on the screen and when you zoom in close. The main reason to scale linetypes is for plotting. A linetype scale that works for a drawing of a house on-screen may appear continuous when you plot it at a scale factor of 1=96.

If you want the linetype to appear exactly according to its definition, use the scale factor for the linetype scale. Chapter 5 covers scale factors. If the scale factor doesn't give you the results you want, try a linetype scale of one-quarter to one-half the scale factor — in the 1=96 example, you might use a linetype scale of 24 or 48.

To change the linetype scale, choose Format \Rightarrow Linetype to open the Linetype Manager, shown in Figure 11-26. Click Show Details if the lower portion of the dialog box is not displayed.

🛅 Linetype Mana	ger			? ×
Linetype filters			Load De	elete
Show all used linetyp	es 🔽 Inve	ert filter	Current Hide	details
Current Linetype: ByLa	ayer			
Linetype	Appearance D	escription		
ByLayer CENTER CONTINUOUS DASHED HIDDEN	 	ntinuous		
Details				
Name:		Global scale	factor: 2.0000	
Description:		Current object	t scale: 1.0000	
Use paper space	e units for scaling	ISO pen widt	in: 1.0 mm	×
		OK	Cancel H	elp

Figure 11-26: The Linetype Manager dialog box.

In the Global scale factor text box, type the scale factor you want. Click OK. The drawing regenerates, changing the scale of every noncontinuous linetype in the drawing.

Tip

The global linetype scale is held in the LTSCALE system variable. You can change the linetype scale by typing LTSCALE at the command line and typing a scale.

Changing linetype spacing by changing the object linetype scale

On occasion, you may want the linetype spacing to be different for one object — or a small group of objects — only. Perhaps the object is too small to show the linetype pattern or you want to set it off visually. The *current object linetype scale* works like setting a current color or linetype — all objects drawn after you set the object linetype scale are drawn with the new linetype scale. In most cases, you want to make sure you change the current object linetype scale back to its default of 1 after using it for that one object or group of objects.

Changing the current object linetype scale

To change the linetype scale, choose Format \Rightarrow Linetype to open the Linetype Manager, as shown in Figure 11-26. Click Show Details if the lower portion of the dialog box is not displayed. In the Current Object Scale text box, type the scale factor you want. Click OK. Now all objects that you draw use the current object linetype scale.

The current object linetype scale is held in the CELTSCALE system variable. You can also change the current object linetype scale by typing **celtscale** at the command line and typing in a scale.

If you have also set the global linetype scale to a value other than 1, AutoCAD and AutoCAD LT multiply the two linetype scales to calculate the final result. For example, if you have a global linetype scale of 12 and a current object linetype scale of 0.5, objects you draw will have a resulting linetype scale of 6.

Changing an existing object's linetype scale

It may be more common to draw an object without setting a special object linetype scale and then decide that you want to change its linetype scale. To change an object's linetype scale, select the object and choose Properties from the Standard toolbar. In the Properties palette, click Linetype Scale and then type the new linetype scale. This linetype scale only affects the selected object. It does not affect the global linetype scale.



The drawing used in the following Step-by-Step exercise on changing linetype scales, ab11-e. dwg, is in the Drawings folder on the CD-ROM.

STEP-BY-STEP: Changing Linetype Scales

- 1. Open ab11-e.dwg from the CD-ROM.
- 2. Save the file as ab11-05.dwg in your AutoCAD Bible folder. This drawing is of a bushing, as shown in Figure 11-27. Notice that the linetype doesn't show clearly on the short line at ① and in the small circle at ②.
- 3. Choose Format ⇔ Linetype. Click Show Details to open the Details section of the Linetype Manager, if necessary. Change the Global scale factor to 0.5. Click OK. The drawing regenerates. Note that the circles are better, but the short line at ① still looks like a continuous line.

- **4.** Choose the line at **①**. Choose Properties from the Standard toolbar. Click Linetype scale and change it to 0.5. Press Enter. Press Esc to remove the grips and see the result. Notice the difference in the line, which now has a linetype scale of 0.5 (global) times 0.5 (object) = 0.25.
- 5. Save your drawing. It should look like Figure 11-28.

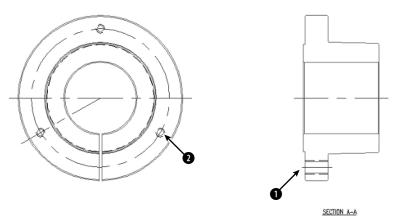
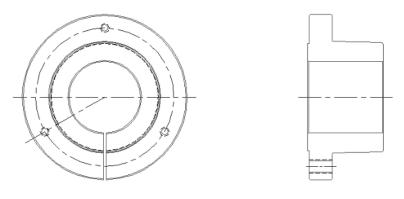


Figure 11-27: This drawing of a bushing has two noncontinuous linetypes. *Thanks to Robert Mack of the Dexter Company, Fairfield, Iowa, for this drawing.*



SECTION A-A

Figure 11-28: The drawing's noncontinuous lines are now more appropriate.

Importing Layers and Linetypes from Other Drawings

The DesignCenter gives you access to drawing content and definitions, such as layers, linetypes, blocks (see Chapter 18), plot layouts (see Chapter 17), and so on that exist in other drawings. I cover the DesignCenter in more detail in Chapter 26, but here I explain how to import layers and linetypes from another drawing. Autodesk calls this *mining your design*. In other words, after you've created a layer or a linetype, you can easily use it in any new or existing drawing.

Choose DesignCenter from the Standard toolbar to open the DesignCenter, shown in Figure 11-29. The DesignCenter's left pane works like the Windows Explorer left pane, letting you navigate throughout your hard drive or your network. (If you don't see the left pane, click the Tree View Toggle button on the DesignCenter's toolbar). If the DesignCenter opens showing only open drawings, click Desktop on the toolbar and navigate to the desired folder. After you click a folder, the drawings in that folder are listed on the right side. Choose Large Icons from the View drop-down list to see a small preview of each item. To access layers and linetypes, double-click a drawing icon or click its plus sign. The various definition categories appear in the right pane. To see the list of the layers or linetypes, double-click the layers or linetypes icon in either the left or right pane. To import a layer or linetype, doubleclick the layer or linetype's icon to bring the layer or linetype definition into your drawing. Click the Layer Control or Linetype Control drop-down list to check it out!

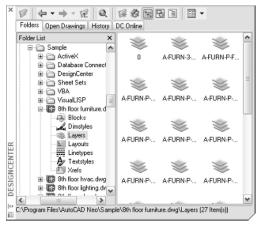


Figure 11-29: The DesignCenter lets you locate definitions contained in other drawings and import them into your current drawing.

Click the DesignCenter's Close button to close the DesignCenter.



AutoCAD enables you to *translate* layers. For example, you can specify that all objects on layer dashed be changed to the layer hidden. Use this feature to maintain layer standards that you have set up. Chapter 26 fully covers layer translating. This feature is not available in AutoCAD LT.

Matching Properties

You may be familiar with the Format Painter button available on the toolbars of many Windows applications. AutoCAD and AutoCAD LT offer something similar that, at the same time, enables you to specify which properties you want to match. AutoCAD calls this process *matching properties*. It is similar to Excel's Paste Special command.

An object can have so many properties that this can be a useful tool. To match properties, you need two objects, a source object and a destination object (or objects). Follow these steps to match properties:

- 1. Choose the object whose properties you want to match (the source object).
- 2. Choose Match Properties from the Standard toolbar. You see a Format Painter cursor with a pickbox. On the command line, you see the Select destination object(s) or [Settings]: prompt.

Note

You can choose Match Properties from the Standard toolbar first and then choose the source object.

- **3.** If you want to match all the object's properties, select the object(s) that you want to receive the matching properties, that is, the destination object(s).
- **4.** If you want to match only some of the object's properties, right-click and choose Settings to open the Property Settings dialog box, shown in Figure 11-30. Uncheck all the properties you don't want to match and click OK. The previous prompt returns. Select the object(s) you want to receive the matching properties, that is, the destination objects(s).

Property Setting	js		? ×
Basic Properties	ByLayer WHEE4042K02 ByLayer 1.000		OK Cancel Help
 ✓ Lineweight ✓ Thickness ✓ PlotStyle 	ByLayer .000 ByLayer		
Special Properties Dimension Polyline	 ✓ Text ✓ Viewport 	✓ Hatch ✓ Table	

Figure 11-30: The Property Settings dialog box.

5. Press Enter to end object selection and match the properties.



The drawing used in the following Step-by-Step exercise on matching properties, ab11-f. dwg, is in the Drawings folder on the CD-ROM.

STEP-BY-STEP: Matching Properties

- 1. Open ab11-f.dwg from the CD-ROM.
- **2.** Save the file as ab11-06.dwg in your AutoCAD Bible folder. This is a drawing of a master-bedroom-suite plan, as shown in Figure 11-31.

- 3. Pick the wall at ① in Figure 11-31. Click Match Properties from the Standard toolbar. At the Select destination object(s) or [Settings]: prompt, use a crossing window to select all the folding closet doors on both sides of the line you just selected. Press Enter to end object selection. This action matches the properties of the doors to the properties of the wall. (The doors turn from gray to black/white.)
- **4.** Pick the text MASTER SUITE. Choose Match Properties from the Standard toolbar. At the Select destination object(s) or [Settings]: prompt, right-click and choose Settings. In the Property Settings dialog box, deselect all the boxes except Text in the Special Properties section. Click OK.
- **5.** At the Select destination object(s) or [Settings]: prompt, choose the text CL. in both closets and press Enter to end the command. This action matches the text properties of the text. Notice that the CL. text becomes bold.
- 6. Save your drawing.

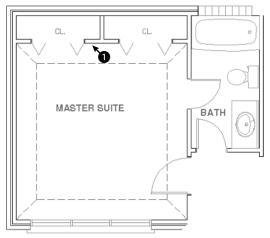


Figure 11-31: The master-bedroom-suite plan.

Summary

In this chapter, you read all about layers, colors, linetypes, and lineweights. You learned about:

- Using layers to help you organize your drawings by assigning the same properties to related objects
- ♦ Creating a layer by giving it a name, color, linetype, and lineweight
- ♦ Changing the layer of existing objects, using the Layer Control drop-down list or the Properties palette
- ✦ All about layer states On/Off, Thawed/Frozen, Unlocked/Locked, and Plottable/Not Plottable

- Changing the properties of existing layers
- ♦ Saving sets of layer states and properties and later restoring them
- ✦ Filtering the layer listing
- Purging unused layers and linetypes
- ◆ Altering the color, linetype, and lineweight of any object
- Globally changing the linetype scale, changing the current linetype scale, and changing the object linetype scale of existing objects
- ◆ Using the DesignCenter to import layers and linetypes from other drawings
- Utilizing the Match Properties command to copy properties from one object to one or more destination objects

The next chapter explains how to get detailed information from your drawing.

