

How to Plot in AutoCAD

"Plotting" is also called "Printing" because you can print to both large-format plotters as well as small printers just like any other windows operation to produce hard-copy output. AutoCAD uses standard Windows printer drivers to control plotters and printers, but there is also

In order to plot a drawing, it must be open.

Plotting is always done through "Layouts."

There are several things that have to be done and settings that have to be set before plotting - they are:

1. **Create a "Layout" and assign plotting parameters to it**
2. **Set up one or more viewports in the Layout**
3. **Set the scale that each viewport will be plotted to**
4. **Set visibility of layers in each the viewports**
5. **Set shading or hidden line parameters in each viewport (so-called "Visibility")**
6. **Select the "Plot Device" to print to for the Layout**
7. **Select the "Plot Style Table" to be used for the Layout (color based - .ctb, or style based - .stb)**
8. **Select the "Paper Size" that you want to plot to**
9. **Select the "Plot Area" - this should almost always be "Extents"**
10. **Set the "Plot Scale" - this should always be 1:1**
11. **Set the "Drawing Orientation" - this should always be "Landscape"**

1. Creating a "Layout:"

There is at least one Layout tab to the right of the Model tab at the bottom of the screen – by default called "Layout 1." Click on one of the Layouts to make it current. Right-click on the layout tab and select "Rename" then type in the name you want to give to that Layout. Each Layout can have a different arrangement of viewports, each with their own scale and each with a different selection of visible (frozen or thawed) layers.

2. Creating at least one viewport in the Layout:

There will likely already be a viewport that exists in the Layout you have selected. When you start a new drawing, AutoCAD automatically creates at least one Layout and puts an automatic viewport in it. But you will want to

create your own with the size you want. First, erase the "bad" viewport you don't want. Don't panic at this point. It will look like you erased your entire drawing in one step, but you didn't - you simply took out the viewport that showed your model drawing through it.

To create a new viewport the same size as the piece of paper you are plotting on, do the following:

Set the current layer to A-ANNO-VPRT - make sure that this layer is a "non-printing" layer by going to the layer dialogue box (type LA<RET> to get there) and clicking on the printer icon on the layer – first double-click will put a red slash through the printer icon, second double-click will turn it off. A red slash through the printer icon means that the layer will not print.

Make sure that the variable "regenauto" is turned ON: Type
REGENAUTO<RET>ON<RET>

Make sure that the variable "UCSFollow" is turned OFF in every viewport: Double-click in each viewport and type
UCSFOLLOW<RET>0<RET>. You cannot set this variable universally because each viewport has its own setting for UCSFollow. When UCSFollow is turned on, every time you double click in a viewport, the model will automatically zoom to extents and align the model drawing with the current viewport (very very bad). If UCSFollow is turned off prior to creating viewports, it will be set correctly with each viewport you create, however, you should know that AutoCAD, in its wisdom, has set it to be on by default.

Type MV<RET>

In response to the Command Prompt "Specify corner of viewport:" type in 0,0<RET>

In response to the Command Prompt "Specify opposite corner:" type in the coordinates of the upper right hand corner of the paper size you want to plot to, minus 1/2" for a border, such as:

8 1/2" x 11" paper: 10.5,8

11" x 17" paper: 16.5,10.5

18" x 24" paper: 23.5,17.5

24" x 36" paper: 35.5,23.5

Set the current layer back to A-WALL

3. Setting the viewport scale:

Viewport scale can be set in two ways:

The first method is to click on the viewport and set its "properties" to a scale - drop down the "Standard Scale" box under the Properties Palette and select one of the standard scales. If the drawing model disappears or extends beyond the viewport, the scale is too large - try a smaller scale.

The second method is to double-click within the viewport (to make it active) and "Zoom" it to the correct "zoom scale factor." For instance, if you want to plot a viewport to 1/4"=1'-0" scale, you would double-click the cursor in that viewport and type **Z** <RET> **1/48XP** <RET> If the drawing disappears from the viewport after doing this, zoom to extents first (double-click the wheel on the mouse), then zoom to the desired zoom scale factor. Below are zoom scale factors for various scales:

Drawing Scaling Chart for Model Space dimensions and text

Plotted Scale of Drawing	Model Space Zoom Magnification (use the denominator for dimension styles "overall scale")	Text Height: 3/32" (Normal Notes)	1/8" (Important Notes)	1/4" (Drawing Titles)
1/64" = 1'-0"	1/768XP	72	96	192
1/32" = 1'-0"	1/384XP	36	48	96
1/16" = 1'-0"	1/192XP	18	24	48
3/32" = 1'-0"	1/128XP	12	16	32
1/8" = 1'-0"	1/96XP	8	12	24
3/16" = 1'-0"	1/64XP	6	8	16
1/4" = 1'-0"	1/48XP	4	6	12
3/8" = 1'-0"	1/32XP	3	6	8
1/2" = 1'-0"	1/24XP	2	3	6
3/4" = 1'-0"	1/16XP	1.5	2	4
1" = 1'-0"	1/12XP	1	1.5	3

1 1/2" = 1'-0"	1/8XP	3/4	1	2
3" = 1'-0"	1/4XP	3/8	0.5	1
Half Size	1/2XP	3/16	1/4	0.5
Full Size	1XP	3/32	1/8	1/4
1" = 1000'-0"	1/12000XP	1125	1500	3000
1" = 500'-0"	1/6000XP	562	750	1500
1" = 400'-0"	1/4800XP	450	600	1200
1" = 200'-0"	1/2400XP	225	300	600
1" = 100'-0"	1/1200XP	112	150	300
1" = 80'-0"	1/960XP	90	120	240
1" = 60'-0"	1/720XP	67	90	180
1" = 50'-0"	1/600XP	56	75	150
1" = 40'-0"	1/480XP	45	60	120
1" = 30'-0"	1/360XP	33	45	90
1" = 20'-0"	1/240XP	22	30	60
1" = 10'-0"	1/120XP	11	15	30

Once a scale has been set, click on the viewport again if necessary to highlight it and drop down the "Display Locked" item in the Properties Palette and select "Yes." This will prevent movement of the model within the viewport.

4. Setting the visibility of layers within each viewport:

You can change the visibility of layers in a viewport by clicking inside the viewport and freezing a layer or layers in that viewport. To accomplish this, double-click in the viewport you want select the drop-down list of layers on the toolbar and select the layer you want to freeze and select the icon for



"freezing the layer in a viewport." The icon looks like this:

It looks like a sun over a rectangle, which I suppose is meant to remind you of a Layout.

Note, do not select the icon for "freezing" the layer, because it will freeze it in all viewports, as well as in model space.



That incorrect “Layer Freeze” icon looks like this: . It is just a plain sun without a rectangle behind it.

Check each viewport to make sure that all layers you want to show on the plot are thawed and are visible on the screen.

5. Setting shaded or hidden line parameters in a viewport:

You may want to hide lines which may fall behind other objects in a three-dimensional view in one or more viewports. To do this, follow these steps:

Select viewports in which you wish to remove hidden lines in the model. In Paper Space, click on the viewport in which you want to hide lines, drop down the list after "Shade Plot" in the Properties Palette and select "Hidden."

At this point, you need to go to the “Page Setup Manager” to complete your plotting parameters. To do this, right-click on your layout Tab at the bottom of the screen, and select “Page Setup Manager...” This is how the dialogue box will look:



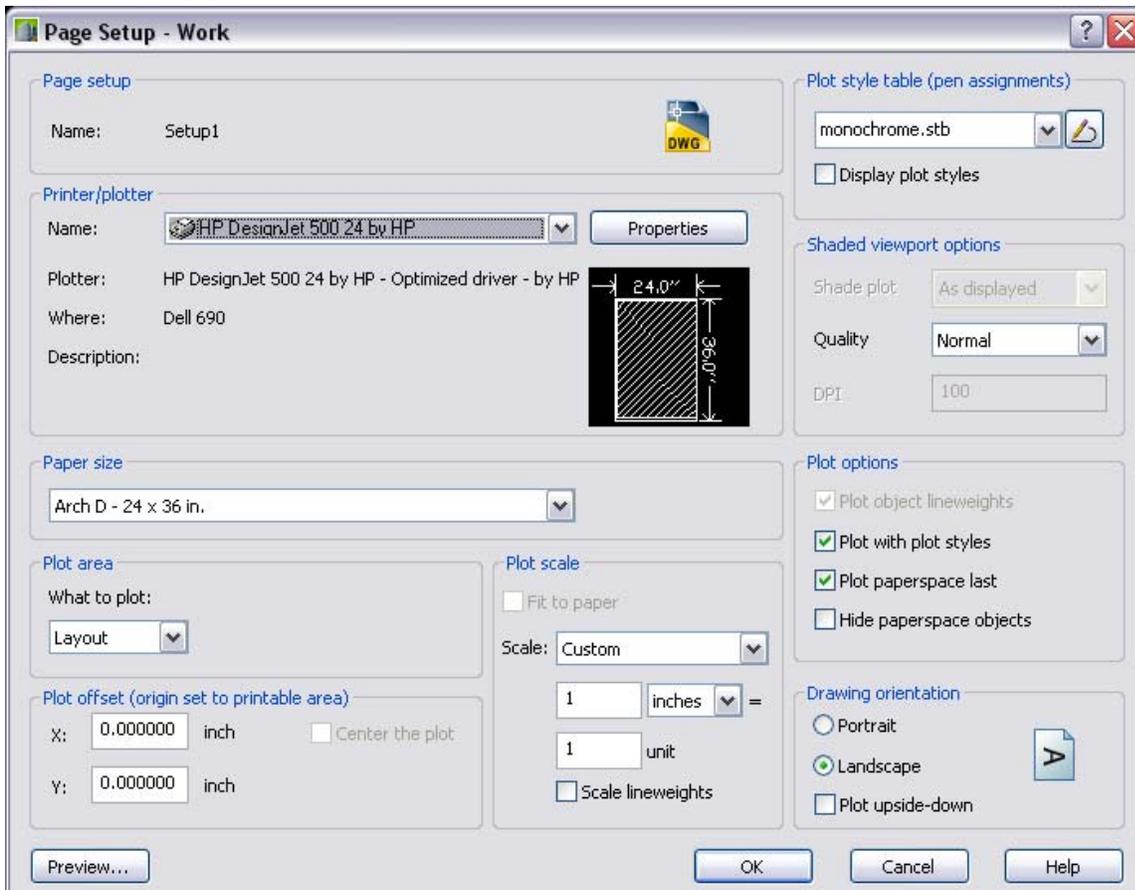
Select the “New...” button.

The “New Page Setup” dialogue box will appear:



Give your new setup a name first – you could give it your own name or name it for the plotter you want to use for plotting the drawing. Click OK. Page setups are saved with the drawing.

The “Page Setup” dialogue box will appear:



Let's take this rather complex dialogue box one step at a time.

First, in the upper left corner is the so-called "Page Setup Name." This is the name you typed in for the "New Page Setup" in the preceding step (in this case the name is "Setup1). There is nothing you can change here.

Next below that box is the "Printer/plotter box. Pull the list down and select the printer to which you want to plot the drawing. You can set the properties of the plotter by selecting the "Properties" button. Some plotters have "Custom Properties" you can set such as the resolution of the plot. This is how that is controlled.

Next below is the paper size. Select the size sheet to which you want to plot.

With the HP Design Jet 500 plotter:

For 8 1/2" x 11" landscape drawings, select ANSI A - 8 1/2 x 11 (portrait)

For 11" x 17" landscape drawings, select ANSI B - 11 x 17 (portrait)

For 18" x 24" landscape drawings, select ARCH C - 18 x 24 in. (portrait)

For 24" x 36" landscape drawings, select ARCH D - 24 x 36 in. (portrait)

Next below is the "Plot area." You typically want to plot the "Extents" of the layout, so select that choice.

Next below is the "Plot offset." Always make sure this is set to 0.00000 for both X and Y directions. This pushes the plot into the lower left hand corner of the printable area of the sheet, leaving the smallest margin possible.

In the middle column is "Plot scale." Set the scale to 1:1 (because the plot scale has already been set in the viewport scale)

In the upper right corner is Plot Style Table. Select "monochrome.stb" if you want all lines to plot black, or Acad.stb if you want lines to plot in their own color.

A "Plot style table" controls the printed colors, line weights, and "screening" (grey tones) of each line when it is plotted.

There are several Plot Style Tables that come standard as part of the Program

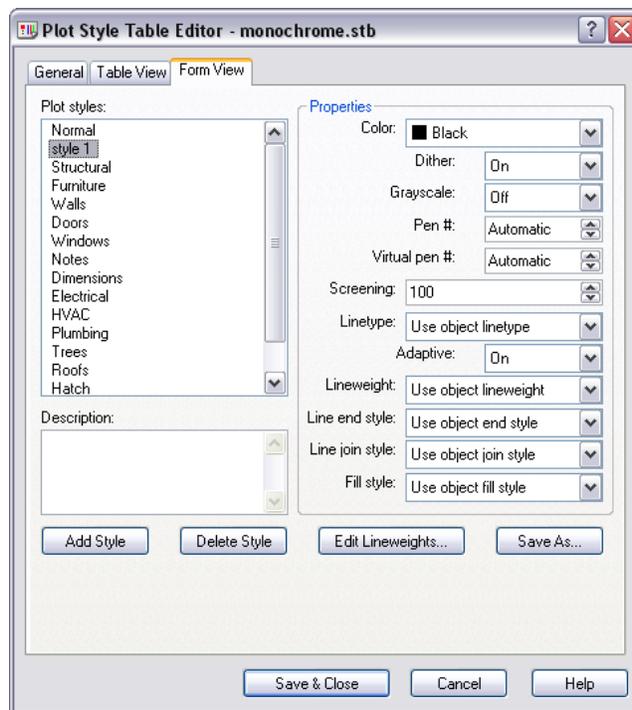
There are two types of Plot Style Tables:

"Named" Plot Style Tables - these use named objects to control the colors, line widths, and "screening" such as "walls," "doors," "windows," "notes," "dimensions," etc., or a more generic "Style1," "Style2," "Style3," etc. Each of those named objects can be set to plot to a different color, line width, and screening. These plot style tables have a file name extension of *.stb. Named Plot style tables are becoming the standard of the industry in recent years.

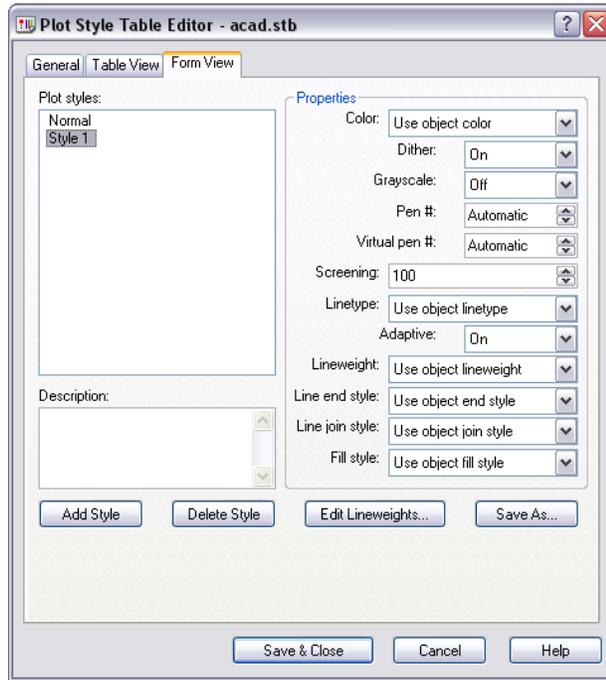
"Color" Plot Style Tables - these use the color of the object to control the colors, line widths, and "screening" such as all yellow-colored lines will plot to 0.60 mm line width, black color and 100% screening, all red colored lines will plot to 0.20 mm line width, etc. These have been the standard prior to named plot styles coming into being. They have the limitation of having only 255 possible combinations (because that is the maximum number of colors in AutoCAD).

Every individual drawing is set up to be plotted with either color plot style tables or named plot style tables. You normally need to decide when you start a drawing what type of plot style table you prefer and pick the Template that corresponds to either the "color-based" (-.ctb) or "name-based" (-.stb) plot style. See info at the end of this paper to learn how to convert from color-based plot style drawings to style-based.

Here is an example of the monochrome.stb plot style table:



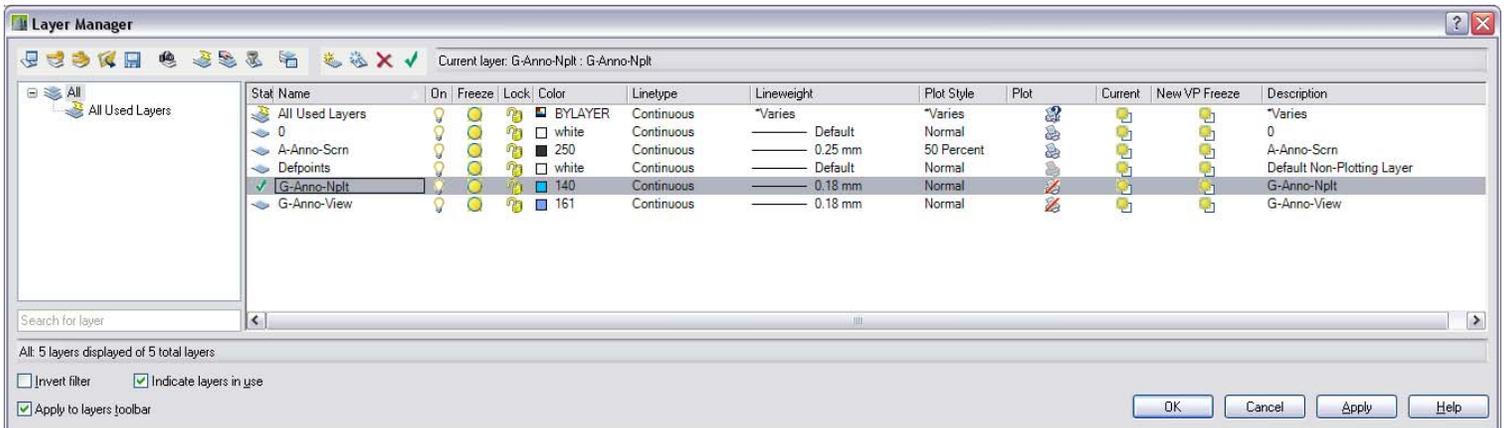
Here is an example of the Acad.stb plot style table:



Using “name-based” plot style tables (-.stb):

The most important thing about plot style tables are assignment of colors and line weights to objects. Varying line weights will make your drawing more readable.

There are several pre-made name-based plot style tables that come with AutoCAD out of the box. The two basic ones are “Acad.stb” and “Monochrome.stb.” Acad.stb plots all objects in their object color. Monochrome.stb plots all objects as black. In both cases line weights are based on the setting of the layer the objects are on. Below is a screen shot of a layer list in the Layer Manager which shows how Lineweight and Plot Style are assigned to every layer. The “Default” Lineweight is 0.25 mm (equivalent to the #000 Rapidograph pen width which manual drafters used for typical thin lineweights).



You typically want all colors to be plotted Black, because you will distribute your drawings in multiple copies to many contractors and printing multiple drawings in color is very costly. Therefore, plot style tables should have the color property of every style set to black.

Plot styles are assigned to layers, although that can be overridden at the object level using the Properties Palette.

The so-called “Normal” plot style: This is an insidious style that is assigned by default to all layers. None of its parameters can be changed by you. It automatically plots every object in the drawing according to its color and screened at 100%. In the case of a black and white plotter (such as a laser-jet) it will convert the colors to their grey-scale equivalent. I do not recommend ever using the “Normal” style.

You also want each object to have its own lineweight associated with it, therefore the plot style table should have the "Lineweight" setting to be set to "Use object lineweight." Therefore, if you change the lineweight of an object, it will be plotted correctly. To make this easier, every layer should be assigned a lineweight, in addition to color and linetype.

Under name-based plot style tables, lineweights can be set to plot in four possible ways:

1. Assign a layer on which that the object is drawn to a plot style that sets Lineweight to “Use object lineweight” and assign a specific lineweight to that layer (this is the most common method).
2. Create a Plot Style for every specific lineweight you want to plot, and assign a layer to a plot style that sets Lineweight to: the specific lineweight. For instance, you could have the following plot styles: “Style 00”, assigned the lineweight 0.0000 mm ; Style 01, assigned the lineweight 0.10 mm; Style 02, assigned the lineweight 0.20 mm; etc. This system is clear but cumbersome to keep track of.
3. Assign an individual object (through the Properties Palette) to a plot style that sets Lineweight to a specific width pen. This overrides the plot style that is assigned to the layer on which the object is drawn.
4. Assign an individual object (through the Properties Palette) to a specific lineweight. This overrides the lineweight that is assigned to the layer on which is drawn.

To edit a plot style table: type stylesmanager<RET>

Below the Plot Style Table pull-down menu is a check box that says enigmatically “Display Plot Styles.” It is unchecked by default. If you check it, the appearance of objects in the plot “Preview” will appear as they will be

according to the Plot style, for instance, all in black if you use the "monochrome.stb" plot style, or in color if you use the "Acad.stb" plot style. No biggie.

Next below is "Shaded viewport options." I would not use this. It will override all of your viewport settings for shading or hiding lines behind other objects. All viewports will be treated the same. Keep it set to "As displayed." The "Quality" pulldown list is only for shaded objects. Keep it set to its default "Normal."

Next below is "Plot Options." Keep this set to the default options, the following of which are checked: "Plot object lineweights," "Plot with plot styles," "Plot paperspace last," but not "Hide paperspace objects."

Next below is "Drawing Orientation." Always select the "Landscape" radio button if you selected "portrait" paper, and vice versa.

Click OK to go back to the Command: prompt.

Finally, How to plot.

To plot, select the plot icon, or type <Ctrl>P, or Select from the "File" pulldown menu and then "Plot..."

In the Plot Select the " Preview" button

If everything looks good, right click, then select "Plot." If it does not look good, click "Exit" and then fix the setup.

When the setup is fixed, select OK and the drawing will plot.

To use this plot setup again in the same drawing, pull down the list of Page Setup Names and select the one you want. The Page Setup controls everything on the dialogue boxes about plotting, such as the Plot Device, the Plot Style Table, the paper size, the plot area, the plot scale, and the drawing orientation.

Plotting Raster objects in drawings

If you have a color photo inserted into your drawing, or if you use a gradient fill, those objects will plot in color or grayscale (in the case of a black-and-white plotter) regardless of how you set up the plot style for the layer they are on.

Appendix:

How to convert a drawing from “color-based” plotting to “name-based” plotting:

Many older drawings and older AutoCAD drafters have used color-based plot styles because the named-based system is a relatively recent development in AutoCAD. Power users recommend the use of named-based drawings and plot styles because they are more flexible. With name-based plot styles your plotted lines are no longer dependent on their color to determine their line width and screening characteristics. If you have a drawing which has been created to use color-based plot style tables, you can convert it to use named-based plot style tables, follow these steps:

1. Open the color-based plot style drawing
2. Type `convertctb<RET>` - This will create a new name-based plot style table mimicking the various plot styles (line color, width and screening) that are mapped to colors in the drawing. A new “style” will be created for each different plotted color variation, and given the names of style1, style2, style3, etc. - this new named plot style table will contain a color mapping table.

A notification box will pop up telling you that "This command converts a Color Dependent plot style drawing to use Named Plot styles, etc. " - click OK.

Select the plot style table in the list that pops up that you would like to use to convert from

Type in a name of the new named plot style table that you would like to convert it to

3. After step 2 is completed, type `convertpstyles<RET>`. A notification box will pop up telling you that "This command converts a Color Dependent plot style drawing to use Named Plot styles" - click OK. Then you will be prompted to select a named plot style table to use with the drawing - you must choose a named plot style table from the list which contains a color mapping table, such as the one you just created in step 2 above. If you do not, an error message will pop up telling you that the named plot style table you selected does not contain a color mapping table and asking you to select a different one.
4. Done