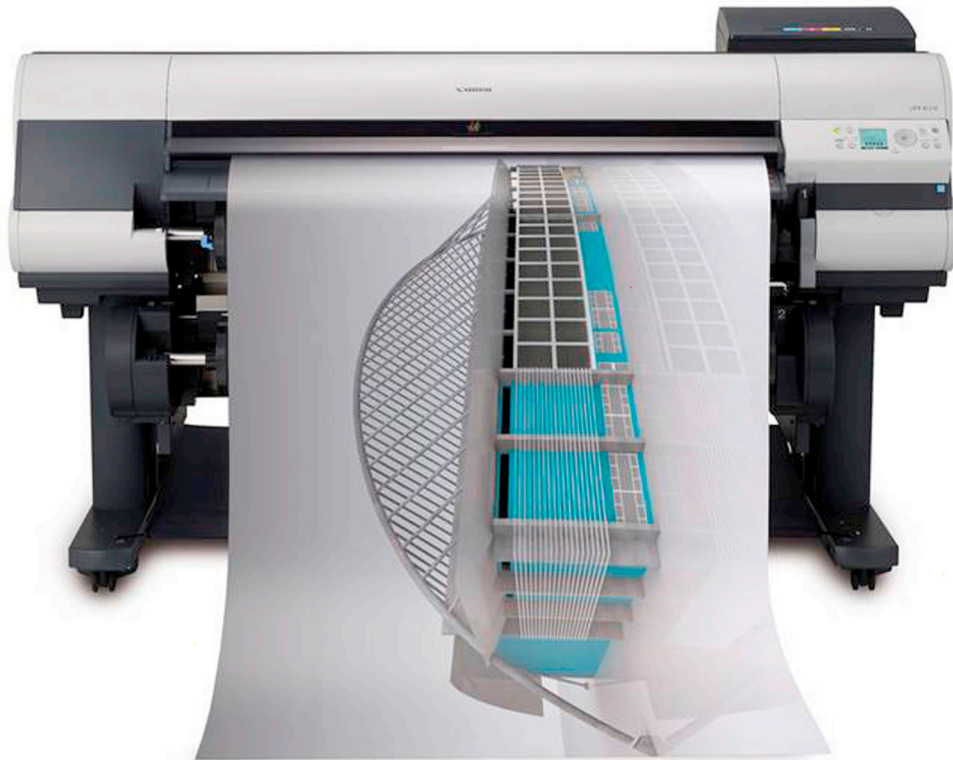


Chapter 9

Basic Printing and Output



Learning Objectives

In this chapter we introduce the Plot dialog box and the Page Setup Manager and go through all the associated options to produce a print or a plot, including the following:

- What *printer* or *plotter* to use
- What *paper size* to use
- What *area* to plot
- At what *scale* to plot
- What *pen settings* to use
- What *orientation* to use
- What *offset* (if any) to use
- The Page Setup Manager

Upon the completion of this chapter you will be able to recognize and set up all the features needed to print or plot any type of drawing from any AutoCAD workstation.

Estimated time for completion of this chapter: 1 hour.

9.1 INTRODUCTION TO PRINTING AND PLOTTING

Designers and their clients usually want something tangible to look at and use. Because of this, most design work in AutoCAD must be created with the ultimate goal of displaying it on a piece of paper, not just on screen. Indeed, the fundamental immediate “product” of most design work is paper output. This output is then used to manufacture, fabricate, build, or assemble the design. It also may be needed for pre- and postdesign purposes, such as sales or archiving. These needs influence the evolution of a drawing from the outset, and a skilled AutoCAD designer selects paper size, output scales, and lineweights early in the process so the inevitable output proceeds smoothly.

Professional-looking output in AutoCAD is no accident and comes with its own set of challenges. Although you may be able to walk up to an expertly set up drawing and just select File→Plot→OK, such smooth results come from only a thorough understanding of what is involved. More important, if the requirements call for a different output of the same drawing (e.g., for an informal check of a small section of the drawing versus a final full-size submission to the client), you must know what to change and by how much.

AutoCAD allows for a wide array of output, each method with its own tricks and details. Output spans this chapter as well as part of [Chapter 10](#), Advanced Output—Paper Space and [Chapter 19](#), Advanced Output and Pen Settings. Our goal right now is only to familiarize you with the essentials and what AutoCAD needs to know to print or plot a drawing.

Take note, as you go through this chapter, that although some specifics, such as type of printer or plotter, may be unique to your particular office, home, or school, most of what you need to know stays constant from situation to situation and from one release of AutoCAD to another (even if the locations of the buttons and menus change). Therefore, it is important that you memorize and understand the essential underlying concepts, not just “which buttons to push.”

9.2 THE ESSENTIALS

You need to give AutoCAD the following information when setting up a drawing for printing or plotting:

- What *printer* or *plotter* to use.
- What *paper size* to use.
- What *area* to plot.
- At what *scale* to plot.
- What *pen settings* to use.
- What *orientation* to use.
- What *offset* (if any) to use.

There are, of course, some other subtleties, but we focus on these essential ones for now. Note that we do not look at the actual Plot dialog box until later, as you first need to understand what the preceding means.

What Printer or Plotter to Use

This is where you select what output device to use. In most architecture offices, engineering companies, and schools, you have a plotter (color or black and white) for C-, D-, and E-sized drawings (paper sizes are discussed next), and a LaserJet printer (color or black and white) for A- and B-sized drawings. Your typical AutoCAD station usually is networked to access both, as requirements may change daily. You need to select which device is getting the drawing. (AutoCAD does not care—it will print a floor plan of a sports stadium on a postcard if you let it.) This choice, of course, is tied in with the scale and the ultimate destination of the printed drawing (is it a check plot or for a client?). We discuss this in more detail later.

What Paper Size to Use

You would think that paper sizing is a cut-and-dried, straightforward matter (somewhere a professional printing company manager is laughing), but this is certainly not the case. Paper comes in a bewildering array of international sizes and standards in both inches and metric (millimeter) sizing. Some common standards include ANSI, ISO, JIS, and Arch. For the purposes of this discussion, we need to simplify matters and present all paper as existing in the following basic sizes as viewed in Landscape mode, meaning the first (larger) value is the horizontal size:

- A size: 11" × 8.5" sheet of paper (letter).
- B size: 17" × 11" sheet of paper (ledger).
- C size: 22" × 17" sheet of paper.

- D size: 36" × 24" sheet of paper.
- E size: 48" × 36" sheet of paper.

Generally speaking, these are the maximum paper dimensions. Some standards list essentially the same sizes but with the border accounted for and removed, so a D-size sheet is 34" × 22" and so on. Note that legal (14" × 8.5") size paper, while certainly can be used, is not common in engineering or architecture.

As a side note, we can now define precisely the difference between printing and plotting.

Printing usually refers to the output of drawings on A- or B-sized paper, which is easily done on most office LaserJet printers. Most home printers can do only A size, but this of course varies with the size (and cost) of the printer.

Plotting usually refers to output of drawings on C-, D-, or E-sized paper, which has to be done on plotters, as a LaserJet generally cannot accept paper of this size.

Memorize the paper sizes presented here, as it is pretty much the industry standard as far as AutoCAD design is concerned. You will hear these sizes asked for and referred to, come printing time; and if there is any deviation from these sizes, rest assured it will not be anything radical, as printers and plotters can accept only so much flexibility, at least among the models that small companies and schools can afford.

What Area to Plot

What “area to plot” can be taken quite literally, as in: What do you want to see on the printed paper? The essential choices really boil down to two. Do you want to see the entire drawing (usually) or parts thereof (sometimes)? Your choices in that regard include the following.

Extents

This option prints everything visible in the AutoCAD file. However, this means everything visible to AutoCAD (and not necessarily to you), so if you have a floor plan with some stray lines that you did not notice located some distance away, AutoCAD shrinks the important floor plan to make room for those unimportant stray lines. This is exactly the same as typing in *Zoom*, then *Extents* (from chapter: AutoCAD Fundamentals—Part I). So it is a very good idea to zoom to extents prior to printing. Remember this acronym: What you see is what you get (WYSIWYG). If you can see it on the screen after zooming, it will print unless prior arrangements are made (freezing the layer etc.) or the geometry is on the Defpoints layer. For a carefully drawn layout, Extents is the only choice when you want to see the entire drawing.

Window

As you may have guessed, this is for those situations where you want to see just a piece of the drawing. You simply select that choice, click on the Window button that appears to the right of it, and draw a selection window around what you want to see.

Display and Limits

The remaining two choices are of little use in most situations. Limits plots the entire drawing from 0,0 to the preset limits, something most users do not set anyway. Display plots the view in the current viewport in the Model tab or the current Paper Space view in a Layout tab, something we have not covered yet. One can generally use Window in those situations, but Display is fine as well if you want only the current viewport printed.

At What Scale to Plot

Of all options in Plot, this one causes the most confusion to a beginner AutoCAD user, for the simple reason that scale is closely tied in with a very important topic: Paper Space. The essential idea here is that while, yes, you can assign a scale from the Plot dialog box, in reality this is not usually done for most drawings, except simple and small mechanical pieces, such as bolts and brackets. What is done instead is that a title block is set up in Paper Space and the design (in model space) is scaled by means of viewports (much more on this in chapter: Advanced Output—Paper Space), so, in the Plot dialog box, you can select 1:1 (one-to-one) and a properly set up drawing prints to scale.

What if you do not care about scale and just want a print to look over? Here, the pendulum swings in the other direction and things become very easy. Just check off the Fit to Paper box above the scale and the drawing fits on whatever paper you are using, with no regard to scale whatsoever. While this technique is not for final prints of to-scale architectural layouts,

it is used very often for nonscaled work, such as electrical wiring schematics, network design, conceptual layouts, and of course check plots.

What Pen Settings to Use

This is a topic that has an entire chapter all to itself (see chapter: Advanced Output and Pen Settings), and we just do a brief overview here. Proper pen settings are a major factor in giving your drawings a professional look. The concept is simple, usually addressed in hand drafting, yet often overlooked in the computerized world of AutoCAD. It deals with the fact that linework in a drawing is not all the same size. Primary features, such as walls on a floor plan, should appear darker on a print, while secondary features, furniture, for example, should appear slightly lighter. This was the reason for the existence of 2H, 4H, and other pencil leads, for those students old enough to remember, and the reason today for the existence of pen settings.

With AutoCAD, different colors represent the different pencil leads, and a strict standard needs to be followed as to what drawing features have what colors assigned to them. In this manner, drawings come out with different shades of linework, something noticed by the eye; and as a result, the drawings are much more readable and professional looking. These settings are created, customized, adjusted, and saved under the `ctb` extension, for all to use according to company standards set by management.

For now, select `acad.ctb` as your `ctb` file; the entire set of customization tools are presented in Chapter 19, Advanced Output and Pen Settings.

What Orientation to Use

This is simply a question of whether you want the drawing to be oriented Portrait or Landscape; in other words, do you want the longer side of the sheet of paper oriented up/down or across? This should be familiar to just about every computer user who has printed anything from a word processor or other software.

One twist here is that you can check off a box to plot upside down. A useful application for this option appears when you are printing many sets of similar-looking (but different) drawings. If you want to know which drawing is coming out of the plotter without waiting until it plots completely, send it in backwards. That way, the title block (with the identifying drawing number) comes out first and the question is instantly resolved.

What Offset to Use



This refers to whether or not you need to shift your drawing around to account for a border and stapling area on the left (or elsewhere). If you check off Center the plot, it will be automatically centered on the paper, and in most cases this is what you would do.

Miscellaneous

There are a number of other features in Plot. For example, you can plot to a file (*.plt) and take it with you to another computer. This is useful for large volume drawing duplication at stores that have no AutoCAD, only printers, such as FedEx. You can also turn on a plot stamp so information such as date and time of the printing can appear in the border. Some plotting features are unique to 3D and solid modeling. We explore some of these topics as well in Chapter 19, Advanced Output and Pen Settings. Finally, there is a Preview window and a Number of copies to print selection, the functions of those being self-explanatory.

9.3 THE PLOT DIALOG BOX

Let us now take a close look at the plot dialog box and identify the locations of all the features described earlier. Open up the floor plan from the earlier chapters and bring up Plot via any of the following methods.

Keyboard: Type in <code>plot</code> and press Enter. Also <code>Ctrl-P</code>
Cascading menus: <code>File</code> → <code>Plot...</code>
Toolbar icon: Standard toolbar 
Ribbon: <code>Output</code> tab→ <code>Plot</code> 

The Plot—Model dialog box appears, as seen in Fig. 9.1. In AutoCAD 2017, it should open to full size right away. If for some reason it is not full size, press the small arrow at the bottom right to expand it fully. The features we discuss are in Fig. 9.2.

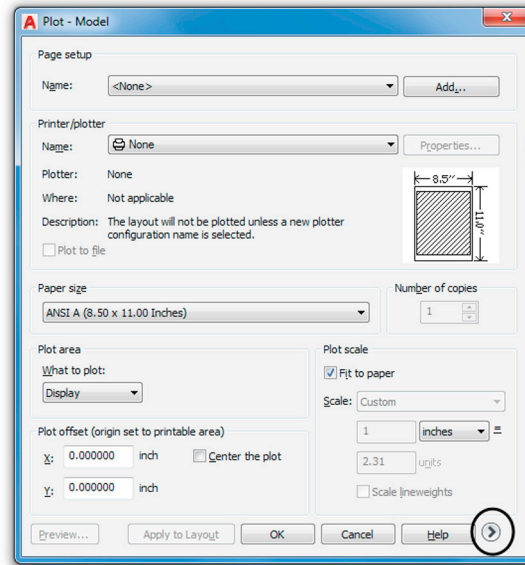


FIGURE 9.1 Plot dialog box, expand arrow.

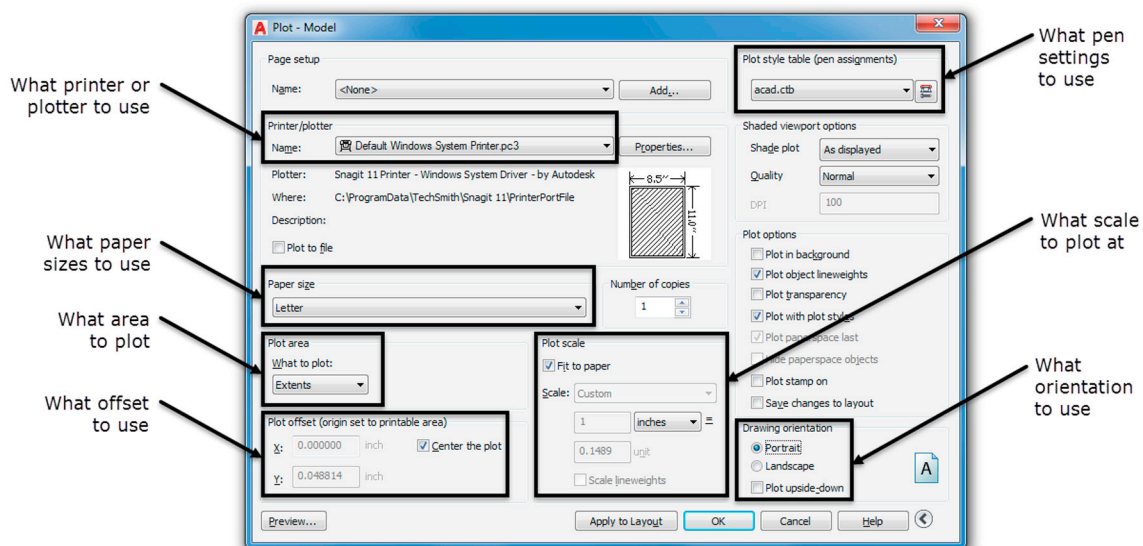


FIGURE 9.2 Plot features.

Go through all of the settings, referencing the explanations in the previous discussion, until you completely understand what each one does. Set the final settings as shown next.

- *What printer or plotter to use:* Set whatever printer is available at your location (it likely differs from what you see here). If you have a plotter, ignore it for now and use a printer instead, as we are using A-size paper for this exercise.
- *What paper size to use:* Select from the drop-down list. We want any A size available; Letter (8.5" × 11") or similar is fine.

- *What area to plot:* Select Extents.
- *At what scale to plot:* Check off Fit to paper for this exercise.
- *What pen settings to use:* Select acad.ctb, and click on Yes if prompted to use this for all layouts.
- *What orientation to use:* Select Landscape for this example.
- *What offset (if any) to use:* Check off Center the plot.

Do not press OK yet. The Plot box should look like (or close to) [Fig. 9.2](#). We need to first discuss an important feature of printing: the preview.

Preview

Much like the situation with creating an array or hatch, a Preview button is available. With printing and plotting drawings, it is crucially important to preview the drawing before sending it to the printer or plotter. Paper and ink cost money, and everyone regardless of skill level, makes mistakes in setting up printing. This really should become a habit, as errors can be costly, especially on large print jobs. On an industrywide scale, this simple Preview button actually saves tons of paper and gallons of ink. Not only printing setup errors but even linework drawing errors can be caught during the preview process.

Go ahead and press Preview... (lower left corner), and the Preview screen in [Fig. 9.3](#) appears. You can zoom and pan around using standard mouse techniques, and when you are ready to send the drawing to the printer (or return to Plot for adjustments), right-click and select Exit or Plot, respectively.

Go ahead and plot. If everything was set up correctly and your computer is connected to the printer, the floor plan should print pretty much as expected and seen in the preview of [Fig. 9.3](#).

If something does not look right anywhere in the process, review the entire set of steps, one by one, returning to the Preview screen to check up on the effects of the changes.

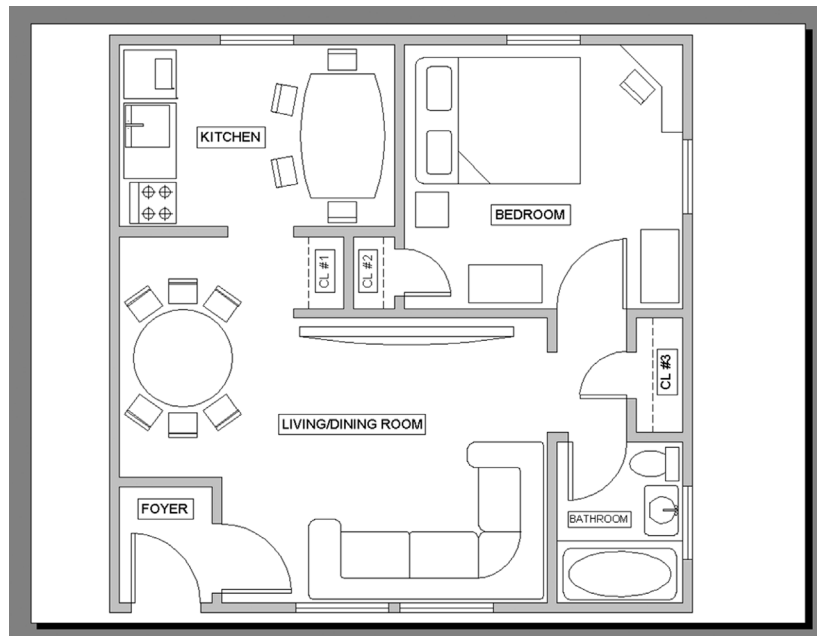


FIGURE 9.3 Plot preview.

9.4 PAGE SETUP MANAGER

There is one last topic to learn in this chapter. The settings on the print job you just sent are not saved in memory. Test this by typing in `plot` again. Unless the settings have been saved somehow, you have to reset them all again. The technique to “save” your settings involves another feature of plot called *Page Setup Manager*.

The idea here is as follows. You need to enter all the data for a print job in another, similar-looking print dialog box and save it under a descriptive name. Then, save the drawing with these settings, and when you do the actual plot, the name you

saved it under appears under Page setup (upper left corner). No more entering settings one item after another; just select the Page setup (it may already be cued up), preview, and print.

This has two advantages. The first is obvious: It speeds things up a lot by keeping all the drawing's print settings ready for use. The second may not be as obvious. Because you can save as many setups as you want, you can have one drawing set up for multiple printers or multiple settings.

For example, your office may need the final output sent in color to a D-sized plotter at a certain scale, but in-house checks are done on 17" × 11" sheets, in black and white and no scale. You can easily set up two distinct setups and name them *Client_Layout* and *Check_Layout*. It is not unusual to see up to half a dozen setups on one drawing, each with its own purpose: presentation, archiving, optimized for color, check plots, and so forth.

A question usually arises when this topic is presented. Does this need to be done every time a new drawing is created from a blank file? The answer is yes, but it is something that needs to be done only once and saves you much time down the road. Obviously, using templates negates the need to do this at all, as all settings carry over.

The Page Setup Manager is found using the cascading drop-down menu: File→Page Setup Manager... or the Output tab on the Ribbon and is shown in Fig. 9.4.

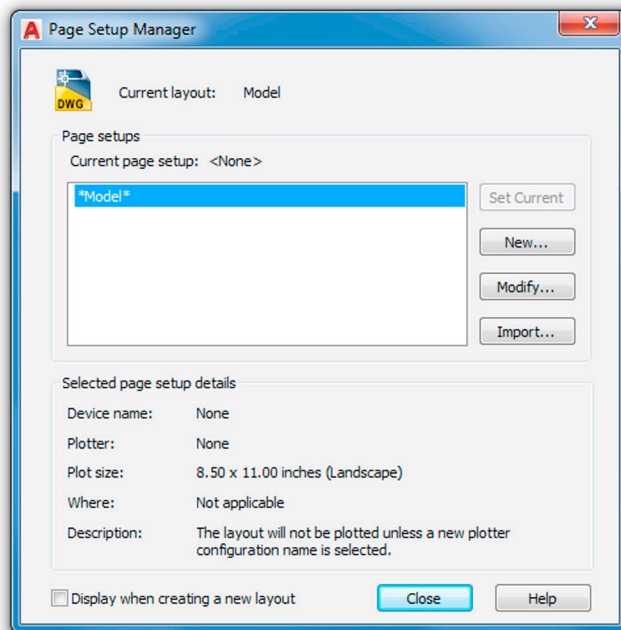


FIGURE 9.4 Page Setup Manager.

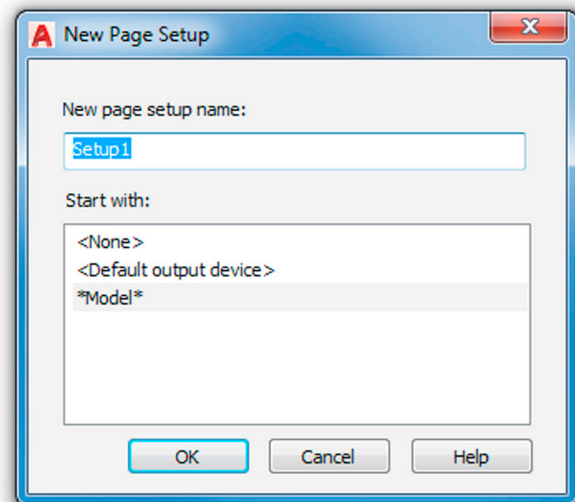


FIGURE 9.5 New Page Setup.

Press the New... button and the New Page Setup box appears, as shown in Fig. 9.5. Enter the name of the new setup and press OK.

You are then taken to the now familiar-looking Page Setup dialog box. Upon completion of the settings, a preview (yes, still needed), and a press of the OK button, you are redirected to the Page Setup Manager, ready for another setup if needed. If not, press Close.

To see the benefit of this, go to Plot and select the name of the setup from the Page setup in the upper left corner; all your settings appear. Plot the drawing and save it. You never have to enter settings again (unless something changes, like the arrival of a new printer). So, finally, after learning all this new material, you can now reduce printing to a pressing of the Preview and the OK buttons—our goal all along.

As stated before, there is still a lot we have not covered, and we revisit this topic again in Chapter 10, Advanced Output—Paper Space and Chapter 19, Advanced Output and Pen Settings. Printing is something you usually receive assistance with at a new job, training center, or consulting gig. However, the most you should expect to be told is what printer is commonly used (up to ten connected to one computer is not unheard of) and what is the standard *ctb* file in use. The rest is up to you, and with the knowledge you gained in this chapter, you should be proficient in all printing matters just short of the level of AutoCAD management and administration.

9.5 SUMMARY

You should understand and know how to use the following concepts and commands before moving on to [Chapter 10](#), Advanced Output—Paper Space:

- What printer or plotter to use
- Differences between plotting and printing
- What paper size to use
 - A size
 - B size
 - C size
 - D size
- What area to plot
 - Extents
 - Window
 - Display
 - Limits
- At what scale to plot
 - 1:1
 - Fit to paper
 - Other scale
- What pen settings to use
- `ctb` files
- What orientation to use
- Portrait or Landscape
- What offset (if any) to use
 - Center the plot
 - X or Y offset
- Preview
- Page Setup Manager

Review Questions

Answer the following based on what you learned in this chapter:

1. List the seven essential sets of information needed for printing or plotting.
 2. List the five paper sizes and their corresponding measurements in inches.
 3. What is the difference between printing and plotting?
 4. List the four plot area selection options.
 5. What scale setting ignores scale completely?
 6. What is the extension of the pen settings file?
 7. Explain the importance of Preview before printing and plotting.
 8. Why is the Page Setup Manager useful?
-

Exercise

1. Open the mechanical device drawing from [Chapter 8](#), Polar, Rectangular, and Path Arrays and practice printing with a variety of scales and other settings. (Difficulty level: Easy; Time to completion: < 10 minutes.)
 - Select printer (specific to your school, home, or office).
 - Select paper size; stay with A size.
 - Select Extents for the area; observe the results in Preview.
 - Select Window for the area; select an area and observe the results in Preview.
 - Try a variety of scales such as 1:1, 1:2, and so on; observe the results in Preview.
 - Pick the `monochrome.ctb` file.
 - Try both Landscape and Portrait orientation.
 - Center the plot.

The following figures show the mechanical device in an Extents Preview (first part) and Windows Preview (second part).

