

# Chapter 7 - Advanced Imaging

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## Chapter Overview

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- Scanner Resolutions
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# Notes

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## Introduction

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To take full advantage of your Accel-a-Writer 8200's high resolution and make your images look their best, it is important that you understand levels of gray, line screens, scanner resolutions, and their uses within specific applications. The first half of this chapter explains what levels of gray and line screens are and how to work with them to achieve the best possible quality of output. It also covers scanning, selecting formats for your files, and using gamma corrections, enhanced screening, and XANTÉ's Accurate Calibration features. The second half of the chapter covers terms and elements of page design with tips for adding finishing touches for a truly professional image.

## Levels of Gray

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The resolution of a laser printer is measured in dots per inch (dpi). The standard resolution on your Accel-a-Writer 8200 is 600 x 600 dpi, which you may have upgraded to 800 x 800 or 1200 x 1200 dpi.

Generally speaking, the human eye can detect approximately 200 shades of gray in an image. This means that the higher the levels of gray (number of shades) used to produce a halftone image, the smoother the image looks during the transition of changing dot sizes.

The following simple formula can help you determine the shades of gray used to produce an image:

$$\left( \frac{\text{dots per inch}}{\text{lines per inch}} \right)^2 + 1$$

For example, if you print at 600 x 600 dpi with a 60 line screen, the image produced has 101 levels of gray ( $600/60 = 10$ ;  $10 \times 10 + 1 = 101$ ). If you want more levels of gray at 600 dpi, the line screen or lines per inch (lpi) has to be reduced.

Keep in mind that the higher the lines per inch, the tighter the screen on the image will be. To produce higher levels of gray without using a lower line screen, you must print at a higher dpi. An illustration of this would be to print the same image at the Accel-a-Writer 8200's optional 800 dpi with the same 60 line screen. You would now have approximately 170 levels of gray ( $800/60=13$ ;  $13 \times 13 + 1 = 170$ ).

Use the following table as a guide to get 256 levels of gray.

### **LPI To Achieve 256 Levels of Gray**

<b><u>Printer Resolution</u></b>	<b><u>LPI</u></b>
1200 x 1200 dpi	75
800 x 800 dpi	50
600 x 600 dpi	38

## **Line Screens**

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Knowing how many levels of gray you would like to achieve is one factor in determining the appropriate line screen to use. Depending on the individual image quality, some degree of experimentation usually is necessary to produce the best possible output. *You do not always have to achieve 256 levels of gray for the best output.* We have found the following line screens (lpi) to work the best: 60 for 600 dpi, 71 for 800 dpi, and 95 for 1200 dpi. Trying these line screens generally gives you a more precise idea of the optimum output for a particular image.

## **Scanner Resolutions**

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Another way to insure high quality output for your images is to determine the optimum scanning resolution.

## Line Art Scanning

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For line art, the optimum scanning resolution would be at the same resolution as the output device, especially when reproduced at the same size. For example, when printing from your Accel-a-Writer 8200 in the 600 dpi mode, the scanner resolution should be set at 600 dpi.

## Halftone Scanning

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The resolution for scanning a halftone is usually lower than that of the output resolution. Black and white images should generally be scanned at a resolution of 2 times that of the line screen used, if printing at 100% size. For example, if a line screen of 95 is used, the scanner resolution should be set to 190 dpi (95 x 2). If that resolution cannot be selected, choose the next higher resolution available. Also, scanner resolutions depend on the size at which the output is printed. If the previous example were to be printed at 75% of original size, then the scanner resolution should be set to 142 dpi (95 x 2 x .75).

The formula for scanning in this section is used to determine the optimum resolution possible. Scanning the image at a lower than optimum resolution results in less detail. Scanning at a higher resolution increases the file size and the processing time, and it may only slightly increase the amount of detail. The following is a formula for scan resolution:

**desired lpi x 2 x % of original size**

## TIFF, PICT, EPS Formats

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After creating or scanning the image, you need to decide the format in which to save it. The three most popular formats are TIFF (Tagged Image File Format), PICT (from Picture), and EPS (Encapsulated PostScript) files. If you use a scanning application such as Photoshop, make sure to choose the appropriate line screen under Page Setup before saving the image. This is essential for importing the image into other applications. Some programs do not allow you to change the line screen of an individual PICT or EPS image once it is imported.

**PageMaker** only allows you to change the line screen of a TIFF file. Do this by clicking the image and choosing Image Control under the Elements menu. Set the line screen using the formulas in the previous section, “Halftone Scanning.”

*Note:* Different versions of PageMaker may work differently. See the application manual for details.

**QuarkXpress** only allows you to change the line screen of an individual TIFF file. Do this through the Style menu. QuarkXpress gives you a choice of Normal (default), 60, 30, 20 and Other line screens. You may choose your own lpi through Other. QuarkXpress goes a step further by allowing you to change the line screen of the entire document in Page Setup under the File menu.

*Note:* Different versions of QuarkXpress may work differently. See the application manual for details.

For more information on specific applications, see appendix B, “Application Notes.”

## Gamma Corrections

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XANTÉ Halftone Calibration Technology includes a sophisticated gamma corrections feature. This feature allows you to change midrange contrasts by adjusting grayscale values without altering the black shadow and white highlight values at each end of the scale.

For example, if a scanned image is too dark, you can use the printer's front panel to select a new gamma setting to lighten and enhance the details. Gamma corrections bring out details that can be lost when printing at higher line screens or when dark photos are scanned.

Your Accel-a-Writer 8200 offers seven gamma settings, 0 through 6 with 0 as the default. Settings 0 through 5 progressively lighten the midrange values. If you need a negative (reverse) image, which is required by some printing processes, you can create one using gamma 6 rather than using a software application. Figures 7.1 and 7.2 illustrate the effects of gamma correction settings.

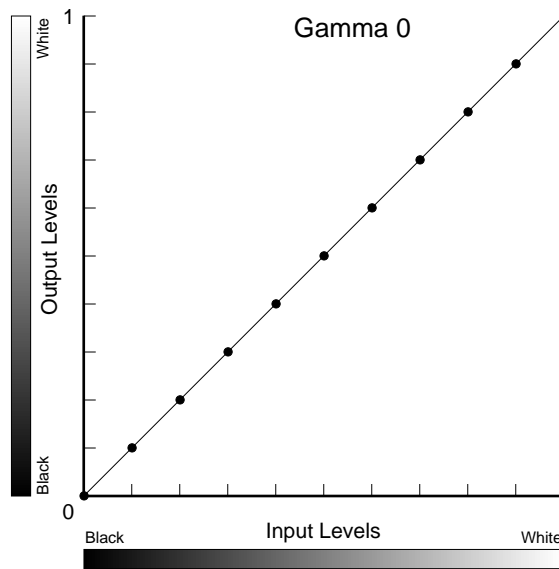


Fig. 7.1 Gamma Correction 0

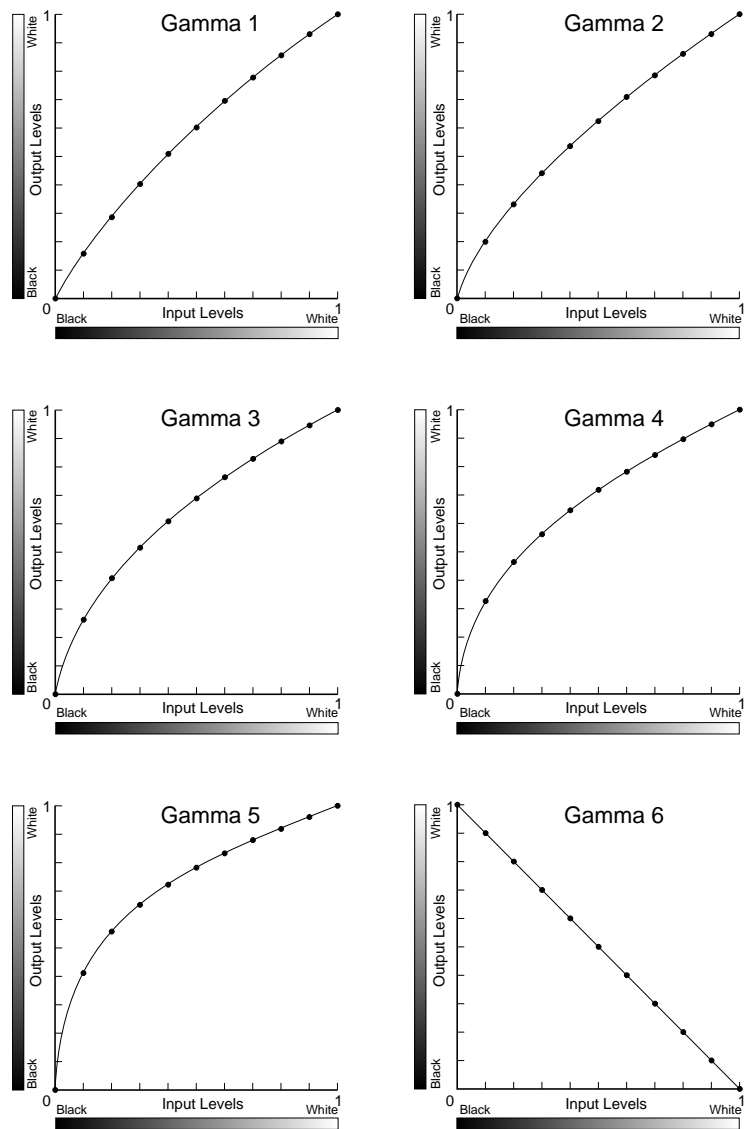


Fig. 7.2 Gamma Corrections 1 through 6

If you use gamma corrections in combination with XANTÉ's new enhanced screening technology, you can further fine tune your output quality. See "Levels of Gray" earlier in this chapter and the next section, "Enhanced Screening," for more details.

## Enhanced Screening

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XANTÉ's enhanced screening allows you to select from the normal (default) or the enhanced screens defined by 145, 197, or 256 levels of gray using either the printer's front panel or via software printer setup. If you use the front panel, the default enhanced screen is setup under the MISC:SCREEN menus. If you use the software printer setup, you can select the levels of gray and gamma settings simultaneously. Gray level and line screen combinations of enhanced screens are defined as:

<b>Levels of Gray</b>	<b>Line Screens</b>		
	<b>600 dpi</b>	<b>800 dpi</b>	<b>1200 dpi</b>
145	70	93	140
197	60	80	120
256	53	72	106

There are nineteen possible gamma correction and levels of gray combinations from which you can choose to fine tune your output quality. Depending on your printing environment, Macintosh or PC, use one of the following procedures to select the enhanced screens.

**In a Macintosh environment**, to select the enhanced screens

1. Select Print... from the File menu from within your application. The print dialog box appears.

2. Click Options.... The Options window appears
3. Select the desired screen.
4. Click OK. The print dialog box reappears.
5. Click Print.

**In a PC environment,** to select the enhanced screens

1. Start your Windows application.
2. Go to the Control Panel and select Printers.
3. Click Setup....
4. Click Features....
5. Locate the Enhanced Screen options and select the desired screen.
6. Click OK.
7. Click OK.
8. Close the Control Panel window.

## Accurate Calibration Technology

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XANTÉ's Accurate Calibration Technology (X•ACT) allows you easily to calibrate the printer's engine to print more precise horizontal and vertical dimensions within the width of one dot.

X•ACT compensates for print engine variations. Every printer prints in a slightly different way; one engine may print one line a little long and another a bit short with a usual accuracy of  $1 \text{ mm} \pm 2 \text{ mm}$ . While this variance is acceptable for many uses, it is unacceptable for color separations and other jobs where pinpoint accuracy is essential.

Working with X•ACT varies depending on if you are in a PC or Macintosh environment. Also, after you adjust the printer's line

length, you need to adjust the printer's margin setting accordingly. Both adjustments can be done using XANTÉ's Command Center.

In a Macintosh environment, to calibrate line lengths and adjust the printer margins

1. Start Command Center by double clicking its icon.
2. Select X•ACT Calibration... from the General menu. The following screen appears.

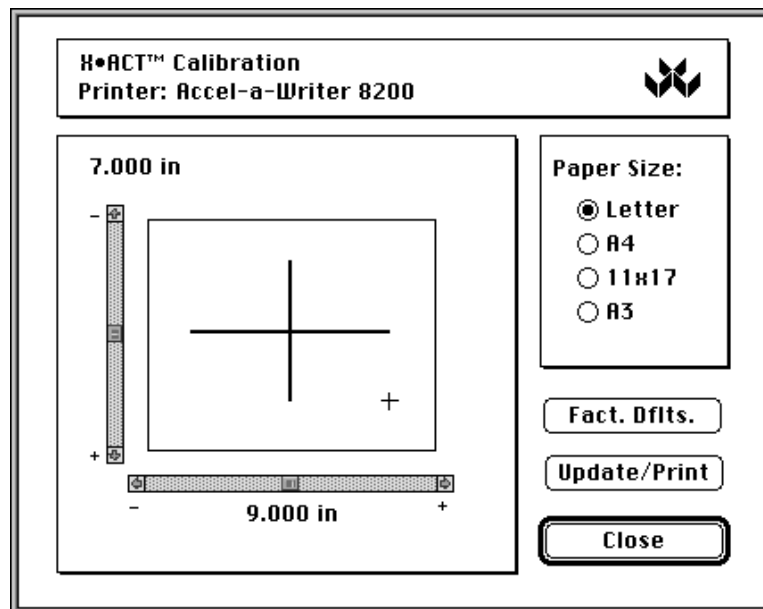


Fig. 7.3 X•ACT Screen

3. Select the media size you are using in the Paper Size box (fig. 7.3).
4. Click Update/Print. A page prints with a horizontal and a vertical line on it.

5. Measure the horizontal line. If it is shorter or longer than the measurement shown underneath the horizontal scroll bar in figure 7.3, adjust the scroll bar until the measurement reads the exact length of your line.
6. Measure the vertical line. If it is shorter or longer than the measurement above the vertical scroll bar in figure 7.3, adjust the scroll bar until the measurement reads the exact length of your line.
7. Click Update/Print. When the new page prints, measure the lines. They should be the correct lengths. If not, repeat steps 5, 6, and 7 until they are correct.
8. Click Close when both lines are the correct length. You return to Command Center's main screen.
9. Select Margin Adjustment... from the Printers menu. The following screen appears.

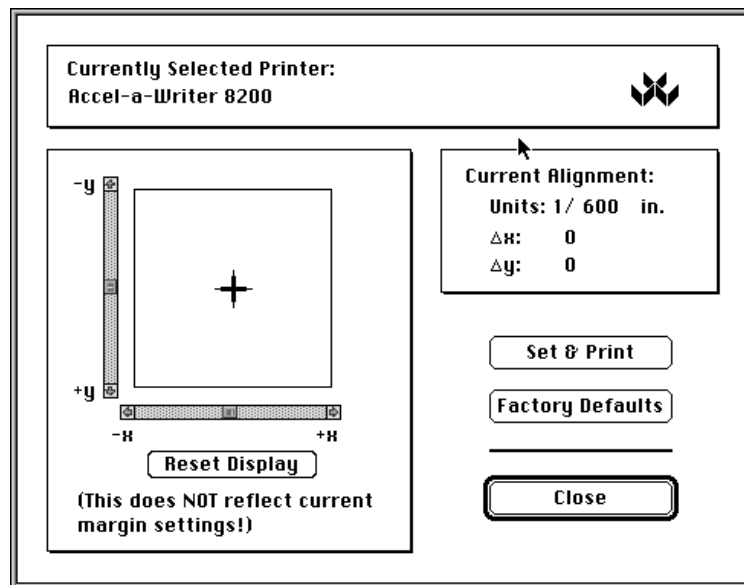


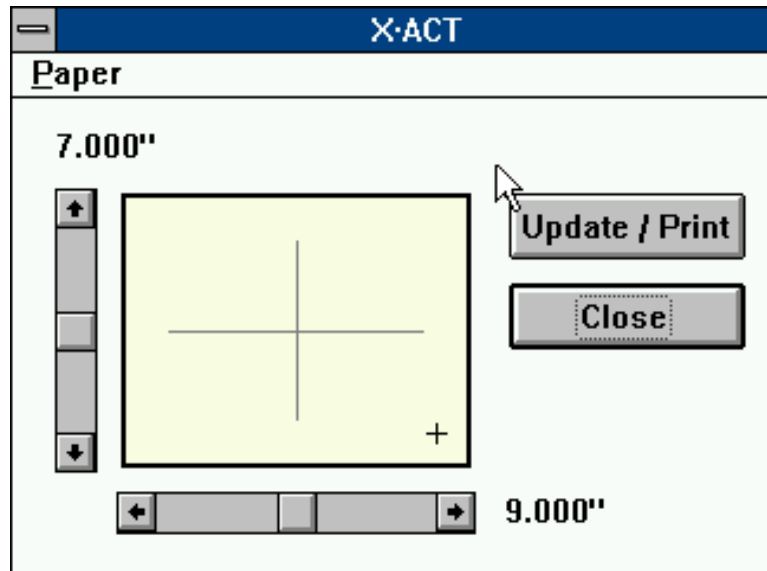
Fig. 7.4 Align Printer Margins

10. Click Set & Print. An alignment test page prints giving current printer settings at the bottom.
11. Measure where the x and y axes cross. They should cross 1' up from the bottom and 1' over from the left side of the page. If the lines cross at the correct place, skip to step 15.
12. Check the measurements from step 11 and then use the x scroll bar to make x axis changes and the y scroll bar to make the y axis changes (fig. 7.4). For example, if the x axis is low, move the x scroll bar right until you reach the desired number of units.
13. Click Set & Print. An alignment page with new settings prints.
14. Measure where the x and y axes cross. If positioning is correct, skip to step 15; if not, repeat steps 11 through 14 until the lines cross 1" from the bottom and 1" in from the left side of the page.
15. Click Close. Then, select Quit from the File menu to exit Command Center.

In a PC environment, to calibrate line lengths and adjust printer margins

1. Start Command Center by double clicking its icon.
2. Select Product... from the Controller menu. A screen appears listing the available printers.
3. Select your printer from the list and then click OK.

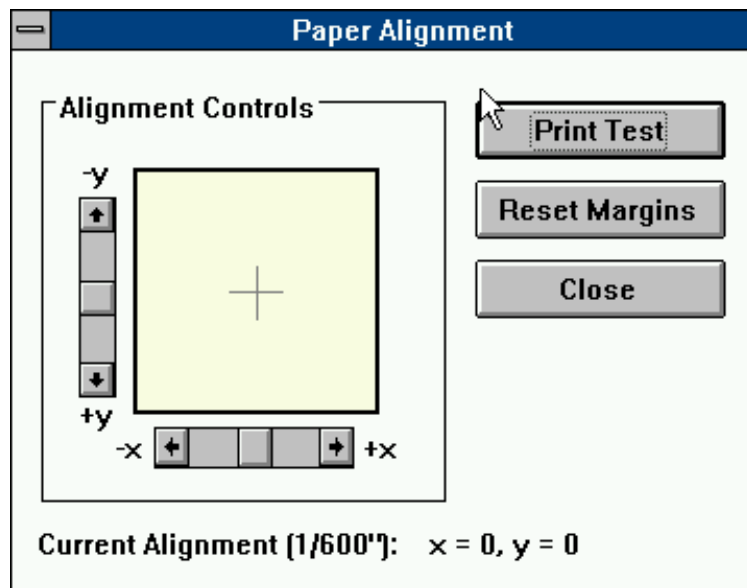
4. Select X•ACT... from the Controller menu. The following screen appears.



*Fig. 7.5 The X•ACT Screen*

5. Select the media size you are using from the Paper menu (Fig. 7.5).
6. Click Update/Print. A page prints with a horizontal and a vertical line on it.
7. Measure the horizontal line. If it is shorter or longer than the measurement to the right of the horizontal scroll bar (fig. 7.5), adjust that bar until the measurement reads the exact line length.
8. Measure the vertical line. If it is shorter or longer than the measurement above the vertical scroll bar in figure 7.5, adjust that scroll bar until the measurement reads the exact length of the line.

9. Click Close when the horizontal and vertical line settings match the lengths of their respective lines. You return to Command Center's main screen.
10. Select Align Paper... from the Controller menu. The following screen appears.



*Fig. 7.6 Align Printer Margins*

11. Click Print Test. An alignment test page prints giving current printer settings at the bottom.
12. Measure where the x and y axes cross. They should cross 1" up from the bottom and 1" over from the left side of the page. If the lines cross at the correct place, skip to step 16.
13. Use the x scroll bar to make x axis changes and the y scroll bar to make y axis changes (fig. 7.6). For example, if the x axis is low, move the x scroll bar to the right the desired number of units.

14. Click Reset Margins and then click Print Test. An alignment page prints with the new settings.
15. Measure where the x and y axes cross. If the positioning is correct, skip to step 16; if not, repeat steps 14 through 17 until the x axis is correct.
16. Click Close when both axes are correct. Then, select Quit from the File menu to exit Command Center.

## Page Design

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Advanced imaging includes not only the mechanical side of printing, but also the elements of page design. Your Accel-a-Writer 8200 with true Adobe PostScript takes care of most of the mechanical side, allowing you such freedom as scaling, rotating, and filling text and graphics. However, a basic understanding of terms and elements of page design can help you add finishing touches for a truly professional image.

The rest of this chapter deals with some of the language and elements used in desktop publishing page design.

## Typefaces and Fonts

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Two very important terms to understand are typefaces and fonts. These terms often are used interchangeably which can lead to confusion sometimes. A font is actually a subdivision of a typeface.

Typeface refers to the style of printing type, not the size. The style includes design elements such as spacing, stroke, and weight which are covered later in this chapter.

A font is one size of a typeface and includes all the available characters of that typeface.

## Serif, Sans Serif, and Miscellaneous Typefaces

Typefaces fall into three categories of styles, serif, sans serif, and miscellaneous. A serif is an extra flourish or decoration added to the end of a main line forming a letter, character, or symbol.

PostScript      PostScript

Serif (Times Roman)

Sans Serif (Helvetica)

*Fig. 7.7 Serif and Sans Serif Typefaces*

**Serif typefaces** include extra flourishes such as the small circle at the top of the a or the small tails hanging down each end of the cross bar in the T in Times Roman (fig. 7.7).

**Sans Serif typefaces** lack the decorations. Sans means without, and these typefaces have very clean, plain lines such as those found in Helvetica (fig. 7.7).

**Miscellaneous typefaces** include those which have combinations of serif and sans serif designs as well as graphic type characters such as arrows, hearts, squares, or Greek symbols.

Each typeface category lends itself to particular areas of page design. For example, the small detailed lines on a serif typeface helps draw a reader's eye across a line of text. This makes it well suited for body text such as the Times Roman font used in this manual.

The clean, sharp lines of a sans serif typeface make it excellent for short headlines or signs. The lack of detail, makes it easier for the eye to group several words into a short phrase, grasping the meaning at a glance. However, it lacks the drawing effect of details which make long text blocks easier to read.

Miscellaneous typefaces are handy to draw attention to a particular section of the page or indicate breaks in topics or sections. For example, three diamonds (◇◇◇) signal the ends of major chapters in this manual.



Bold, demi, medium, and light forms are created by varying the stroke weight (density) of character lines. For example, the following note has a bold italic introduction to draw attention, but the body text switches back to a medium weight (sometimes referred to as roman) format for easy readability.

**Note:** Although forms may be combined such as a bold italic versions, if you change form too often within a document, the forms tend to lose the power to draw attention and end up with a cluttered appearance.

## Other Elements of Design

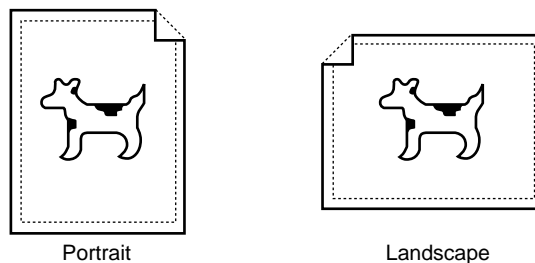
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Other elements of design besides typeface forms include orientation, pitch, point size, and spacing.

### Orientation

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The terms portrait and landscape orientations come from the art world and indicate the direction of a picture or copy on the page. Usually portraits are narrow in width and long in length while landscapes are wider across and shorter in length. The same is true when you print from your Accel-a-Writer 8200. Copy across the narrow direction of the page is in portrait orientation which is used for most business letters. Landscape orientation goes across the wide dimension of the page and is used often for spreadsheets and graphs.

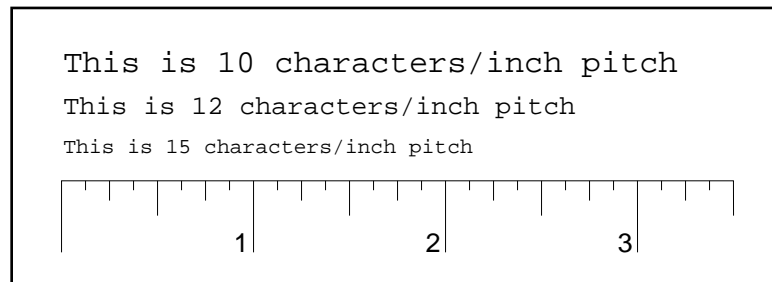


*Fig. 7.8 Page Orientations*

## Pitch

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Pitch, sometimes referred to as cpi or characters per inch, indicates the number of characters which can fit horizontally within one inch. For example, your printer has the PCL typeface Courier 10 pitch, 12 points. Ten characters fit within an inch and the size is 12 points in height.

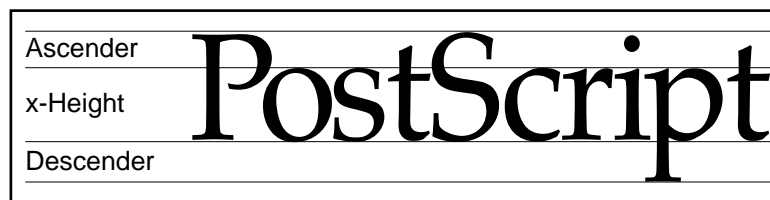
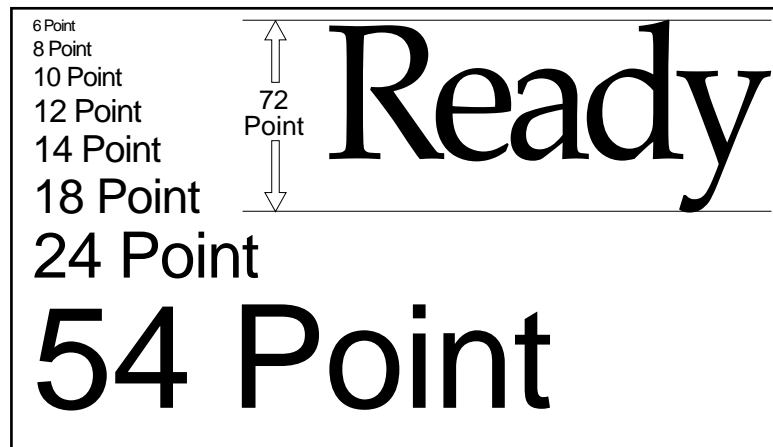


*Fig. 7.9 Pitch Samples*

## Point Size and x-Height

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Point size comes from an old typesetting term for a typeface's height. This is measured from the top of highest ascender (the upward stroke on a character) to the lowest descender (the downward stroke) within a character set (fig. 7.10).



*Fig. 7.10 Point Sizes and x-Height*

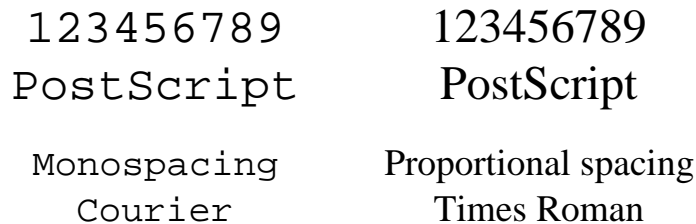
The height of a lowercase letter without an ascender or descender is referred to as the x-Height. This measurement varies from typeface to typeface and can cause an optical illusion where the same size typefaces appear to be different sizes.

## Spacing

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Character spacing has two forms, monospacing and proportional spacing (fig. 7.11). Monospaced characters have equal spacing between each letter which is sometimes referred to as fixed spacing. An excellent example is the resident Courier typeface. Monospacing has a mechanical, block look and works extremely well for spreadsheets where multiple columns of numbers need to be aligned.

Proportional spacing varies the width between characters. For example the letter l needs less space than a w. Except for Courier, the rest of your printer's resident PostScript typefaces are proportionally spaced. Proportional spacing is more legible, better for most documents not requiring multiple aligned columns.



*Fig. 7.11 Character Spacings*

## Page Design Tips

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Often little design details make the difference between an adequate or professional job. The following tips may help you produce the best possible output from your Accel-a-Writer 8200.

- Keep your page design simple. Too many typeface and design element changes can produce a cluttered, confusing page.

- Always consider your audience first. For example, readers with visual problems or youngsters learning to read will respond better to larger point sizes. A conservative group of investors would be more impressed by a tradition typeface like Times Roman, while accountants may prefer Courier.
- Usually, serif typefaces are more legible for large bodies of text, while sans serifs work better for headlines.
- Keep text column widths under 4" to reduce the chance of a reader losing his place when his eyes move from the end of one line to the beginning of the next.
- All capitalized text is much harder to read than mixed case text.
- Vary paragraph lengths to help readers keep track of where they are on the page.
- Keep most paragraphs to five lines or less to help prevent long text blocks from tiring or intimidating readers. Mixing line lengths within a paragraph also helps.
- Match your typeface to the subject. For example, *ZapfChancery* is perfect for formal invitations, while **Helvetica Bold** works better for **EXIT** signs.
- Use white space (wider margins, more space between section headings and paragraphs, etc.) to decrease a cluttered, heavy text look.

These tips are not ironclad rules. They are suggestions which work well in most cases. Your Accel-a-Writer printer and PostScript make it easy for you to test these tips and select the ones that work best for your particular job.



