



Figure 2-20 Revenue Passengers Carried by U.S. Airlines

Examples 13 and 14 illustrate the following principles related to misleading graphs:

- **Nonzero axis:** Always examine a graph to see whether an axis begins at some point other than zero so that differences are exaggerated.
- **Pictographs:** When examining data depicted with a pictograph, determine whether the graph is misleading because objects of area or volume are used to depict amounts that are actually one-dimensional. (Histograms and bar charts represent one-dimensional data with two-dimensional bars, but they use bars with the same width so that the graph is not misleading.)

Conclusion

In this section we saw that graphs are excellent tools for describing, exploring, and comparing data.

Describing data: In a histogram, for example, consider the distribution, center, variation, and outliers (values that are very far away from almost all of the other data values). What is the approximate value of the center of the distribution, and what is the approximate range of values? Consider the overall shape of the distribution. Are the values evenly distributed? Is the distribution skewed (lopsided) to the right or left? Does the distribution peak in the middle? Is there a large gap, suggesting that the data might come from different populations? Identify any extreme values and any other notable characteristics.

Exploring data: Look for features of the graph that reveal some useful and/or interesting characteristics of the data set. For example, the scatterplot included with Example 1 shows that there appears to be a relationship between the waist circumferences and arm circumferences of males.

Comparing data: Construct similar graphs to compare data sets. For example, Figure 2-14 shows a frequency polygon for the IQ scores of a group with low lead exposure and another frequency polygon for a group with high lead exposure, and both polygons are shown on the same set of axes. Figure 2-14 makes the comparison relatively easy.

In addition to the graphs we have discussed in this section, there are many other useful graphs—some of which have not yet been created. The world desperately