Determination of the characteristic curve is essential for quantitative evaluation of digital as well as screen-film radiographic imaging systems. When it is not practical to generate the entire curve through variation of a single exposure parameter, bootstrap methods can be used. One bootstrap method involves the generation of curve segments by capturing images with known differences in exposure achieved by changing the mAs. Multiple curve segments are produced concurrently by varying the exposure within each image using a stepped wedge. An appropriate shift of each segment along the log relative-exposure axis is used to join the overlapping curve sections. Since manual graphical matching of segments is tedious and imprecise, an automatic matching algorithm has been developed for use on a PC. A cubic spline fit of log exposure versus pixel value (or film density) is performed for each segment and the mean values for the overlapping sections of pairs of segments is determined by interpolation. The difference between the mean values of successive pairs of segment sections is taken as the best-fit log-exposure shift. The cumulative shift is then calculated for each segment to obtain the complete composite curve. The algorithm is evaluated for several digital image receptors and with known mathematically generated functions. This bootstrap method can provide complete, accurate characteristic curves, while the segment joining program makes the process fast and precise.