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Photocell timing systems are used routinely to measure running speeds. In this study, the accuracy of such systems was evaluated using centre of mass speed estimates from three-dimensional video analysis as criteria. One subject ran at five nominal speeds (5-9 $m.s^{-1}$) for each of five separations (1.6-2.4m) between consecutive photocells. Running speeds were calculated from the photocell data using single beam and double beam systems. For single beam systems, the start of the first break of a beam and the start of the longest break of a beam were used as trigger criteria. For double beam systems, the first occurrence of both beams being broken and the start of the longest double break were used as trigger criteria. Root mean square speed errors were smaller for the double beam systems. The longest break criterion gave smaller root mean square errors than the first break criterion. In general, errors in speed were smaller for greater photocell separations. An error of $0.1m.s^{-1}$ was achieved using a single beam system set at hip height with a longest break criterion for photocell separations of around two stride lengths. The advantage of using a double beam system is that it achieves this accuracy without the need to adjust photocell separation for different stride lengths.