

Pad-Button Time Adjustment Factor *Guidelines* for the Colorado Timing System (CTS) and Daktronics Timing System (DTS)¹

Value	CTS (seconds) ²	DTS (seconds) ³
<p>Range Within Which Most Pad-Button Time Adjustment Factors Will Fall</p> <ul style="list-style-type: none"> • Adjustment factors outside of this range should be relatively rare and warrant a closer look when they occur. <ul style="list-style-type: none"> ○ Such values could be real, particularly if the timers at a given session are on average either faster or slower than the average timer. ○ Such values may need to be corrected before use due to the presence of one or more “outliers”⁴ that skew the average. Removal of one or more outliers may bring the value within the normal range. Outliers can be present even when the overall average falls within the normal range, thus it is always a good idea to check for their presence and remove them as necessary. • When Horizontal Timing Adjustments (Hy-Tek method) are being used, the Recorder should alert the Timing Judge when the recommended correction factor falls outside this range (or whatever other range is established by the Referee/Timing Judge) before accepting the adjusted time • When a Session Average Time Adjustment Factor is being calculated, it will generally fall within this range, particularly if the adjustment factors from 6-8 heats are used to determine the average 	-0.02 to 0.06 (average = 0.02)	-0.17 to -0.09 (average = -0.13)
<p>Lane Timer Outlier Values</p> <ul style="list-style-type: none"> • The Recorder should notify the Timing Judge anytime an individual lane value falls within these ranges (or whatever other range is established by the Referee/Timing Judge) • Lanes with these values should generally be excluded (click lane off in Hy-Tek) from the heat Time Adjustment Factor calculation as directed by the Timing Judge 	≥ 0.15 ≤ - 0.11	≥ 0.00 ≤ - 0.26

¹ **The values in this table are for guidance purposes only and should not be considered absolutes.** The particular circumstances of a meet (timers, equipment, weather conditions, etc.) may result in conditions that result in values that occur at the extremes or even outside of these values. A given Referee/Timing Judge may also establish their own range of values under which the Timing Judge/Recorder can operate without consultation with the Referee/Timing Judge.

² *(The information in this footnote is for advanced informational purposes only. If you don't understand it, please feel free to ignore it.)* The CTS-5 automatically subtracts 0.15 seconds from each button time prior to reporting the times. This is done because Colorado determined that on average, button times are 0.15 seconds slower than the corresponding valid pad time. After analyzing 1,000+ heats of data, the VSI Officials Committee determined that the average heat differential is 0.02 seconds rather than 0.00 seconds, which indicates that the subtraction of 0.15 seconds is an over-correction as it makes the button times 0.02 seconds faster, on average, than the corresponding valid pad times. Thus, on average, 0.02 seconds must be added to the button times when being used in place of the pad time.

³ Values have not been directly obtained from the DTS, but rather have been calculated based on the CTS data that indicates that on average, the button times will be 0.13 seconds slower than the corresponding valid pad times. Thus, on average, 0.13 seconds must be subtracted from the button times when being used in place of the pad time. (Comments on the apparent accuracy of these values would be appreciated and should be sent to kevinhogan56@earthlink.net (Kevin Hogan) and may be incorporated in an updated version of this document.

⁴ The introduction of the human factor into timing means that there is an element of imprecision in button times. A given timer repeatedly timing the same event will not always get the same time, but will get a range of times that are generally within a relatively tight interval, perhaps within a range of plus or minus 0.05 seconds. An outlier can be defined mathematically, but for our purposes is a value that can easily be recognized as a value that is outside the normal range.