

The Baseline "TOTALITY RUNS" – Format/Informational Details

Details of the TRs are provided (with one-minute cadence) in Tables 1 and 2, from which the three key time-correlated waypoints, used for baseline flight planning and navigation, were extracted.

(a) The top section of the TR tabulations provides information about the intercept planning and the resulting eclipse visibility. The bottom section provides minute-by-minute information on the progression and geometry of the Moon's shadow, and of the aircraft track throughout the totality run.

(b) The top left section of the header gives the key parametric inputs for the TR flight segment that are: the UTC of MEI, the aircraft flight altitude AMSL, the true heading at MEI (computed here to put the Sun straight out the left-side windows), the aircraft TAS, and the assumed wind vector for the totality run (here assumed no wind).

(c) The top right section gives: the duration of the total phase of the eclipse as seen from the moving aircraft, the angular depression of the apparent horizon in degrees with respect to the astronomical horizon, and the eclipse circumstances for Contacts 2 and 3 (the start and end of totality) as seen from the aircraft. The UTCs, latitude, and longitude of Contacts 2 and 3 given are not inputs, but are computed based upon the totality run geometry.

(d) The bottom section, for each UTC minute throughout the TR, gives information for the center of the lunar umbral shadow, and for the aircraft. For the center of the umbra, its UTC correlated lat/lon, the width of the path of totality, the speed of the shadow as projected onto a surface 39,000 ft AMSL, and the Sun's azimuth and altitude from those corresponding positions are tabulated.

(e) For the aircraft, most importantly, the UTC-correlated lat/lon waypoints for the TR are given. *At a minimum*, only those in green (first, last, and MEI) must be programmed into the aircraft FMS for execution, but using intermediate points for TRs with start-MEI > 10 minutes is suggested. The column labeled Mid Δ T is the time in seconds from the UTC of MEI. The column labeled Mid Δ D gives the distance in nm the aircraft is from the MEI location. (These are useful numbers to watch on a FMS display in the run-up to totality and mid-eclipse.) The column labeled LOS is the line-of-sight deviation angle of the vector out the left-side windows to the sun (which is zero at MEI). The column labeled Course is the aircraft course (true, not magnetic), and Azm, Alt are the azimuth and altitude angles of the Sun.