

Timing of the four viewing opportunities on STS-75 FD8 // Jim Oberg // May 14, 2014

Comparing the scene lists, the videos, and the Flight Plan, here is my provisional timeline of events associated with crew observation of the TSS-1R on Flight Day 8 ['FD08']. Times are given in Mission Elapsed Time [from launch], in DD/HH:MM

7/08:13 playback begins of first observation; TSS range "150 NM"; duration 14 minutes. Event time NOT recorded.

Based on subsequent sunrise times [below] of 7/09:12, 7/10:44, and 7/12:16, at 92 minute intervals [the orbital period of 'Columbia'], sunrise on THIS 'day' would have been at 7/07:40 and that would have easily allowed the time to search and find the tether out the window, make a 14 minute observation, rewind, wait for TDRS relay satellite contact [at 7/08:13, you can read it off the timeline chart in the Flight Plan], and begin playback at 7/08:13.

7/08:44 estimated time of closest approach, 'Columbia' passes below tether. Prior to this, tether was observed to the east [sunrise], all subsequent passes tether observed behind them, with sun at their backs. Observations only possible in short interval after sunrise, otherwise bright overhead sun seems to have interfered.

7/09:12, begin second observation interval immediately post sunrise. Tether and 'debris'. Duration 6 minutes. Range 113 NM.

7/10:44, tether observed 'faintly'.

7/12:16, tether observed in glare for 3 minutes, range 719 NM.

Note relative speed -- in two sunrises, tether had moved 606 nm, that's 303 nm/orbit [3.4 nm per min].

Go back to first observation. Extrapolate range at that sunrise, get value of 190 nm behind tether. Video was first made at range of "150 NM", that's 40 / 3.4 or 12 minutes later. That's 7/07:52. Add video recording duration of 14 minutes, that brings you to 7/08:06, just a few minutes before the playback began at 7/08:13, so the timeline is consistent with known event times and extrapolated distances.

Summary: Four separate observation intervals each at/just-after sunrise, ranges consistent with relative rate of 303 NM [348 statute miles] per 92-minute orbit.

Observation 1 -- looking forward into sun, range 150 NM, no other objects.

Observation 2 -- looking backwards away from sun, 113 NM, 'swarm'

Observation 3 -- looking backwards away from sun, interpolated range 416 NM, no other objects

Observation 4 -- looking backwards away from sun, range 719 NM, no other objects

Observation 5 not attempted, extrapolated range 1022 NM.