This report presents a description of wind tunnel tests conducted on a 1/40 scale model of PSLV to determine the trajectories of the four strap-on boosters separating from the core. The tests were conducted at a Mach number of 3.1, employing a specially built test rig and the separation trajectories were determined using the Semi-Captive Trajectory Technique. For the two Critical Values of wind vector roll orientations of 20° and 50° and for both the nominal and off-nominal cases considered in the present tests, separation of all the four boosters was found to be clean without any collision.