

nedy, who was waving as the car had turned the corner, suddenly stopped waving. He looked to his right toward the crowd, and then back to his left to Jacqueline, as if to be reassured that everything was all right. As the President began waving again, Mrs. Kennedy's head abruptly twisted from her left to right, the general direction of the School Book Depository.

In addition to the reactions of the Willis girl, the President, and Mrs. Kennedy, Governor Connally's recollection and actions confirm a shot was fired before frame 166. The Governor has always been consistent in his testimony, and because he is a surviving participant, his perceptions must be given considerable weight. "We had just made the turn, well, when I heard what I thought was a shot," he told the Warren Commission. "I heard this noise which I immediately took to be a rifle shot. I instinctively turned to my right because the sound appeared to come from over my right shoulder . . ."²⁰

What does the Zapruder film show? The film reveals that the Governor's head turned from mid-left to far right in less than half a second, beginning at frame 162, when the Willis girl started turning around and the President stopped waving.²¹

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The film also provides additional evidence of the moment of the first shot, but in an unusual way. Dubbed the "jiggle analysis," it was first postulated by Luis Alvarez, the Nobel Prize-winning physicist.²² He checked the film for evidence that when a shot was fired, the sharp noise made Zapruder jerk the camera, blurring the next frame or two. CBS, in research for a 1967 documentary, tested the theory. Two volunteers were told to hold a movie camera as steady as possible. Despite advance knowledge that shots would be fired, an advantage Zapruder did not have, the men were unable to hold the camera still. Motion was always detectable on the film during the rifle fire.²³ The presence of a jiggle or blur in the film, of course, could be caused by many other factors. However, while sudden movement of Zapruder's camera may not prove a shot was fired, its absence is good evidence there was no shot. Therefore, the question is whether Zapruder had the jerky reaction for an early, missed shot. The House Select Committee determined there were four such noticeable movements, any of which could be evidence of a shot. The first significant blur was at

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19. Rosemary Willis interview with Marcia Smith-Durk, 1979.
20. Testimony of John B. Connally, WC Vol. IV, pp. 132-33.
21. HSCA Vol. VI, p. 29.
22. Luis Alvarez, "A Physicist Examines the Kennedy Assassination Film," *American Journal of Physics*, Vol. 44, No. 9, September 1976, pp. 815-19.
23. "The Warren Report," CBS News, Part I, June 25, 1967, pp. 17-18.
24. Ibid., p. 29.
25. Ibid., p. 28.
26. Testimony of Dr. Vincent Guinn, HSCA Vol. I, pp. 504, 555-56.
27. Testimony of Robert Frazier, WC Vol. V, pp. 172-73.
28. Interview with Robert Kraus, March 29, 1992.
29. Testimony of Virgie Rachley, WC Vol. VII, p. 509.
30. Ibid., p. 513.
31. Interview with James Tague, January 19, 1992.
32. Ibid., January 20, 1992.
33. Ibid., January 19, 1992.
34. Warren Commission memorandum, Arlen Specter to Lee Rankin, June 11, 1964; WC Vol. XXI, p. 472.
35. WR, p. 117.
36. Testimony of Robert Frazier, WC Vol. III, pp. 432, 435.
37. Testimony of Lyndal Shaneyfelt, WC Vol. XV, p. 700.
38. Interview with Art Pence, February 21, 1992.
39. WR, p. 105.
40. HSCA Rpt., p. 46.
41. HSCA Vol. VI, p. 43.
42. Testimony of Governor John Connally, WC Vol. IV, p. 135.
43. Ibid., p. 133.
44. Interview with Dr. Michael Baden, January 21, 1992; interview with Dr. Michael West, November 7, 1992.
45. Testimony of Dr. Malcolm Perry, WC Vol. III, p. 389; Lattimer, *Kennedy and Lincoln*, pp. 241-43;
46. Interview with Dr. Michael West, November 7, 1992.
47. Interview with Dr. John Lattimer, May 25, 1993.
48. Lattimer, op. cit., pp. 243-44; interview with Dr. Lattimer, February 6, 1992.
49. Interview with Dr. John Lattimer, February 6, 1992.
50. Interview with Dr. Michael West, November 7, 1992; interview with Dr. Robert Piziali, November 9, 1992.