

It contains certain positions marked as frame numbers. It indicates elevations and a column dealing with angle of sight from the frame positions to the window and to a horizontal line.

It also contains angles of sight the degree of sight and distances from these positions to a point on the top of the bridge, handrail height.

Mr. SPECTER. May it please the Commission, that concludes the description of the general setting.

I would like to move now at this time for the admission into evidence of Exhibit No. 884, which completes all of the exhibits used heretofore.

Mr. McCLOY. It may be admitted.

(The document heretofore marked for identification as Commission Exhibit No. 884, was received in evidence.)

Mr. SPECTER. May it please the Commission, that completes the testimony of Inspector Gauthier.

I would like to call Mr. Shaneyfelt.

Mr. McCLOY. Mr. Shaneyfelt?

TESTIMONY OF LYNDA L. SHANEYFELT

Mr. SPECTER. Would you state your full name for the record, please?

Mr. SHANEYFELT. Yes; Lynda L. Shaneyfelt.

Mr. SPECTER. By whom are you employed?

Mr. SHANEYFELT. I am employed as a special agent of the Federal Bureau of Investigation.

Mr. SPECTER. And how long have you been so employed?

Mr. SHANEYFELT. Fourteen years.

Mr. SPECTER. What are your duties, in a general way?

Mr. SHANEYFELT. I am assigned to the FBI Laboratory, as a document examiner, and photographic expert.

Mr. SPECTER. During the course of those duties, have you had occasion to make an analysis of certain movies which purport to have been taken of the assassination?

Mr. SHANEYFELT. Yes; I have.

Mr. SPECTER. What movies have you examined?

Mr. SHANEYFELT. I have examined a roll of 8-mm. motion pictures made by Mr. Abraham Zapruder of Dallas, Tex., that he took on November 22, of the assassination of President Kennedy.

Mr. SPECTER. Can you outline in a general way how the movies taken by Mr. Zapruder came into your possession?

Mr. SHANEYFELT. Yes; Mr. Zapruder, on realizing what he had in his photographs, took them immediately to a local Dallas processing plant, had them processed, and had three copies made. He turned two copies of those movies over to representatives of the Secret Service.

The original and other copy he sold to Life magazine.

The FBI was given one of the copies by the Secret Service. The Secret Service loaned a copy to us long enough for us to make a copy for our use, which we did, and this copy is the one that I have been examining.

Mr. SPECTER. At any time in the course of the examination of the Zapruder film, was the original of that movie obtained?

Mr. SHANEYFELT. Yes; it was. On February 25, Mr. Herbert Orth, who is the assistant chief of the Life magazine photographic laboratory, provided the original of the Zapruder film for review by the Commission representatives and representatives of the FBI and Secret Service here in the Commission building.

Mr. SPECTER. And what was the reason for his making that original available?

Mr. SHANEYFELT. Life magazine was reluctant to release the original because of the value. So he brought it down personally and projected it for us and allowed us to run through it several times, studying the original.

Mr. SPECTER. Was that because the copies were not distinct on certain important particulars?

Mr. SHANEYFELT. That is correct. The original had considerably more detail

and more there to study than any of the copies, since in the photographic process each time you copy you lose some detail.

Mr. SPECTER. And subsequently, were slides made from the original of the Zapruder film?

Mr. SHANEYFELT. Yes. Since it was not practical to stop the projector when using the original of the Zapruder film, because of the possibility of damage to the film, Mr. Orth volunteered to prepare 35-mm. color slides directly from the original movie of all of the pertinent frames of the assassination which were determined to be frames 171 through 434.

Mr. SPECTER. Would you outline what you mean by frames, please?

Mr. SHANEYFELT. Yes. In motion picture films, the actual motion picture film consists of consecutive pictures that are made in rapid succession, each one being a separate exposure. And as the camera runs, it films these, and they are projected fast enough on the screen when you do not have the sensation of them being individual pictures, but you have the sensation of seeing the movement—even though they are individual little pictures on the film. So each one of those little pictures on the film is called a frame.

Mr. SPECTER. And how did you number the frames?

Mr. SHANEYFELT. I numbered the frames on the Zapruder film beginning with No. 1 at the assassination portion of his film.

He did have on his film some photographs of a personal nature that we disregarded, and started at the first frame of his motion picture that was made there on Elm Street of the assassination.

Mr. SPECTER. And what was happening at the time of frame 1?

Mr. SHANEYFELT. At the time of frame 1, the police motorcycle lead portion of the parade is in view, and that goes for several frames. Then he stopped his camera, feeling that it might be some time before the Presidential car came into view. Then when the Presidential car rounded the corner and came into view, he started his camera again, and kept it running throughout the route down Elm Street until the car went out of sight on his right.

Mr. SPECTER. What other movies have been examined by you in the course of this analysis?

Mr. SHANEYFELT. An amateur 8-mm. motion picture film made by a Mr. Orville Nix of Dallas, Tex., has been examined. Mr. Nix was standing on the corner of Houston and Main Streets, photographing the motorcade as it came down Main Street and turned right into Houston Street.

Mr. SPECTER. Would you explain briefly how you ascertained the location of Mr. Nix when he took those movies?

Mr. SHANEYFELT. Yes. At the time Mr. Nix took his movies of the motorcade coming down Main Street, he was standing on the corner, and photographed them turning the corner and going down Houston Street.

Mr. SPECTER. You are now indicating the southwest corner of Houston and Main?

Mr. SHANEYFELT. Yes; southwest corner. After he heard the shots, he hurried down along the curb of Main Street, but did not remember exactly where he was standing. On the basis of his motion pictures, we were able to analyze the pictures using his camera, and on the 23d of May of this year, during the survey, preparatory to the reenactment, we reestablished this point by viewing pictures taken from his motion picture camera, at varying angles across here, in order to reestablish the point where he was standing, based on the relationship of this street light to other items in the background of the photograph.

Mr. SPECTER. When you say this point, you mean the point of the Nix position?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. And when you say this street light, you are referring to a street lamp on the opposite side of Main Street?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Would you outline in a general way how you obtained the copy of the Nix film?

Mr. SHANEYFELT. Yes.

The Nix film was obtained as a result of a notice that the FBI gave to processing plants in the Dallas area, that the FBI would be interested in obtaining or knowing about any film they processed, that had anything on it, relating to the assassination.

And, as a result of this, we learned of the Nix film and arranged to obtain a copy of it.

Mr. SPECTER. Did you analyze any other film in connection with this inquiry?

Mr. SHANEYFELT. Yes. I analyzed a film that was 8-mm. motion picture film taken by Mrs. Mary Muchmore of Dallas, Tex.

Mr. SPECTER. How did you obtain a copy of that film?

Mr. SHANEYFELT. Our first knowledge of this came as a result of a review of the book "Four Days" which covers the assassination period, in which representatives of the FBI noted a colored picture taken from a motion picture film that did not match either the Nix film or the Zapruder film.

Once we established that, then we investigated and learned that it was made by Mrs. Mary Muchmore, and was at that time in the possession of United Press International in New York, and made arrangements for them to furnish us with a copy of the Muchmore film. That is the copy that I used for examination.

Mr. SPECTER. Where was Mrs. Muchmore standing at the time she took those movies?

Mr. SHANEYFELT. Mrs. Muchmore was standing along Houston Street, close to the corner of Main, on the west side of Houston Street, and photographed the motorcade as it came down Main, turned into Houston, and proceeded down Houston. She says that when she heard the shots, she panicked, and did not take any further pictures. But a review of her film shows pictures of the assassination route, the motorcade going down Elm Street, beginning just before the shot that hit the President in the head, and continuing a short period after that.

Since she did not remember taking the pictures, we then, in the same manner we established Mr. Nix's position, by checking the photograph in relation to objects in the background, established her position along this structure that is marked on the map and found that she had come from the curb over to this point—

Mr. SPECTER. Indicating a position on Exhibit No. 883 marked "Muchmore Position."

Mr. SHANEYFELT. That is correct.

And this we established as her position when she photographed a portion of the assassination—motorcade.

Mr. SPECTER. Would you elaborate just a bit more on how you ascertained that position from fixed points in the background of the movie?

Mr. SHANEYFELT. Yes; we took a frame of the motion picture that is close to the beginning and a picture that is close to the end, and made a still photograph of those. We then establish a position and try to line up the relationship of objects close to where we are standing with objects in the background, so that they are in relation to each other as they are in the picture.

Then we take the other picture from farther along the motion picture film, and do the same thing, and where those two lines intersect is where she had to be standing.

Mr. SPECTER. You draw two straight lines through two objects that you line up on each of those pictures, and the intersection point of those two lines is the calculated position of the camera.

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And was that same system used to ascertain the position of Mr. Nix?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And how did you ascertain the position of Mr. Zapruder?

Mr. SHANEYFELT. Mr. Zapruder's position was known, as he was on the top of the abutment along Elm Street—he stated that he was standing on the abutment. And there is relatively no room to move around there, other than to stand there. It is about 2 feet wide by 3 to 4 feet deep.

(At this point, Representative Ford entered the hearing room.)

Mr. SHANEYFELT. And aside from that, we checked that position against his photographs and determined that that was in fact correct.

Mr. SPECTER. Was the position of Mr. Zapruder confirmed through the use of any other film?

Mr. SHANEYFELT. Yes; in Mr. Nix's motion picture films you can see Mr. Zapruder standing on the abutment.

Senator COOPER. May I ask a question there?

After you had made those calculations to establish the position of Mrs. Muchmore and Mr. Nix and Mr. Zapruder, did you then identify those positions to the three and ask them whether or not it corresponded—your findings corresponded with their recollection as to where they were standing?

Mr. SHANEYFELT. We did not do that; no. Mr. Nix, I might say, did state that he went down along this side—the south side of Main Street, along the curb, and it generally conforms to where he stated he went, but he could not place the exact position. We did, by this study.

Senator COOPER. Mr. Zapruder's position was established by another photograph?

Mr. SHANEYFELT. That is correct.

Mr. DULLES. Do I understand you correctly that Mrs. Muchmore didn't realize she had taken the later pictures that appear?

Mr. SHANEYFELT. According to her statement, she said after hearing the shots, she panicked, and didn't take any more pictures.

Mr. DULLES. You think she did?

Mr. SHANEYFELT. On the film there are pictures.

Mr. SPECTER. Was the position of Mrs. Muchmore and Mr. Nix ascertained through a geometric calculation, lining up various points as you have just described?

Mr. SHANEYFELT. Well, it is actually a geometric calculation, although no strings were drawn or no lines were drawn. It is a matter of standing in a position out there with Mr. Nix's camera, and viewing the two different photographs we had selected, until we arrived at a point that matched.

Mr. SPECTER. Was there reasonable mathematical certainty in that alignment, within the limits of your observations of their pictures?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Did Mr. Zapruder himself point out his location on the abutment as depicted on Exhibit No. 883?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Now, how many occasions were you a participant in an analysis of these various films which you have just described?

Mr. SHANEYFELT. Seven.

Mr. SPECTER. And when was the first time that you were a participant in such an analysis?

Mr. SHANEYFELT. On January 27, 1964.

Mr. SPECTER. And who else has been with you at the time you analyzed those films—just stating in a general way without identifying each person present on each of the occasions?

Mr. SHANEYFELT. On most occasions, Mr. Gauthier of the FBI was present. I was present, Mr. Malley of the FBI was present. Inspector Kelley from Secret Service, and Mr. John Howlett from Secret Service.

Representatives of the Commission were always present—normally Mr. Redlich, Mr. Specter, or Mr. Eisenberg were present.

On several occasions Mr. Ball and Mr. Belin were present. Mr. Rankin was present on some occasions.

I believe Mr. McCloy was present on one occasion.

Various representatives of the Commission were present.

Mr. SPECTER. And how long did those analysis sessions ordinarily last?

Mr. SHANEYFELT. They would normally last most of the day, about all day.

Mr. SPECTER. And what would be done during the course of those analytical sessions?

Mr. SHANEYFELT. In each case we would take the film and run it through regular speed, slow motion, we would stop it on individual frames and study it frame by frame, trying to see in the photographs anything that would give any indication of a shot hitting its mark, a reaction of the President, a reaction of Mr. Connally or Mrs. Connally, reaction of the Secret Service agents, reaction of people in the crowd, relating it to all the facts that we felt were important.

When we obtained the slides from Life magazine, we went through those very thoroughly, because they gave so much more detail and were so much clearer and analyzed again all these things about the reaction of the President and Mr. Connally, trying to ascertain where he was reacting—whether either one was reacting to being hit.

Of course the only shot that is readily apparent in any of the films, and it appears in the Zapruder, the Nix, and the Muchmore films, is the shot that hit the President in the head.

Mr. SPECTER. Why do you say that is readily apparent?

Mr. SHANEYFELT. Because on the film there is practically an explosion of his head and this is obviously the shot that hit the President in the head. It is very apparent from the photograph.

Mr. SPECTER. Now, were any others present at any time, such as witnesses who appeared before the Commission, during the analysis sessions on these films and slides?

Mr. SHANEYFELT. Yes.

On April 14, representatives of the Commission, FBI, and doctors—Dr. Hume of the Navy, who is at Bethesda, Commander Boswell from the U.S. Navy Medical School at Bethesda, Colonel Finck, Chief of the Wound Ballistics Pathology of the Armed Forces Institute of Pathology.

Mr. SPECTER. Are those the autopsy surgeons?

Mr. SHANEYFELT. Yes; that is my understanding. Dr. Olivier, from Edgewood Arsenal, Dr. Light, from Edgewood Arsenal, were present also with Dr. Humes and the others, on April 14.

Mr. SPECTER. Did any individuals who were present at the motorcade itself ever have an opportunity to view the films and slides?

Mr. SHANEYFELT. Yes; on April 21, films were again viewed by representatives of the Commission and the FBI, and at that time Drs. Gregory and Shaw, from Parkland Hospital in Dallas, were available, Drs. Light and Olivier, and a Dr. Dolce, and Governor and Mrs. Connally were present.

And at all of the viewings, they were again reviewed frame by frame, studied by the doctors to tie it in with their findings, studied by the Parkland doctors, and studied by the Connallys, to try to tie in where the shots occurred along the film.

Mr. SPECTER. I now hand you an album which has been marked as Commission Exhibit No. 885.

(The document referred to was marked Commission Exhibit No. 885 for identification.)

Mr. SPECTER. I ask you to state what that album depicts.

Mr. SHANEYFELT. This is an album that I prepared of black and white photographs made of the majority of the frames in the Zapruder film—

Mr. SPECTER. Starting with what frame number?

Mr. SHANEYFELT. Starting with frame 171, going through frame 334.

Mr. SPECTER. And why did you start with frame 171?

Mr. SHANEYFELT. This is the frame that the slides start from. This was an arbitrary frame number that was decided on as being far enough back to include the area that we wanted to study.

Mr. SPECTER. Is that a frame where President Kennedy comes into full view after the motorcade turns left off of Houston onto Elm Street?

Mr. SHANEYFELT. Yes, yes.

Mr. SPECTER. And how was the ending point of that frame sequence, being No. 334, fixed?

Mr. SHANEYFELT. It was fixed as several frames past the shot that hit the President in the head. Frame 313 is the frame showing the shot to the President's head, and it ends at 334.

Mr. SPECTER. Are there any other photographs in that album in addition to the Zapruder frames?

Mr. SHANEYFELT. Yes; there are. There are six photographs selected at random from the Nix film, including frame 24, which is a frame depicting the shot to the head of the President, and there are three photographs picked at random from the Muchmore film, including frame 42, which is the frame depicting the head shot. These are the pictures that were used in establishing the location of the Nix and Muchmore cameras on location in Dallas. Frame 10, which is the first one of the Nix series, is the one showing Mr. Zapruder standing on the projection.

Mr. SPECTER. And where was the viewing of the films and slides undertaken?

Mr. SHANEYFELT. They have been viewed here at the Commission—all those in addition to the ones I have made personally in the FBI Laboratory.

Mr. SPECTER. And was that down on the first floor of the VFW Building here?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And was there any model available adjacent to the area where the films were shown, for use in re-creating or reconstructing the assassination events?

Mr. SHANEYFELT. Yes; the model was available and used.

Mr. SPECTER. Is that the model which has been described earlier this afternoon by Inspector Gauthier?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Were you present on May 24 in Dallas, Tex.?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. And what, if anything, was done at the site of the assassination on that date?

Mr. SHANEYFELT. On May 24, 1964, representatives of the Commission, Secret Service, and FBI reenacted the assassination, relocated specific locations of the car on the street based on the motion pictures, and in general staged a reenactment.

Mr. SPECTER. Who was present at that time representing the Commission?

Mr. SHANEYFELT. The Commission was represented by Mr. Rankin, Mr. Spector, and Mr. Redlich.

Mr. SPECTER. And who was present at that time from the FBI?

Mr. SHANEYFELT. I was present, Inspector Gauthier was present, Inspector J. R. Malley was present, Special Agent R. A. Frazier was present, with some aids, assistants.

Mr. SPECTER. Other aids from the FBI were also present?

Mr. SHANEYFELT. Yes; in addition, there were several agents from the Dallas office of the Federal Bureau of Investigation who assisted.

Mr. SPECTER. And were there representatives of the Secret Service participating in that onsite testing?

Mr. SHANEYFELT. Yes; there were. Inspector Kelley was present, Agent John Howlett was present, the driver of the car, or the Secret Service agent whose name I do not recall—

Mr. SPECTER. George Hickey?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And at what time did the onsite test start?

Mr. SHANEYFELT. They started at 6 o'clock Sunday morning.

Mr. SPECTER. Why was that time selected?

Mr. SHANEYFELT. The time was selected because of the traffic in the area. The Dallas Police Department recommended that that would be the most logical time to do it, causing the least problem with traffic.

Mr. SPECTER. At what time did the onsite tests conclude?

Mr. SHANEYFELT. They concluded about 1 o'clock, 12:45 to 1 o'clock.

Mr. SPECTER. Was there any subsequent testing done in Dallas on that day?

Mr. SHANEYFELT. Yes; there was.

Mr. SPECTER. And where was that testing undertaken?

Mr. SHANEYFELT. There was some testing done in a railway express agency garage nearby the assassination site.

Mr. SPECTER. At what time did that start?

Mr. SHANEYFELT. That started at 3 p.m., and lasted until 5:30 p.m.

Mr. SPECTER. Where were the various individuals positioned who participated in these onsite tests at the outset, at, say, 6 a.m., on the 24th of May?

Mr. SHANEYFELT. At the very beginning, at 6 a.m., Mr. Rankin and Mr. Specter were in the sixth floor window of the Texas School Book Depository Building, which is the southeast corner of the building, sixth floor window, which was referred to as our control point, and where we had the master radio control for the other units.

Mr. Redlich was on the street with the car. At the car on the street were the occupants of the car, the Secret Service driver, Mr. Hickey, an agent from the FBI, who handled radio contact with control, Agents Anderton and Williams in the President's and Connally's seats, Mr. Gauthier and his aids, a surveyor, and I, were all on the ground in the vicinity of the car.

Agent Frazier was in the window of the Book Building at the control point with the rifle that was found at the window following the assassination.

Mr. SPECTER. Now, was that rifle found at the window or in another location on the sixth floor?

Mr. SHANEYFELT. In another location on the sixth floor.

Mr. SPECTER. And that is the Mannlicher-Carcano rifle which was heretofore identified as Commission Exhibit No. 139?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And where were you positioned on most of the occasions at the time of the onsite tests?

Mr. SHANEYFELT. For the first portion of them, I was at the car in the street, and at the position of Mr. Zapruder, the position from which he took his pictures.

Mr. SPECTER. What communications were available, if any, among the participants at the various locations heretofore described?

Mr. SHANEYFELT. We had radio contact between all points.

Mr. SPECTER. What was the starting position of the car at the most easterly position on Elm Street, immediately after turning off Houston Street?

Mr. SHANEYFELT. The first position we established that morning was frame 161.

Mr. SPECTER. Was there not a position established prior in sequence to frame 161, specifically that designated as position A?

Mr. SHANEYFELT. That was actually established later. But the first one to be actually located was 161. And we went back later and positioned point A.

Mr. SPECTER. Well, let's start with the position which is the most easterly point on Elm Street, which I believe would be position A, would it not?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Have you a photographic exhibit depicting that position?

Mr. SHANEYFELT. Yes; in each of the positions that we established, we used, insofar as possible, the Zapruder pictures to establish the position, or we established it from the window, and made photographs from the position Mr. Zapruder was standing in.

Mr. SPECTER. This chart has been marked as Commission Exhibit No. 886.

(The document referred to was marked Commission Exhibit No. 886 for identification.)

Mr. SHANEYFELT. This shows the photograph that was made from the point where Zapruder was standing looking toward the car, and is a point that we have designated as position A because it is in a position that did not appear on the Zapruder film.

The Zapruder film does not start until the car gets farther down Elm Street.

Mr. SPECTER. What is that exhibit number?

Mr. SHANEYFELT. Exhibit No. 886.

Mr. SPECTER. And why was that location selected for the position of the car?

Mr. SHANEYFELT. This location was selected as the first point at which a person

in the sixth floor window of the Book Building at our control point could have gotten a shot at the President after the car had rounded the corner from Houston to Elm.

Mr. SPECTER. And what position is station C?

Mr. SHANEYFELT. Station C is on a line drawn along the west curb line of Houston Street in a direct line, and station C is at a point along that line that is in line with where the car would have turned coming around that corner. It is on a line which is an extension of the west curb line of Houston Street.

Mr. DULLES. Where is position A on that chart?

Mr. SHANEYFELT. Position A is here.

Mr. McCLOY. That is before you get to the tree?

Mr. SHANEYFELT. Yes; he isn't under the tree yet.

Mr. SPECTER. And what occupant, if any, in the car is position A sighted on for measuring purposes?

Mr. SHANEYFELT. All of the photographs made through the rifle sight that are shown on the exhibit in the lower left-hand corner were sighted on the spot that was simulating the spot where the President was wounded in the neck. The chalk mark is on the back of the coat.

Mr. SPECTER. When you say that position A is the first position at which President Kennedy was in view of the marksman from the southeast window on the sixth floor of the School Book Depository Building, you mean by that the first position where the marksman saw the rear of the President's stand-in?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. So that would be the first position where the marksman could focus in on the circled point where the point of entry on the President was marked?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Could the marksman then have taken a shot at the President at any prior position and have struck him with the point of entry on that spot, on the base of the President's neck?

Mr. SHANEYFELT. I don't quite understand the question.

Mr. SPECTER. Was there any prior position, that is a position before position A, where the marksman from the sixth floor could have fired the weapon and have struck the President at the known point of entry at the base of the back of his neck?

Mr. SHANEYFELT. No; because as the car moves back, you lose sight of the chalk mark on the back of his coat.

Mr. SPECTER. And what is the distance between that point on the President and station C?

Mr. SHANEYFELT. That is 44 feet from station C—91.6 feet to the rifle in the window from the actual chalk mark on the coat. All measurements were made to the chalk mark on the coat.

Mr. SPECTER. On the coat of the President?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. The President's stand-in?

Mr. SHANEYFELT. Right. The angle to the rifle in the window was $40^{\circ}10'$.

Mr. SPECTER. And what is the other data?

Mr. SHANEYFELT. The distance to the overpass was 447 feet, and the angle to the overpass was minus $0^{\circ}27'$; that is, 27' below the horizontal.

Senator COOPER. May I ask a question there? How did you establish the location of the rifle in making those calculations?

Mr. SHANEYFELT. The location of the rifle was established on the basis of other testimony and information furnished to us by the Commission, photographs taken by the Dallas Police Department immediately after the assassination, and the known opening of the window.

It was an estimation of where the rifle most likely was based on the knowledge that the Commission has through testimony.

Mr. SPECTER. Senator Cooper, Mr. Frazier is present and has been sworn, and he is going to identify that. He could do it at this time, to pinpoint that issue.

Senator COOPER. I think we can just make a note of that, and go ahead with this witness.

Mr. SPECTER. Fine. We will proceed then with this witness and Mr. Frazier will testify in due course.

Mr. SHANEYFELT. I might say that this position was determined by Mr. Frazier in the window. We moved the car around until he told us from the window, viewing through the rifle, the point where he wanted the car to stop. And he was the one in the window that told us where the point A was. Once we established that, we then photographed it.

Mr. DULLES. Could he see the mark on the back of the coat from the window?

Mr. SHANEYFELT. Yes; through the rifle scope, he could see the mark.

Mr. SPECTER. Does the picture designated "photograph through rifle scope" depict the actual view of the rifleman through the actual Mannlicher-Carcano weapon?

Mr. SHANEYFELT. That is correct. At point A.

Senator COOPER. When Mr. Frazier testifies, then, will he correlate this photograph with a frame from photographs taken of the actual motorcade at the time of the assassination?

Mr. SHANEYFELT. No; we cannot correlate this with a frame from the motion picture because Mr. Zapruder didn't start taking pictures until the car had passed this point.

So we, therefore, on this frame and for the next two or three points, have no picture from Mr. Zapruder, since he wasn't taking pictures at that time.

Mr. DULLES. Off the record.

(Discussion off the record.)

Mr. DULLES. Back on the record.

Do I understand that you are not suggesting that a shot was necessarily fired at this point A, but this was the first point where this particular vision of the President's back could have been obtained?

Mr. SHANEYFELT. That is correct. It is only an arbitrary point showing the first possible shot that could have entered the President's coat at this chalk mark.

Representative FORD. What criteria did you use for determining that you could see the chalk mark? Was the criteria a part or the whole of the chalk mark?

Mr. SHANEYFELT. The actual manner in which it was set up—let me see if this answers your question. As we moved the car around, Mr. Frazier was in the window looking through the actual scope of the rifle, and could see very clearly the President or the man taking the President's place, as the car moved around.

And the instant that he could first see that chalk mark is the point where he radioed to us to stop the car, and is the first point at which a shot could be fired that would go in where the chalk mark is located.

Mr. DULLES. And that is point A?

Mr. SHANEYFELT. That is point A. Does that answer your question?

Representative FORD. I think it does. Is that picture in the lower left-hand corner of Exhibit No. 886 an actual photograph taken through the sight of the weapon that was allegedly used in the assassination?

Mr. SHANEYFELT. That is correct.

Representative FORD. And the chalk mark we see there is through that sight?

Mr. SHANEYFELT. That is correct. And that is exactly what an individual looking through the sight would see.

Mr. SPECTER. Then at point A, could the rifleman see the entire back of the President's stand-in as well as the specific chalk mark, as depicted on the exhibit?

Mr. SHANEYFELT. He could see only a portion of the back.

Mr. SPECTER. And the portion, which he could not see, is that which is below the seat level?

Mr. SHANEYFELT. Yes.

Mr. DULLES. You didn't say the President's stand-in, did you?

Mr. SPECTER. Yes; stand-in.

Mr. Shaneyfelt, for purposes of illustration would you produce the photograph

at this time showing the mounting of the motion picture camera on the weapon found on the sixth floor?

I now hand you a photograph which is being marked as Commission Exhibit No. 887 and ask you to state for the record who that is a picture of, and what else is in the photograph.

(The document referred to was marked Commission Exhibit No. 887 for identification.)

Mr. SHANEYFELT. Commission Exhibit No. 887 is a picture of me that was taken on May 24, 1964. My location was at the sixth floor window of the Texas School Book Depository that we have designated as our control point. I have the rifle that is the assassination rifle mounted on a tripod, and on the rifle is mounted an Arriflex 16-mm. motion picture camera, that is alined to take photographs through the telescopic sight.

This Arriflex motion picture camera is commonly known as a reflex camera in that as you view through the viewfinder a prism allows you to view directly through the lens system as you are taking your photographs so that as I took the photographs looking into the viewfinder I was also looking through the scope and seeing the actual image that was being recorded on the film.

Mr. SPECTER. Was the view recorded on the film as shown on Exhibit No. 886 the actual view which would have been seen had you been looking through the telescopic sight of the Mannlicher-Carcano itself?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. How did you determine the level and angle at which to hold the rifle?

Mr. SHANEYFELT. I placed the rifle in the approximate position based on prior knowledge of where the boxes were stacked and the elevation of the window and other information that was furnished to me by representatives of the Commission.

Mr. DULLES. You used the same boxes, did you, that the assassin had used?

Mr. SHANEYFELT. No; I did not.

Mr. SPECTER. Were those boxes used by Mr. Frazier.

Mr. SHANEYFELT. They were used by Mr. Frazier and used in making the measurements. I had to use a tripod because of the weight of the camera and placed the elevation of the rifle at an approximate height in a position as though the boxes were there.

Mr. SPECTER. Was Mr. Frazier present at the time you positioned the rifle on the tripod?

Mr. SHANEYFELT. Yes; he was.

Mr. SPECTER. Did he assist in describing for you or did you have an opportunity to observe the way he held a rifle to ascertain the approximate position of the rifle at that time?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. May it please the Commission, we will, with Mr. Frazier, indicate the reasons he held the rifle in the way he did to approximate the way we believe it was held at the time of the assassination.

What is the next position which has been depicted on one of your exhibits, please.

Mr. SHANEYFELT. The next position that we established during the reenactment is frame 161 of the Zapruder motion picture film.

Mr. SPECTER. Permit me to mark that if you would as Commission Exhibit No. 888.

(Commission Exhibit No. 888 was marked for identification.)

Mr. SHANEYFELT. This position which has been designated by us as frame 161 and as Commission Exhibit No. 888, was established as the last position that the car could be in where the rifleman in the window could get a clear shot of the President in the car before the car went under the covering of the tree.

Mr. SPECTER. How was that position located, from the ground or from the sixth floor?

Mr. SHANEYFELT. This was positioned by Mr. Frazier in the sixth floor window. In addition we knew from the Zapruder photographs the relative position of the car in the street as related to the curb and the guidelines or the lane lines.

Following those lane lines we then moved the car down to a point where Mr. Frazier radioed to us that it was the last point at which he could get a clear shot and we stopped the car there.

Mr. SPECTER. How did you then select the appropriate frame from the Zapruder film?

Mr. SHANEYFELT. After Mr. Frazier had stationed the car at this point, I then went to the position of Mr. Zapruder. Based on his motion pictures, a comparison of the photograph that we made with the photograph from the film, I was able to state that because of the relative position of the car in the street and in relation to other objects in the background, it corresponded to frame 161 of the motion picture.

Mr. SPECTER. Do you have on Exhibit No. 888 a reproduction of frame 161?

Mr. SHANEYFELT. Yes; the upper left-hand corner is a reproduction of the frame 161 of the Zapruder motion picture. The picture on the upper right is a photograph that I made with a speed graphic camera from Zapruder's position of the car reestablished in that location. The photograph in the lower left-hand corner, is a photograph of the view through the rifle scope that Mr. Frazier saw at the time he positioned the car there. This is the view that you would obtain from looking through the rifle scope from the sixth floor window.

Mr. SPECTER. Was the automobile in exactly the same position at the time of the taking of the "photograph through rifle scope" and the "photograph from reenactment"?

Mr. SHANEYFELT. Yes; approximately the same. We went through all stations with Mr. Frazier in the window and I took photographs from Mr. Zapruder's position, and once establishing a frame position, we marked it clearly in the street. After we had taken all of the photographs from Zapruder's position, we then took the car back, and went to the sixth floor window and mounted the motion picture camera on the rifle. These photographs were made by rolling the car in the same position based on the marks we had in the street so it was as accurate as could be done in the same position.

Mr. DULLES. There is no one sitting in that right-hand corner of the rear seat, is there in that picture?

Mr. SHANEYFELT. Yes; the person taking President Kennedy's place is sitting in the back seat.

Mr. DULLES. Yes; I see it. It is rather hard to see through the trees.

Mr. SHANEYFELT. Yes; we moved it up to a point where the chalk mark was just about to disappear on the street.

Mr. DULLES. I don't think I see the chalk mark maybe someone else can.

Mr. SHANEYFELT. It may be covered by the crosshair of the rifle scope.

Representative FORD. In that picture photographed through the rifle scope on Exhibit No. 888 a man standing in for Governor Connally is also in the car, is he not?

Mr. SHANEYFELT. That is correct. He is mostly hidden by the tree.

Mr. DULLES. Yes; I see.

Mr. SPECTER. Was there any difference between the position of President Kennedy's stand-in and the position of President Kennedy on the day of the assassination by virtue of any difference in the automobiles in which each rode?

Mr. SHANEYFELT. Yes; because of the difference in the automobiles there was a variation of 10 inches, a vertical distance of 10 inches that had to be considered. The stand-in for President Kennedy was sitting 10 inches higher and the stand-in for Governor Connally was sitting 10 inches higher than the President and Governor Connally were sitting and we took this into account in our calculations.

Mr. SPECTER. Was any allowance then made in the photographing of the first point or rather last point at which the spot was visible on the back of the coat of President Kennedy's stand-in before passing under the oak tree?

Mr. SHANEYFELT. Yes; there was. After establishing this position, represented by frame 161, where the chalk mark was about to disappear under the tree, we established a point 10 inches below that as the actual point where President Kennedy would have had a chalk mark on his back or where the wound would have been if the car was 10 inches lower. And we rolled the car then

sufficiently forward to reestablish the position that the chalk mark would be in at its last clear shot before going under the tree, based on this 10 inches, and this gave us frame 166 of the Zapruder film.

Mr. SPECTER. What Commission Exhibit number has been affixed to that?

Mr. SHANEYFELT. This is Commission Exhibit No. 889.

(Commission Exhibit No. 889 was marked for identification.)

Mr. DULLES. Is that 10 inches difference due to the difference in the two cars?

Mr. SHANEYFELT. That is correct.

Mr. DULLES. That is the President's—the car the President was in and the car you had to use for this particular test?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. On Exhibit No. 889, is the car in the same position on the "photograph through rifle scope" as it is on "photograph from reenactment"?

Mr. SHANEYFELT. That is correct, the same position.

Mr. SPECTER. And what is the comparison between the photograph from Zapruder film on that Exhibit No. 889 and the photograph from reenactment?

Mr. SHANEYFELT. The car is in the same position relative to the surrounding area in both the reenactment photograph and the Zapruder photograph.

Incidentally, the position that was used throughout all of the positioning of the car was the President's. His placement in the photograph, and this will be clearer in some of the later photographs, if the President's head was directly under a stop sign or a street sign or whatever, in the background, this was then the way we positioned the car with the person standing in for the President directly below or slightly to the side or directly below the stop sign and so on; so all of the calculations were based upon the position of the President.

Mr. SPECTER. Before leaving frame 161 finally, would you recite the distances which appear from the various points on that exhibit?

Mr. SHANEYFELT. Yes.

At the position that has been designated as frame 161, and appears on Commission Exhibit No. 888, the distance from the wound mark on a stand-in for President Kennedy to station C was 94.7 feet.

The distance to the rifle in the window was 137.4 feet, the angle to the window was $26^{\circ}58'$ based on the horizontal line, the distance to the overpass was 392.4 feet, and the angle to the overpass was minus $0^{\circ}7'$.

Mr. SPECTER. Are all angles calculated thereon based on the horizontal?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Was there any street angle taken into consideration in the calculations here?

Mr. SHANEYFELT. Yes; there is a 3° street grade that has to be deducted from the angle to the window to determine the actual angle from the street to the window as opposed to the horizon.

Mr. SPECTER. Will you now—

Mr. DULLES. Frame 161 is 3° on 161?

Mr. SHANEYFELT. Three degrees all along Elm Street.

Mr. DULLES. All along. That applies to all of these different pictures, is that correct?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Would you now read the same statistical data from frame 166 on Exhibit No. 889, please?

Mr. SHANEYFELT. Yes.

From the chalk mark on the back of the stand-in for President Kennedy, to station C is 95.6 feet, the distance to rifle in window, 138.2 feet, the angle to rifle in window based on the horizontal, is minus $26^{\circ}52'$.

Distance to overpass is 391.5 feet. The angle to the overpass is $0^{\circ}7'$.

Mr. SPECTER. Did the back of President Kennedy ever come into view at any time while he was passing through the foliage of the oak tree?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. What frame number was ascertained with respect to that position?

Mr. SHANEYFELT. This was determined to be frame 185. There is a slight opening in the tree, where the car passed under the tree, where a shot could have

been fired that would have passed through this opening in the tree. This again was positioned on the basis of Mr. Frazier in the window looking through the rifle scope and telling us on the street where to stop the car at the point where he could get a shot through the trees.

Mr. SPECTER. What Commission Exhibit number has been assigned to frame 185?

Mr. SHANEYFELT. This is Commission Exhibit No. 890, frame 185.

Mr. SPECTER. Is the "photograph through rifle scope" taken with the position of the car at the same place as "photograph from reenactment"?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And is the "photograph from reenactment" in the same position, as close as you could make it to the "photograph from Zapruder's film"?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Will you read the statistical data from frame 185?

Mr. SHANEYFELT. Yes; from the point of the chalk on the back of the stand-in for the President at position 185 to station C is 114.8 feet, the distance to rifle on window is 154.9 feet.

The angle to rifle in window based on horizontal is $24^{\circ}14'$, distance to overpass is 372.5 feet. The angle to the overpass is $0^{\circ}3'$ above horizontal.

Mr. SPECTER. Was there any adjustment made for the difference in the height of the automobiles on the location where the back of the President's stand-in was visible through the tree?

Mr. SHANEYFELT. Yes; there was an adjustment made for the 10 inch differential in the heights because of the different cars, and this was established as frame 186.

Mr. SPECTER. What Commission Exhibit number is affixed to frame 186?

Mr. SHANEYFELT. Commission Exhibit No. 891.

Mr. SPECTER. On Exhibit No. 891 is the car in the same position in "photograph through rifle scope" and "photograph from reenactment"?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Are the cars on those two pictures in the same positions on all of the frames which you are going to show this afternoon?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. In the "photograph from Zapruder film", does that "photograph from Zapruder film" show the Presidential automobile to be in the same position or as close to the same position as you could make it as is the replica car in the "photograph from reenactment"?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Will you read the statistical data from frame 186, please?

Mr. SHANEYFELT. Yes.

At frame 186 position the distance from the chalk mark on the back of the stand-in for the President was 116.3 feet from the station C. It was 156.3 feet to the rifle in the window.

The angle to the rifle in the window was $24^{\circ}3'$ based on the horizontal. Distance to the overpass was 371.7 feet. The angle to the overpass is $0^{\circ}3'$.

Mr. SPECTER. Was that position ascertained where the chalk spot on the back of President Kennedy's coat was first visible from the sixth floor window through the telescopic sight?

Mr. SHANEYFELT. That is correct.

Mr. DULLES. This is after passing the tree.

Mr. SHANEYFELT. Yes.

Mr. SPECTER. After passing out from under the oak tree.

Mr. SHANEYFELT. Yes.

Mr. SPECTER. What frame did that turn out to be?

Mr. SHANEYFELT. That was frame 207.

Mr. SPECTER. Do you have an exhibit depicting the same photographic sequence on frame 207?

Mr. SHANEYFELT. Yes; I do.

Mr. SPECTER. What Commission Exhibit number has been affixed to that frame?

Mr. SHANEYFELT. Commission Exhibit No. 892.

Mr. SPECTER. Is the car in the same position on "photograph through rifle scope" and "photograph from reenactment" on that exhibit?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Is the car in the same position, as closely as you could make it, on the "photograph from reenactment" and "photograph from Zapruder film"?

Mr. SHANEYFELT. That is correct.

Mr. SPENCER. Will you now read the statistical data from that exhibit?

Mr. SHANEYFELT. Yes. Distance from the chalk mark on the back of the stand-in for the President to the station C is 136.6 feet.

Distance to rifle in the window is 174.9 feet. The angle to the rifle in the window based on the horizontal is $21^{\circ}50'$. The distance to the overpass is 350.9 feet, and the angle to the overpass is $0^{\circ}12'$.

This is on frame 207, Commission Exhibit No. 892.

Mr. SPECTER. Was an adjustment made on that position for the heights of the automobiles?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. What was the adjusted frame for the first view that the marksman had of the President's stand-in coming out from under the tree?

Mr. SHANEYFELT. That is frame 210 and has been marked as Commission Exhibit No. 893 and represents the 10-inch adjustment for the difference in the height of the car as compared with frame 207.

Mr. SPECTER. Is the layout of frame 210 exactly the same as that for frames 207 and 185 that you have already testified about?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. In viewing the films on the frames preceding 210, what was President Kennedy doing?

Mr. SHANEYFELT. He is waving to the crowd, and in some frames it is obvious that he is smiling, you can actually see a happy expression on his face and his hand—

Mr. DULLES. Which way is he turning, to the left or to the right?

Mr. SHANEYFELT. He is looking toward the crowd to his right during most of that area, he is looking slightly to his right. His arm is up on the side of the car and his hand is in a wave, in approximately this position and he appears to be smiling.

Mr. SPECTER. What is the latest frame count where, to your eye, it appears that he is showing no reaction to any possible shot?

Mr. SHANEYFELT. Approximately—I would like to explain a little bit, that at frames in the vicinity of 200 to 210 he is obviously still waving, and there is no marked change.

In the area from approximately 200 to 205 he is still, his hand is still in a waving position, he is still turned slightly toward the crowd, and there has been no change in his position that would signify anything occurring unusual. I see nothing in the frames to arouse my suspicion about his movements, up through in the areas from 200 on and as he disappears behind the signboard, there is no change.

Now, 205 is the last frame, 205 and 206 are the last frames where we see any of his, where we see the cuff of his coat showing above the signboard indicating his hand is still up generally in a wave.

From there on the frames are too blurry as his head disappears you can't really see any expression on his face. You can't see any change. It is all consistent as he moves in behind the signboard.

Mr. SPECTER. When you say "signboard" what do you mean by that, Mr. Shaneyfelt?

Mr. SHANEYFELT. I refer to the sign that is between the photographer, Mr. Zapruder, and the Presidential car.

Representative FORD. Not any sign post between the rifleman and the President?

Mr. SHANEYFELT. No; this is a sign between the cameraman and the President. So that we are unable to see his reaction, if any.

Mr. SPECTER. What is the frame at which Governor Connally first emerges from behind the sign you just decribed?

Mr. SHANEYFELT. That is frame 222.

Mr. SPECTER. Have you prepared a model demonstration on frame 222?

Mr. SHANEYFELT. Yes; I have.

Mr. SPECTER. What Commission Exhibit number has just been affixed on that frame?

Mr. SHANEYFELT. Frame 222 has been given Commission Exhibit No. 894.

Mr. SPECTER. Was the location of the automobile fixed from the window or from the street on frame 222?

Mr. SHANEYFELT. On frame 222, the position of the automobile was fixed from the street, based on the photograph from the Zapruder film.

Mr. SPECTER. Are the various photographs on that frame and the various distances the same in terms of general layout as the prior exhibit you testified to?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What is the first frame at which President Kennedy is visible coming out from behind that sign?

Mr. SHANEYFELT. This is frame 225.

Mr. SPECTER. What Commission Exhibit has been affixed to frame 225?

Mr. SHANEYFELT. Frame 225 has been assigned Commission Exhibit No. 895.

Mr. SPECTER. What, if anything, is detectable from a view of the Zapruder film frame 225 as to the positions or reaction of President Kennedy?

Mr. SHANEYFELT. Frame 225 there appears to be a reaction on the part of the President. This is—

Mr. SPECTER. Describe specifically what movement he is making in that picture or what his position is?

Mr. SHANEYFELT. At frame 225 his hand is down, his right hand that was waving is down, and has been brought down as though it were reaching for his lapel or his throat. The other hand, his left had is on his lapel but rather high, as though it were coming up, and he is beginning to go into a hunched position.

Mr. SPECTER. When you say beginning to go into a hunched position is that apparent to you from viewing the motion picture and slides from the frames which succeed frame 225?

Mr. SHANEYFELT. That is primarily apparent from the motion picture because of the two or three or four frames that show as he emerges from the sign; that is, in the motion picture, you see the President reaching for his coat lapels and going into a hunched position, leaning forward and lowering his head.

Mr. McCLOY. That doesn't exist in frame 225 yet, does it?

Mr. SHANEYFELT. It is just beginning in frame 225. That is frame 225 is the first view we have of the President.

Mr. McCLOY. Out past the sign.

Mr. SHANEYFELT. As he comes out from behind the sign that obstructs the cameraman from the President.

Mr. DULLES. But there is no obstruction from the sixth floor window?

Mr. SHANEYFELT. No; no obstruction at this point. There is no obstruction from the sixth floor window from the time they leave the tree until they disappear down toward the triple overpass.

Mr. SPECTER. Do the photographs on frame 225 depict the same circumstances as those depicted on the prior exhibits?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And do the measurements on frame 225 cover the same subjects as those covered on prior exhibits?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What is the angle from the rifle to the spot on the President's back on frame 210, please?

Mr. SHANEYFELT. On frame 210, the angle from the rifle to the window, based on the horizon is 21°34'.

Mr. SPECTER. That is from the rifle to what, Mr. Shaneyfelt.

Mr. SHANEYFELT. From the rifle to the chalk mark on the back of the stand-in for the President.

Mr. SPECTER. What is the same angle at frame 225?

Mr. SHANEYFELT. It is 20°11'.

Mr. SPECTER. Those angles are computed to the horizontal?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What is the range of distance from the position of the car in frame 210 to the position of the car in frame 225?

Mr. SHANEYFELT. That is 14.9 feet between frame 210 and frame 225.

Mr. SPECTER. What is the position of President Kennedy at frame 210 with respect to position C.

Mr. SHANEYFELT. President Kennedy is 138.9 feet from station C at frame 210.

Mr. SPECTER. Station C.

Mr. SHANEYFELT. Yes; station C to President Kennedy on frame 210 is 138.9 feet.

Mr. SPECTER. What is the distance between station C and President Kennedy at frame 225?

Mr. SHANEYFELT. That is 153.8 feet.

Mr. SPECTER. Was the car further positioned at frame 231?

Mr. SHANEYFELT. Yes; it was.

Mr. SPECTER. What Commission exhibit number are we affixing to that?

Mr. SHANEYFELT. That is Commission Exhibit No. 896.

Mr. SPECTER. Are the photographs and measurements on 896 the same layout as those affixed to prior exhibits?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Was the automobile stopped at frame 235 and similar photographs and measurements taken?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What Commission exhibit number is affixed to frame 235.

Mr. SHANEYFELT. Exhibit No. 897.

Mr. SPECTER. Was the automobile again stopped at frame 240 with measurements and photographs taken similar to those in prior exhibits?

Mr. SHANEYFELT. Yes; it was. That is correct.

Mr. SPECTER. What Commission exhibit number is affixed to that frame?

Mr. SHANEYFELT. Exhibit No. 898.

Mr. SPECTER. Was the automobile again stopped at frame 249 with similar photographs and measurements taken?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And what Commission exhibit number is given to those calculations and photographs on frame 249?

Mr. SHANEYFELT. Commission Exhibit 899.

Mr. SPECTER. Now, as to frame 249, that is how many frames beyond the first point at which the spot on President Kennedy's back was visible after he passed out from under the oak tree?

Mr. SHANEYFELT. That is 249?

Mr. SPECTER. Yes.

Mr. SHANEYFELT. It is 42 frames.

Mr. SPECTER. And does a 42-frame count have any significance with respect to the firing time on the Mannlicher-Carcano rifle?

Mr. SHANEYFELT. Yes; we have established that the Zapruder motion picture camera operates at an average speed of 18.3 frames per second. And we have been advised that the minimum time for firing the rifle in successive shots is approximately two and a quarter seconds. So this gives us then a figure of two and a quarter seconds of frames; at 18.3, this gives us this figure of 41 to 42 frames.

Representative FORD. Would you repeat that again, please?

Mr. SHANEYFELT. The camera operates at a speed of 18.3 frames per second. So that in two and a quarter seconds it would run through about 42—41 to 42 frames.

Representative FORD. Then the firing of the rifle, repeat that again?

Mr. SHANEYFELT. As to the firing of the rifle—we have been advised that the minimum time for getting off two successive well-aimed shots on the rifle is approximately two and a quarter seconds. That is the basis for using this 41

to 42 frames to establish two points in the film where two successive quick shots could have been fired.

Representative FORD. That is with one shot and then the firing.

Mr. SHANEYFELT. Work the bolt and fire another one.

Mr. SPECTER. At frame 249 was Governor Connally in a position where he could have taken a shot with the bullet entering at the point immediately to the left under his right armpit with the bullet then going through and exiting at a point immediately under his right nipple?

Mr. SHANEYFELT. No; Governor Connally has begun to turn in his seat around in this manner, in such a way, turn to his right so that his body is in a position that a shot fired from the sixth floor window could not have passed through the path that it reportedly took through his body, if the bullet followed a straight, undeflected path.

Mr. DULLES. I don't quite get that. You mean because of his having turned this way, the shot that was then—had then been fired and apparently had hit the President could not have gone through him at that point?

Mr. SHANEYFELT. That is correct under the stated conditions. Even a shot, independent of the shot that hit the President, could not have gone through in that manner, coming from the sixth floor window, because the window was almost directly behind the automobile at that time and the Governor was in a position where the bullet couldn't have gone through his body in the manner that it reportedly did.

It would have come in through his shoulder and out through the other shoulder, in the way that he was lined up with the window.

Mr. SPECTER. So you say it could have gone through him, but it could not have passed through him with the angle of entry as disclosed in the Parkland Hospital records and described by Dr. Shaw?

Mr. SHANEYFELT. That is correct, if it followed a straight path.

Mr. SPECTER. And exiting immediately under his right nipple, again as described in the hospital records at Parkland and by Dr. Shaw.

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Have those points of entry and exit been made available to you in your analysis of this situation?

Mr. SHANEYFELT. Yes; they have.

Mr. SPECTER. Could you elaborate just a little further on the observations and reasoning which you have undertaken to come to the conclusion which you have just expressed?

Mr. SHANEYFELT. We are speaking of frame 249, are we?

Mr. SPECTER. Yes, sir, frame 249.

Mr. SHANEYFELT. Could I see that exhibit? The photograph in the lower left corner of Commission Exhibit No. 899 is the photograph taken through the scope of the rifle on the sixth floor window when the car was stationed in this frame number position. It is noted from this photograph that the rifle is not quite directly behind the car but very nearly directly behind the car.

Governor Connally's body is turned. We have duplicated the position in the Zapruder photographs of Governor Connally and the President in the reenactment photograph, as nearly as possible, duplicated the same body position, and from the sixth floor window then you can see from the photograph that the Governor's body is turned to the Governor's right in such a fashion that an undeflected shot would not go through in the path as described by the Parkland doctors.

Mr. McCLOY. I don't quite follow that yet. The President has been shot at frame 249, according to your theory.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. Might he not also have been shot at some earlier frames in—the indications are the reactions are shown considerably ahead of that frame.

Mr. SHANEYFELT. That is correct.

Mr. McCLOY. So, for example, at frame 237 and at frame 237 Governor Connally hasn't turned to the right.

Mr. DULLES. But a shot has been fired at this time.

Mr. McCLOY. But a shot has been fired at that time.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. So at that point he could have been hit; Governor Connally could have been hit.

Mr. SHANEYFELT. Yes; Governor Connally could have been hit by frame 238.

Mr. McCLOY. But your point is when he gets farther along, he couldn't have been hit, let's say at frame 249 in the same spot where he was hit.

Mr. SHANEYFELT. That is correct.

Mr. McCLOY. Yes.

Mr. DULLES. He made the turn later than those frames you have been discussing at the time apparently of the first shot at the President.

Mr. McCLOY. Yes; the first shot, but according to these frames, the first shot hit the President considerably before this.

Mr. SHANEYFELT. Yes, sir.

Mr. McCLOY. And at a time again when Governor Connally's back was square to the window.

Mr. SHANEYFELT. Well, not exactly square. I believe he was turned slightly to the right as he went behind the sign.

Mr. McCLOY. Take frame 231.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. There the President has got his hands up as you put it to his throat.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. And here is Connally facing to the front.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. So at that point a bullet coming through the President's throat could have hit Connally in the spot where it did hit Connally.

Mr. SHANEYFELT. I am going to defer that question to Mr. Frazier who is in the window with the rifle scope and made a more thorough study of the possible path of the bullet. But he is straight in the car in frame 231.

Mr. McCLOY. But your testimony is in frame 248—frame 249 Connally couldn't have been hit from this window in the position where he was sitting.

Mr. SHANEYFELT. That is correct, on the basis stated.

Mr. DULLES. But you would have then the problem you would think if Connally had been hit at the same time, would have reacted in the same way, and not reacted much later as these pictures show.

Mr. McCLOY. That is right.

Mr. DULLES. Because the wounds would have been inflicted.

Mr. McCLOY. That is what puzzles me.

Mr. DULLES. That is what puzzles me.

Senator COOPER. Would you identify the frame in which Governor Connally started turning to the right?

Mr. SHANEYFELT. I might say that as—in the motion picture—as the car comes out from behind the signboard, the Governor is turned slightly to his right in this manner. This would be in the first frame, in frame 222, he is turned just slightly to his right, and from there on he turns almost square, straight on with the car momentarily, and there is a jerking motion there at one point in the film about there, at which time he starts to turn this way and continues to turn.

Mr. DULLES. Jerky motion in Connally in the film.

Mr. SHANEYFELT. There is—it may be merely where he stopped turning and started turning this way. It is hard to analyze.

Mr. DULLES. What I wanted to get at—whether it was Connally who made the jerky motion or there was something in the film that was jerky. You can't tell.

Mr. SHANEYFELT. You can't tell that.

Mr. McCLOY. Certainly the film is jerky at that point. I mean there is a big blur.

Mr. SHANEYFELT. He does turn.

Mr. McCLOY. Just before and after that.

Representative FORD. But isn't it apparent in those pictures that after a

slight hesitation Governor Connally's body turns more violently than the President's body?

Mr. SHANEYFELT. Yes.

Representative FORD. The President's only reaction is a motion to his throat or to his neck with his hands.

Mr. SHANEYFELT. That is correct.

Representative FORD. Whereas Governor Connally actually turns his body rather sharply?

Mr. SHANEYFELT. Yes; he turns as they go behind the signboard, he turns this way and he is turning a little bit this way and as he comes out of the signboard he is facing slightly to the right, comes around straight on and then he turns to his left straight on, and then he turns to his right, continues to turn around and falls over in Mrs. Connally's lap.

But in the motion picture it is a continuous movement as he goes around and falls.

Senator COOPER. Will you again answer my question which I asked and hasn't been answered and I say with all respect, in what frame did Governor Connally begin to turn to the right after he had placed his position straightforward as you have testified.

Mr. SHANEYFELT. I am sorry. That starts approximately at frames 233 to 234.

Senator COOPER. In what frame does the photograph show or in what frame is it shown that President Kennedy had moved his hands to his throat?

Mr. SHANEYFELT. That shows on frame—it is clearer on frame 226, 225 is the frame where you first see him, and frame 226.

Mr. DULLES. How many frames between those two?

Mr. SHANEYFELT. From 26 to 33, eight. That would be a fraction of a second in time.

That is less than half second.

Representative FORD. It can be contended that based on these photographs of films that the first shot apparently was fired in frames 220 to 224, in that area.

Mr. SHANEYFELT. Yes; I think you have to go back even to 210 because of reaction times; we don't know reaction times. But I would say between 210 and 225 because at 225 we have the President reacting.

So, in that 15 frames there it is behind the signboard, we can't see what is happening.

Mr. DULLES. What frame first shows him with his hands at his throat?

Mr. SHANEYFELT. 225, 226.

Mr. McCLOY. 225, it is not too clear. It is much more pronounced in the next frame is where he puts his both hands to his throat, such as that.

Mr. DULLES. And Mrs. Kennedy has apparently turned around and looking at him.

Mr. McCLOY. One hand may be coming down from waving in 225.

Mr. DULLES. That is his left hand there—no; it is his right hand, your right. His right hand.

Representative FORD. Then based on the mathematics of how quickly a second shot could be fired, the second shot would be fired in approximately what frame?

If you assume it, the first shot is from 210 to 224.

Mr. SHANEYFELT. It would be 252 to 266, down in there.

Representative FORD. That would be the elapsed time of what?

Mr. SHANEYFELT. Two and a quarter seconds.

Representative FORD. Two and a quarter seconds.

Mr. SHANEYFELT. That is the very quickest.

Mr. SPECTER. On fixing the range from frames 210 to 225, where the President was first struck, did you take frame 210 because that was the first point after the President had passed out from under the oak tree?

Mr. SHANEYFELT. Yes; that is the first point from this, and although we are able to see in the films that there is no apparent reaction from the President from 205 to 210, and as he disappears from behind the signboard, we cannot estimate the reaction time.

Mr. SPECTER. When you say reaction time you mean?

Mr. SHANEYFELT. Of the President?

Mr. SPECTER. Reaction time from 205——

Representative FORD. To 210?

Mr. SHANEYFELT. Yes.

Representative FORD. But there at frame 210, that is the first point at which the marksman had a clear shot after the President passed out from under the tree.

Mr. SHANEYFELT. That is correct.

Representative FORD. Then you select frame 225 as the outside limit of the shot which struck the President because that is where you first observe a reaction by the President when he comes out from behind the sign.

Mr. SHANEYFELT. That is correct.

Mr. DULLES. What frames are blanked out because of the sign?

Mr. SHANEYFELT. The President, the last we get any scene of him at all, and this is just the very top of his head is 210.

Mr. DULLES. 210 to what is blanked out?

Mr. SHANEYFELT. 225.

Mr. DULLES. To 225 is blanked out?

Mr. SHANEYFELT. Yes, that is 15 frames.

Mr. McCLOY. 224 he just begins to appear.

Mr. SHANEYFELT. Yes.

Mr. McCLOY. I don't think if you assume the President was hit at 225 and I don't think that is clear at all. I think it begins to get clear about 227 that he had been hit, that the reaction really develops. But I think that 225 it may very well be that he has not been hit because his hand isn't at his throat, he may be just moving from the position of waving.

Mr. DULLES. But that is about a tenth of a second.

Mr. McCLOY. Yes; it is a very short time entirely, but I don't think the frame unequivocally shows the reaction to the bullet at 225. I think it does unequivocally show it at 226 and 227.

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Perhaps an additional question on the clarity of the slide itself as a point of reaction would be in order for Mr. Shaneyfelt, and then, may I say parenthetically, we want to have the Commission see these slides this afternoon.

We have prepared them to show to you so that you can observe for yourself what we are bringing to you through the witness to give you a frame of reference and an orientation.

Mr. Shaneyfelt, then what was your impression by frame 225, as you viewed it most recently this morning, with respect to a possible reaction on that frame made from the original Zapruder film?

Mr. SHANEYFELT. It is my feeling that at frames 225, 226 and 227 you are having a reaction. You have a split second there, and at 225 the reaction is barely discernible, more discernible on the film and the slides than the reproduction you have here but it has to be considered in the light of the motion picture you see as he starts this reaction, and the reaction is by frame—in either the slides or pictures—is clearly apparent in 226, and barely apparent in 225.

Mr. SPECTER. Now, was frame 249 selected as a situs for calculations on the possible construction that President Kennedy was struck in the back at the first point unadjusted at which he emerged from the tree, to wit: frame 207, with an additional calculation of 42 frames giving the approximately two and a quarter seconds for the firing of a second shot to determine through this one means whether there was time for the rifleman to have operated the bolt, assuming he made a shot at 207, and to have made another shot at the earliest possible time at 249.

Mr. SHANEYFELT. That was the basis for the selection of frame 249, yes.

Mr. SPECTER. Now, going back just a moment, was frame 231 selected as a basis for analysis as the first frame after 225 because Governor Connally expressed the opinion when he viewed the frames that he thought he was hit by or at frame 231.

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And was frame 235 selected as a basis of analysis because that was one point at which a number of the viewers, including staff and agents of the FBI and Secret Service thought that might be the last frame at which Governor Connally had turned enough to the right to still take a shot and have the bullet pass through his body from the sixth floor window at the angle described in the medical reports and by his doctors.

Mr. SHANEYFELT. That is correct on the basis of an undeflected path. That is the frame that the doctors selected as the frame beyond which he could not have received this shot and have it travel in the path that it reportedly traveled.

Mr. SPECTER. Was frame 240 selected for analysis as being the absolutely last time, based on the observations of those whom you have described as seeing the films, that the Governor could have conceivably taken a shot from the sixth floor window and have it pass through the body of the Governor in the way described in the medical reports and by the Governor's doctors?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Was the analysis, made on the ability of the Governor to take the shot at each of the positions, based on the position he had at that particular frame in accordance with the amount of turn to the right which he had made at that particular time?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Was there a still photograph known as AP photograph, which was taken at the time of the assassination or a view seconds thereafter, studied by you and others in connection with the analysis that you have been describing?

Mr. SHANEYFELT. Yes; there was.

Mr. SPECTER. Was the simulated automobile placed in the same position that the Presidential automobile was in when the photograph was made by the AP photographer, as closely as it could be positioned at the time of the reenactment?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What Commission exhibit number is attached to the photographs of that AP shot and the reenactment picture?

Mr. SHANEYFELT. That is Commission Exhibit No. 900.

Mr. SPECTER. Would you describe what photographs appear then on Commission Exhibit No. 900?

Mr. SHANEYFELT. On Commission Exhibit No. 900, the top photograph is a photograph purportedly made by an AP photographer shortly after one of the shots. It depicts the side of the Governor's head, the left side of the Governor's head, his ear is visible, he has turned considerably. It depicts the President's hand touching his lapels, and a portion of the President's face.

Secret Service agents on the followup car are seen also. The Texas School Book Building in the background.

The reenactment photograph was made after positioning the car by looking at the photograph, based on the position of the car as related to the lane line in the street, as related to the position of the building, the column of the building and so on to reestablish the location.

We also reestablish in reenactment the position of the agent taking Governor Connally's position in the car used in the reenactment and the position of President Kennedy to closely approximate the actual photograph made by the AP, Associated Press. This was then studied, the car in this position was then studied, from the Zapruder position, and was determined to be frame 255.

Mr. SPECTER. Was an exhibit prepared then on frame 255?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What Commission exhibit number is affixed to frame 255?

Mr. SHANEYFELT. Exhibit No. 901.

Mr. SPECTER. Does that have the same layout of photographs and measurements as on frames 225, 222 and those which preceded them.

Mr. SHANEYFELT. Yes; it has. It has the Zapruder photographs, the matching reenactment photograph, and the photograph through the rifle scope along with the measurements and the angles.

Mr. SPECTER. On the AP photograph shown on Commission Exhibit No. 900, what reaction, if any, do you observe by the Secret Service agents on the followup car?

Mr. SHANEYFELT. The Secret Service agents on the right-hand side of the

followup car are looking back and to their right. The one to the front on the left-hand side of the car is looking generally toward the President.

The one in back of him on the left fender is looking slightly to his right.

Representative FORD. What is the distance on frame 255 between the President and the rifle?

Mr. SHANEYFELT. The distance to the rifle in the window is 218 feet. This is frame 255, which is well past the signboard, well past 249 which is the last frame we considered.

Mr. McCLOY. Well past the first evidence of reaction?

Mr. SHANEYFELT. Yes.

Mr. McCLOY. On the part of the President to a shot.

Mr. SHANEYFELT. Well past, and past the point in the film where Governor Connally states he has been hit.

Mr. SPECTER. Was that simulated car placed in any other position to duplicate still a subsequent frame?

Mr. SHANEYFELT. Yes; the frame No. 313, which is the frame that records the shot to the President's head, was recorded as frame 313 and was reestablished during reenactment.

Mr. SPECTER. What Commission number has been affixed to frame 313?

Mr. SHANEYFELT. Commission Exhibit No. 902.

Mr. SPECTER. Is this exhibit organized in a somewhat different fashion from the prior frame exhibits?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Will you start with the photograph in the upper left-hand corner and describe for the Commissioners, please, each photograph or picture which appears thereon and what it represents?

Mr. SHANEYFELT. Yes; I might state first that all of the other photographs were reestablished on the basis of the Zapruder film using reference points in the background of the pictures.

As is apparent here from the photograph of the Zapruder frame 313 there are no reference points. There is just a grassy plot. So there is no reference point on which we can reestablish the position of the car in the roadway.

For this reason it was necessary to use the Nix film of the head shot and the Muchmore film of the head shot to establish this position in the road.

The right-hand photograph represents frame 24 from the Nix film, and is the frame that depicts the shot to the head. We used Mr. Nix's camera and a print of this picture and stood in the previously determined position of Mr. Nix when he took his photographs, and had them roll the car down to a position so that the President's head was directly under the point where Mr. Zapruder is standing on the projection.

Mr. SPECTER. You are describing the photograph on which side——

Mr. SHANEYFELT. On the——

Mr. SPECTER. Of the viewer.

Mr. SHANEYFELT. On the upper left-hand side.

Mr. McCLOY. I think you said right.

Mr. SHANEYFELT. The upper left-hand photograph is the photograph from the—— taken from the frame 24 of the Nix film.

The photograph on the right, upper right, is the photograph taken at the reenactment from the position where Mr. Nix was standing. We then proceeded over to the point that we had established as the position of Mrs. Muchmore, and using frame 42, which is a frame in her film depicting the shot to the head, and using the steps and their relation to the President and the objects in the background in relation to the President as shown in this lower left-hand photograph, which is the Muchmore frame 42, we reestablished, we checked the position we had placed the car in, based on the Nix photographs, and found that it conformed and checked out as being in a closely accurate position.

This is the basis used for establishing the position of the car. After we had established that, through the Nix and Muchmore films, we then checked it against the Zapruder photograph, which is the second from the top on the left of Commission Exhibit No. 902, frame 313, which shows the explosion from the top of the President's head. Just to the right of that second

picture down from the right, is the photograph made at the reenactment from Zapruder's position.

We know from studying the films that just two or three frames before frame 313 we can see a little bit of yellow along the curb, and this checks out because along this area of the photograph from the Zapruder position of the reenactment is a yellow strip.

Mr. SPECTER. When you say this area you are referring to the yellow area which appears on the left-hand curb immediately to the rear of the simulated car?

Mr. SHANEYFELT. That is correct, and this, therefore, checks out this as being a fairly accurate position for the car in frame 313.

This photograph then, the third down on the left, is a photograph through the telescope of the rifle of the car positioned in frame 313.

Mr. McCLOY. Would you read off those dimensions from that?

Mr. SHANEYFELT. The dimensions from the surveyor on frame 313 of the distance from the wound mark on the President's stand-in to station C is 230.8 feet.

Distance to the rifle in the window is 265.3 feet. The angle to rifle in window is $15^{\circ}21'$ and this is based on the horizontal.

Distance to the overpass is 260.6 feet, the angle to the overpass is $1^{\circ}28'$.

Mr. SPECTER. What would the angle be considering the adjustment on the angle of the street?

Mr. SHANEYFELT. It would be less 3° or $12^{\circ}21'$, approximately.

Mr. SPECTER. When you say approximately is that because the adjustment is somewhat greater than 3° ?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. How much is it exactly, if you know?

Mr. SHANEYFELT. It is 3.9. It is almost 4.

Mr. SPECTER. Three degrees nine minutes?

Mr. SHANEYFELT. Three degrees nine minutes, I am sorry.

Mr. DULLES. Would you have to make a similar adjustment to the overpass?

Mr. SHANEYFELT. Yes; because the angle to the overpass is based on the horizontal. The overpass, you would have to add the $3^{\circ}9'$.

Mr. DULLES. From the overpass, is this an angle up or angle down?

Mr. SHANEYFELT. This is an angle down.

Mr. DULLES. So it is an angle down in both cases?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. When you say that you are reducing the angle of $15^{\circ}21'$ by $3^{\circ}9'$ to an angle of $12^{\circ}12'$, is that as the shot passes through the body of the President?

Mr. SHANEYFELT. That is correct. It is at that point.

Mr. SPECTER. How was the speed of the camera ascertained, Mr. Shaneyfelt?

Mr. SHANEYFELT. We obtained from Mr. Zapruder, Mr. Nix, Mrs. Muchmore; their cameras for examination, and in the FBI laboratory exposed film in all three cameras, aiming, focusing the camera on a clock with a large sweep-second hand. We then ran the camera at the speed and conditions as described by the people who used the cameras. We ran through several tests of film, and then after the film was developed it was studied under magnification, and frames were counted for a period of 2 to 3 seconds or for the full running time, and averages were taken.

Mr. Zapruder has stated that his camera was fully wound. Most of the others have stated their cameras were fully wound, so we were able to more or less eliminate the very slow time that occurs when the cameras are approximately run down, and all of these things were taken into consideration and were averaged.

The Zapruder camera was found to run at an average speed of 18.3 frames per second.

The Nix and Muchmore cameras were both found around 18.5 frames per second.

Mr. SPECTER. Were you able to ascertain the speed of the Presidential limousine at the time of the assassination?

Mr. SHANEYFELT. Yes; because we were able to determine the speed of the camera, and thereby accurately determine the length of time it takes for a

specific number of frames to run through the camera at this 18.3 frames per second, and having located these frame positions in the street, we took the farthest distance point we had in the Zapruder film which was frame 161 through frame 313.

This was found to run elapsed time from the film standpoint which runs at 18.3 frames a second, runs for a total of 8.3 seconds.

This distance is 136.1 feet, and this can be calculated then to 11.2 miles per hour.

Mr. SPECTER. Is that a constant average speed or does that speed reflect any variations in the movement of the car?

Mr. SHANEYFELT. That is the overall average from 161 to 313. It does not mean that it was traveling constantly at 11.2, because it was more than likely going faster in some areas and slightly slower in some areas. It is only an average speed over the entire run.

Mr. DULLES. Over the entire run between what points?

Mr. SHANEYFELT. Between frame 161 and 313.

Mr. DULLES. Yes; but where, could you place that on that chart, for example?

Mr. SHANEYFELT. Yes.

Mr. DULLES. And describe the points?

Mr. SHANEYFELT. This is frame 161 which is the frame where they have just gone under the tree, to frame 313 which is the shot to the head. So that it is that distance there which is 136.1 feet.

Mr. SPECTER. In referring to those points, will you specify what exhibit number you are referring to there?

Mr. SHANEYFELT. That is—

Mr. DULLES. I wonder if we could mark those points on that exhibit?

Mr. SPECTER. Of course, Mr. Dulles.

That is Commission Exhibit No. 883, is it not, Mr. Shaneyfelt?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. Will you take the first point Mr. Dulles has referred to and mark it as point X. I think we already have some letter designations in the early part of the alphabet.

Mr. McCLOY. Where is that point? What significance is that point? The first point?

Mr. SPECTER. This frame 161—

Mr. McCLOY. Yes.

Mr. SPECTER. Is the first frame we have on the Zapruder film.

Mr. DULLES. It is only to get the speed and distance here.

Mr. McCLOY. It has no relation to any shots.

Mr. DULLES. No relation to shots. Speed and distance.

Mr. SPECTER. It is the first frame we have where the marksman has his last clear shot of the back of the President's neck before it passes under the tree without adjustment. Is that correct, Mr. Shaneyfelt?

Mr. SHANEYFELT. That is correct. What letter designations did you want?

Mr. SPECTER. Mark 161, frame 161, with the letter designation X, if you will, please.

Mr. SHANEYFELT. And 313?

Mr. SPECTER. With the letter designation Y.

Mr. McCLOY. The record ought to show the two points are the point which you merely calculated the speed at which the car is going, isn't that right?

Mr. SHANEYFELT. That is correct.

Mr. McCLOY. Yes.

Mr. DULLES. Between those two points the car went at an average speed of 11.2 miles an hour?

Mr. SHANEYFELT. That is correct. Between point X and Y on Exhibit No. 883 the speed of the car was determined to be an average speed of 11.2 miles per hour.

Mr. DULLES. How long did the car take to go that distance, do you know, translated into time?

Mr. SHANEYFELT. 8.3 seconds.

Mr. DULLES. 8.3 seconds.

Mr. SPECTER. What motion pictures, if any, were taken during the reenactment?

Mr. SHANEYFELT. During the reenactment the black-and-white photographs were made from Zapruder's position with a Speedgraphic camera and we also took motion pictures with Mr. Zapruder's camera from Zapruder's position with the car in the fixed locations as they were established with the car just stationary in those locations.

After establishing all those points and making these film records of it, we then had the car proceed along that Elm Street route at approximately 11 miles per hour, and filmed it with Mr. Zapruder's camera loaded with color film from Mr. Zapruder's position and simultaneously photographed it with Mr. Nix's camera from Mr. Nix's position, and Mrs. Muchmore's camera from Mrs. Muchmore's position, and this was done twice.

(Off the record.)

Mr. SPECTER. The last question was about what movies and stills you took?

Mr. SHANEYFELT. We haven't discussed them all yet.

Mr. SPECTER. Were any other movies taken or photographs taken in addition to those which you heretofore described?

Mr. SHANEYFELT. Yes; after positioning the car in the street at the specific locations and making the movies with the Zapruder, Nix, and Muchmore cameras with the car running at 11 miles an hour on the route, I then went to the sixth-floor window and mounted the camera on the rifle, and photographs were made with black and white film motion pictures of the car in the fixed positions from frame 161 through frame positions 313. The car was stopped at each position. The individuals and the car were positioned by Mr. Gauthier on the street using the Zapruder pictures to reposition the individuals in the car, and motion pictures were made of the car sitting in those various positions. After this the car was driven at 11 miles an hour along the route and photographs were made through the rifle scope with a 16-mm. motion picture camera following the car as a target, as the car drove down the assassination route.

Following this, there were three runs made on black and white film. Then color film was loaded in the camera and it was again photographed on color film, 16 mm. with the car traveling at 11 miles an hour and the scope of the rifle following the car as the target.

This completed all the photographs that were made at the assassination site.

Mr. SPECTER. Was a subsequent photograph taken in the garage which you previously identified as the railway express garage?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. Will you repeat, even though you have heretofore mentioned them, the angles between the spot on the back of President Kennedy's neck which was marked with a white chalk mark and the muzzle of the rifle when the car was positioned at frame 210?

Mr. SHANEYFELT. The angle, based on the horizontal at frame 210, to the rifle in the window was $21^{\circ}34'$.

Mr. SPECTER. What was the comparable angle at frame 225?

Mr. SHANEYFELT. $20^{\circ}11'$.

Mr. SPECTER. So what would be the average angle then between those two points?

Mr. SHANEYFELT. The average angle, allowing for the $3^{\circ}9'$ street grade results in an average angle between frame 210 and frame 225 of $17^{\circ}43'30''$.

Mr. SPECTER. And that is the average angle from the muzzle to President Kennedy as he sat in the car or President Kennedy's stand-in as he sat in the car?

Mr. SHANEYFELT. That is correct. To the wound entrance.

Mr. SPECTER. Is the average angle of $17^{\circ}43'30''$ measured from the muzzle to the President's body as the President would be seated in the car?

Mr. SHANEYFELT. That is out on the street in those frame positions, yes. It is measured to the point of the wound on the back of the President.

Mr. SPECTER. I now hand you a photograph which has been marked as Commission Exhibit No. 903 and ask you if you know who the photographer was?

Mr. SHANEYFELT. Yes; I took this photograph.

Mr. SPECTER. When was that photograph taken?

Mr. SHANEYFELT. It was taken Sunday afternoon, May 24, 1964.

Mr. SPECTER. Is there a white string which is apparent in the background of that photograph?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. What is the angle of declination of that string?

Mr. SHANEYFELT. That string was placed along the wall by the surveyor at an angle of 17°43'30".

Mr. SPECTER. Did the surveyor make that placement in your presence?

Mr. SHANEYFELT. He did.

Mr. SPECTER. Were the stand-ins for President Kennedy and Governor Connally positioned in the same relative positions as those occupied by President Kennedy and Governor Connally depicted in the Zapruder films?

Mr. SHANEYFELT. Yes; these positions were approximately the position of the President and Governor Connally in the Zapruder films in the area around frame 225 as they go behind the signboard and as they emerge from the signboard.

Mr. SPECTER. Was the rod which is held in that photograph positioned at an angle as closely parallel to the white string as it could be positioned?

Mr. SHANEYFELT. Yes.

Mr. SPECTER. And through what positions did that rod pass?

Mr. SHANEYFELT. The rod passed through a position on the back of the stand-in for the President at a point approximating that of the entrance wound, exited along about the knot of the tie or the button of the coat or button of the shirt, and the end of the rod was inserted in the entrance hole on the back of Governor Connally's coat which was being worn by the stand-in for Governor Connally.

Mr. SPECTER. And was Governor Connally's stand-in seated in the position where the point of exit would have been below the right nipple at the approximate point described by Governor Connally's doctors?

Mr. SHANEYFELT. That is correct.

Senator COOPER. May I ask a couple of questions?

Am I correct in assuming that you have made these determinations about the degree of the angle of the trajectory of the bullet at the time the President was struck, locating the position of the President in the car on the one hand, and the location of the rifle at the time the shots were fired?

Mr. SHANEYFELT. The location of the wound, you mean the angle of the wound?

Senator COOPER. Yes.

Mr. SHANEYFELT. The angle—

Senator COOPER. You had to establish the position of the President at the time the bullet struck him and the position of the rifle to make a determination about the degree of the angle of the direction?

Mr. SHANEYFELT. That is correct. The positions in the car, their positions in the car, were based on the Zapruder film.

Senator COOPER. And you were able to determine what you think very accurately the position of the President in the car by the films that you have examined?

Mr. SHANEYFELT. Yes.

Senator COOPER. Then the factor then, which is not determinable exactly, then is the location of the rifle, is that correct?

Mr. SHANEYFELT. That is correct.

Senator COOPER. Upon what did you determine the location of the rifle—upon what factors?

Mr. SHANEYFELT. The rifle was positioned in the sixth floor window of the Book Building where the cartridges were found, and was determined from information furnished by representatives of the Commission.

Senator COOPER. Did you have information about the location of certain boxes that were seen—were found—at the window after the shooting occurred?

Mr. SHANEYFELT. That is correct. Yes; we had photographs of the boxes and we were advised, of the approximate position in the window and how far down the window was, the fact that some observers noted the rifle sticking out the window.

Senator COOPER. I want to ask you—you did have information from the testimony of witnesses who said they saw the rifle protruding from the window?

Mr. SHANEYFELT. We had this information furnished to us by the Commission.

Senator COOPER. And those facts, those locations were made known to you, and upon that evidence did you locate the rifle in making these calculations?

Mr. SHANEYFELT. That was the basis for the location of the rifle in all of our calculations.

Senator COOPER. Just one other question. Assuming that there might have been some variation in the location of the rifle, length of the window, the breadth of the window, or that the rifle you used was held higher than the rifle might have been, would it have made—how much variation would it have made, in your judgement, in these calculations you made?

Mr. SHANEYFELT. I don't believe that any movement of the rifle in that specific window would alter our calculations to any appreciable degree if you stay within that window, because our reenactment and our repositioning of the bodies in the car based on the photographs is subject to some variation, too, so we have variations throughout.

And the variations from the position of the rifle at that particular window, I feel would be negligible.

Senator COOPER. At every point where you made it, hypothetically, at least, made the determination that at a particular point the President was struck by a bullet, at that point the car and the President could be seen from the window?

Mr. SHANEYFELT. That is correct.

Senator COOPER. That is all I want to ask.

Mr. SHANEYFELT. Even under the tree you still could see the car and the President through the tree.

Mr. SPECTER. Mr. Shaneyfelt, did the surveyors calculate the angle and distance from each position where the simulated car was stopped from the President to the triple underpass?

Mr. SHANEYFELT. That is correct.

Mr. SPECTER. And are those figures reproduced in terms of distance to overpass, and angle to overpass on every one of the exhibits which also depict distance to window, referring to the sixth floor window, and angle to rifle in window?

Mr. SHANEYFELT. Yes; they do. They are on all the exhibits.

Mr. SPECTER. Now; is there any point on the overpass where the angle to the President's car or the angle to the President's stand-in seated in the simulated car, would permit a shot to be fired and to create the wound in the President's neck, which has an angle of decline of approximately 17° , based on the information furnished to you by the medical evidence, which we have asked you to assume, where that wound could be inflicted on the President's neck without regard to the point of entry?

Mr. SHANEYFELT. No; none of the angles from the overpass are anywhere near 17° . They range from frame 161 at a minus $7'$, from horizontal, to frame 313 which is $1^{\circ}28'$. None of them are even close to 17° .

Senator COOPER. From the exhibit that has been introduced, showing the position of the car and the President at the time of the first shot—what was the distance from that point to the overpass?

Mr. SHANEYFELT. The approximate location of the first shot—

Senator COOPER. Frame what?

Mr. SHANEYFELT. Well, the exact frame has not been established, but it would be in the range from frames 207 to 225. At frame 207, the distance to the handrail on a line of sight vision to the wound on the President is 350.9 feet.

At frame 225 the line of sight distance from the handrail of the overpass to the wound on the President is 334 feet.

Senator COOPER. What is the distance at those points to the window in the Texas School Book Depository?

Mr. SHANEYFELT. Frame 207 line of sight distance from the wound to the window is 174.9 feet. This distance to the overpass from there is 350.9.

On frame 225, line of sight to the window is 190.8 feet as opposed to the distance to the handrail on the overpass of 334.0 feet.

Senator COOPER. Did you yourself stand at the handrail of the overpass?

Mr. SHANEYFELT. Did I?

Senator COOPER. Yes.

Mr. SHANEYFELT. No; I did not.

Mr. SPECTER. What do you mean, Mr. Shaneyfelt, by line of sight?

Mr. SHANEYFELT. Straight line distance.

Representative FORD. Is that what is calculated by the surveyor?

Mr. SHANEYFELT. That is correct; by Mr. West.

Mr. SPECTER. Were there members of the testing teams that did go to the hand-rail at the triple underpass to make observations?

Mr. SHANEYFELT. Yes; there were.

Mr. SPECTER. Who were they?

Mr. SHANEYFELT. I am not real sure.

Mr. SPECTER. Mr. Chairman, those conclude my questions for Mr. Shaneyfelt. If it please the Commission, I would like to call Mr. Frazier at this time.

Mr. McCLOY. Thank you very much, Mr. Shaneyfelt.

TESTIMONY OF ROBERT A. FRAZIER RESUMED

Mr. SPECTER. Would you state your full name for the record, please?

Mr. FRAZIER. Robert A. Frazier.

Mr. SPECTER. Mr. Frazier, you have appeared before to testify, but will you at this juncture again give us the outline of your occupation and experience?

Mr. FRAZIER. Yes; I am a special agent of the Federal Bureau of Investigation assigned to the FBI Laboratory, Washington, D.C.

I work in the firearms identification unit in the laboratory, making examinations of firearms, bullets, the effects of bullets, trajectories, firing tests, powder pattern tests, and various other types of examinations.

(At this point Senator Cooper left the hearing room.)

Mr. SPECTER. Have you appeared heretofore before the Commission to testify about examinations which you have conducted of the clothing worn by President Kennedy, the clothing worn by Governor Connally, the examination of the Presidential limousine and certain ballistics information?

Mr. FRAZIER. Yes; I have.

Mr. SPECTER. Did you participate in the onsite tests at Dallas on May 24, 1964?

Mr. FRAZIER. Yes.

Mr. SPECTER. What was your position during most of the time of those onsite tests?

Mr. FRAZIER. I was stationed at the window on the sixth floor of the Texas School Book Depository Building at the southeast corner of the building.

Mr. SPECTER. How far was that window open at the time the tests were being conducted?

Mr. FRAZIER. I estimated it as approximately one-third. It was somewhat less than halfway open.

Mr. SPECTER. Is that the distance depicted on Commission Exhibit No. 492, which has heretofore been introduced in evidence?

Mr. FRAZIER. Yes, sir.

Mr. SPECTER. Is the distance open on that window about the same as that which you had it open at the time these tests were run?

Mr. FRAZIER. Yes; I would say that this is very close. The window was placed according to information already furnished to the Commission as to how much it had been opened at that time.

Mr. SPECTER. Did you handle the Mannlicher-Carcano rifle during the course of the onsite tests?

Mr. FRAZIER. Yes, sir.

Mr. SPECTER. The rifle previously identified as Commission Exhibit No. 139?

Mr. FRAZIER. Yes, sir; I did.

Mr. SPECTER. At what position—what was the basis for your positioning of that rifle during those tests?

Mr. FRAZIER. To position the rifle, we selected boxes of the same size and contour as boxes shown in a photograph or rather in two photographs, reportedly taken by the police department at Dallas shortly after the assassination.