

TO: WEINBERG

JESAJUE, sent me this
to review. He did a fine job

I disagree with him

on (A) FIRST SHOT → came
from behind (he claims)

(B) Connally lapel flap
(Z 224) - he says explained by a

shot - I say it was a wind factor
→ H.C.

copy to = WELBERG

Abstract: BY DR. DOVA DESAI

JFK ASSASSINATION Evidence Review 1995:

- The first shot fired in Dallas was around the time of film frame 191 on the amateur movie taken by Abraham Zapruder, perhaps a moment later, but not significantly earlier.

- That shot struck JFK's body, probably in the shoulder.

- Though from the rear, this shot is difficult to localize to the Texas School Book Depository, as at that moment the view was obscured by an oak tree.

- The second shot, which struck Governor Connally, probably came at z-224.

- The famed controversial single bullet theory works poorly given the reality of this early shot hitting the President. This is no surprise to its critics, but of note to supporters of a shot hitting Connally at z224.

- "Jiggle" analysis of the Zapruder film, as noted by Nobel Prize Physicist Luis Alvarez and others correlates with the premise of a z191 shot. It does not contradict a second shot at z224.

- The acoustics evidence is at variance with the above, and is probably invalid.

- The head shot (or shots) remain a puzzle, but probably represent two nearly simultaneous impacts, first from the rear, then from the front.

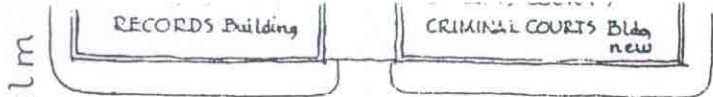
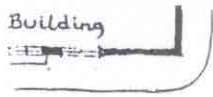
Preface:

Advances in technology permit viewing Zapruder's movie of the JFK assassination with greater detail than was ever before possible ~~previously~~. The film has been put onto laser disc where frame by frame comparisons, and sequence analysis can be performed with an accuracy not previously available to the public. Projection systems now available for home use allow great magnification of the imagery and review of details which have been a source of much controversy over the years.

I conducted such a review at the home of Rex & Rebecca Dean in several sessions. One occasion included Dr's Gary Aguilar and David Mantik, as well as researcher Hal Verb.

In conjunction with careful examination of other photo evidence and eyewitness testimony a number of controversies were resolved to our satisfaction. We believe that our analysis is as reproduceable as it is convincing and we encourage others to confirm the following contentions.

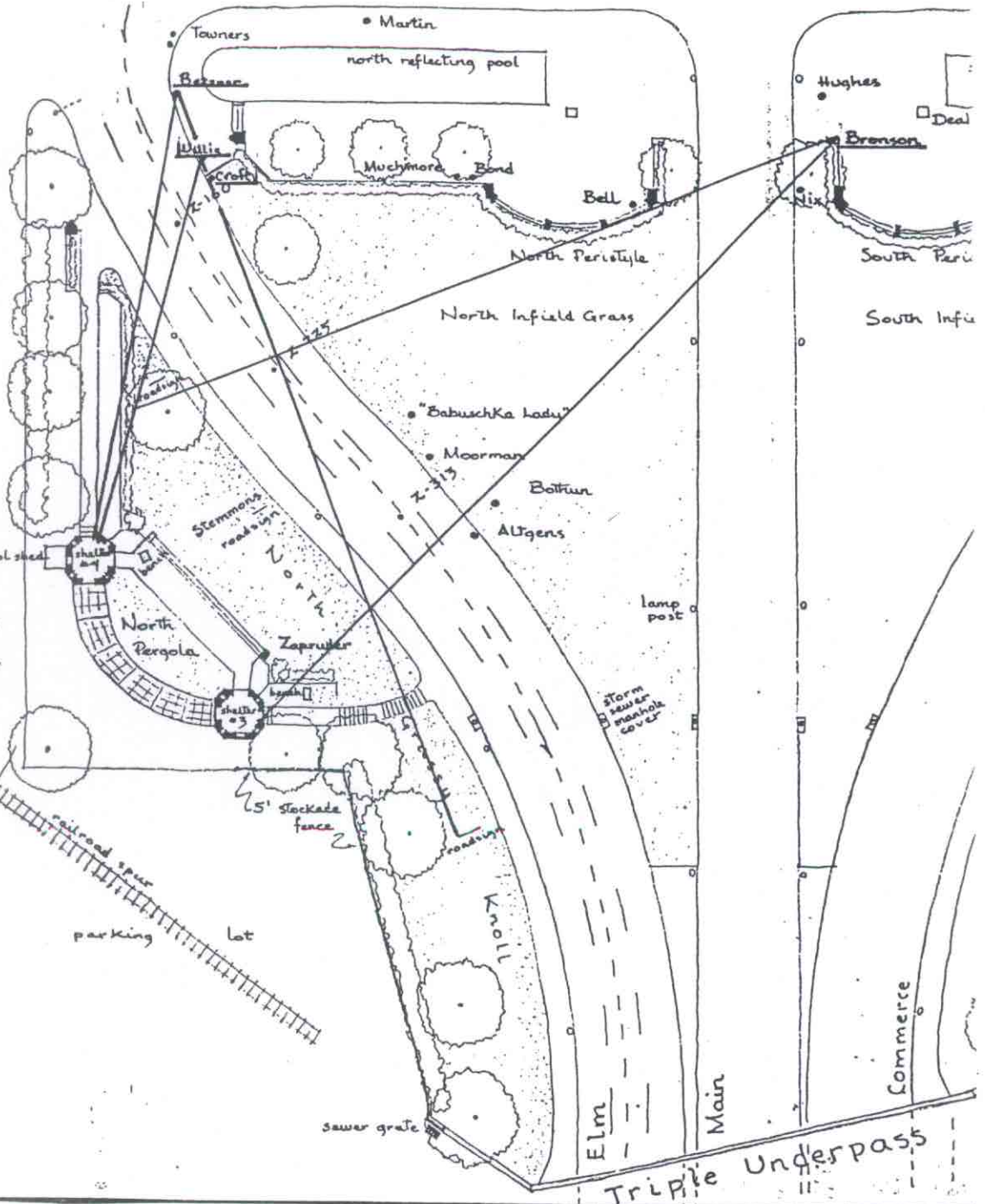
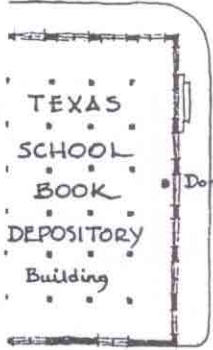
Note: "we" will be used when opinions offered are not disputed by any of my fellow researchers. "I" will be used if there is any doubt, or if it refers to work I did solo. Dissents will be noted.



Elm

Main

Houston motorcade route



Elm St Extension (original)

Elm Main

Triple Underpass

Commerce

Introduction:

The Zapruder film, though the most important evidence we have regarding what happened in Dealy Plaza, has a flaw that minimizes its value for determining the timing of the first shot. A Stemmons Freeway highway sign obscured the limosine for a crucial second near the time of the shot #1. Vital information was lost to Zapruder's perspective as to what JFK did between frames 207 and 224 of the film. We know he is hurt by frame 225, the first frame in which he is fully visible. He was thus struck earlier. A debate still rages over how much earlier.

Recently an effort has been made by Warren Commission supporters to assert that JFK was hit at z224, and that this is shot #2.

elect to
Since at least the mid-70s it has been contended that there is an earlier shot than the z210-225 time frame put forth by the Warren Commission (for shot 1 or 2 they did not commit). Much of the imprecision derives from the sign. A shot coming perhaps as early as frames z153 to 160 has been alleged by many. This appears to have originally come from arguments made for young Rosemary Willis who was running alongside the limosine. The little girl is observed on film to halt. She has said that she ceased running upon hearing the first shot. Her sudden turn of her head to the right on the film visibly supports this idea.

Rosemary's reaction, was reviewed over a dozen times on a laser disc film and although it does provide strong evidence for the timing of the first shot that shot is not at z/160, but substantially later.

It should be noted at this point that the analysis to follow is hair splitting. The difference between z153, the earliest suggested time for shot #1 and z224, the last possible moment for same (agreed by all parties) is 71 frames of film. The limo has been calculated to have been moving at 11 mph or 16 feet/second. The limo was 21'2" long making this critical point of contention one of less than 3 car lengths (2.9). The timing possibilities range over less than 4 seconds (3.9 sec)

Eyewitness testimony is notoriously unreliable, and the many conflicts among same have muddied the waters regarding most aspects of what happened in Dallas. One can find at least one witness to make a case for almost any scenario. We have reviewed the statements of certain critically placed eyewitnesses, however, to try to again establish where among these critical three car lengths the limo was located as the first shot rang out. We believe the evidence converges on the middle of the interval based upon:

1. Five people on Elm St. towards the Houston St. corner. Their descriptions put the limo nearly in front of them at first shot so their descriptions are especially accurate.

2. Three witnesses in the motorcade who can be localized with particular accuracy because their cars were turning onto Elm.

3. Eyewitnesses who had camera's in hand. Review of their photos vs certain specifics recalled is key.

Analysis

With regards to the first shot in Dealy Plaza, it was contended by Josiah Thompson in his 1967 work Six Seconds in Dallas that review of eyewitness statements established that the first shot was around z210. (See SSID pp32, much of this discussion comes directly from his seminal work. Thompson's case was well made but he erroneously believed that the key slide of Phil Willis (#5) was coincidental with z frame 210.

It is, in fact, coincidental with frame z202.

This picture is important as Willis noted that he took the picture as he heard the first shot making it the single best anchor point to localize this shot. Thompson in 1967 corroborated this to eyewitness statements, something the Warren Commission failed to do. Thompson was correct, but his timing was a hair late. The difference in timing has implications for a Texas School Book Depository assassin.

In Thompson's 1967 iteration the first shot coincides with the first possible moment, as established by the FBI re-creation, for the shot from the 6th floor TSBD window. It represented the first frame in the z film that was free of obstruction from the oak tree below.

Surprisingly, another photographer in Dealy Plaza snapped a slide as the first shot had just rung out. He was not known to Thompson. He surfaced in the 1970s. Charles Bronson had his finger on the shutter awaiting a photo of the limo on Elm St when he heard a shot. His startled response caused him, like Willis, to snap a photo. His photo corresponds to about z-frame 230.

Yet a third photographer, Hugh Betzner, took a photo at the critical time which he could correlate to the first shot. The shot rang out just after it, he told the Warren Commission. Betzner's picture was taken at z-186.

A fourth photographer, Robert Croft, took an excellent picture near the time of the first shot too. He was standing west of Willis ("downstream") but took a photo before either Betzner's or Willis's mentioned above. Croft's third photo appears to match frame z161. Croft does not correlate his picture to the shots timing, however, except to note that he wound his camera and took a fourth shot that he believed was coincidental with the head shot.

An aside: this later crucial photo was the only one on the roll that failed to come out. JFK is unhurt in this photo at z161, and as we shall see, other evidence establishes that this photo is well before the first shot.

It was noticed by Harold Weisberg in Whitewash as early as 1965 that Zapruder had trouble holding his camera steady during the course of filming. This happens twice for

though not
quite as
dvd Phil
Willis

sequences longer than several frames. The second episode comes after JFK is struck with a mortal bullet. It starts at frame 317 and lasts till frame 321.

The first blurred sequence comes around frame 194 and lasts until about frame 202. In 1968, CBS news, in a four part special aired in the wake of widespread criticism of the Warren Commission Report, noted that a shot could have come at frame z186 when, as FBI reconstruction showed, there was a gap among the tree branches as seen from the TSBD. (CBS swpt the oak with a metal detector).

The FBI has established that between frames 166 and 210 that tree otherwise blocks the view from the 6th floor "sniper's nest". CBS placed a shot around z186 based on an assumption the Zapruder was startled by the first shot with his response causing a blurring of his tracking. This novel approach derived from work by Physicist Luis Alvarez. Alvarez included his own review of this "jiggle" analysis years later in an article in the American Journal of Physics (September 1976). At this time Alvarez advanced an earlier estimated time for shot #1 (z177). Also included in the article was commentary on his shooting of melons to claim a "jet effect" was responsible for the powerful and dramatic rearward motion of JFK's torso following the fatal shot.

There will be some comment on this point here later as I attempted to reproduce Alvarez's experiments in 1994, recording the results on video. I was unable to support Alvarez's contentions regarding a "jet effect" despite recording over four times the number of bullet impacts upon melons as did Alvarez.

Alvarez's analysis was substantiated by others for the HSCA (see graph). It is interesting to note that Zapruder only heard two shots per his testimony and he had trouble tracking the limo twice. One is after a shot, the filmed action establishes this clearly. The other prior sequence presumably is too.

Alvarez, claimed in his article that people's tracking errors in attempting to pan a hand held camera are dependent upon a natural 3 cycles per second oscillation frequency. Without attempting to verify Alvarez's claim (he notes he was a Bell and Howell consultant working on camera stabilizing systems, there is no reason to doubt him) it should be noted that Zapruder reacts about 1/3 sec. after the head shot (6 frames later). Alvarez curiously locates the first shot at z-177 in the article, which appears at variance with his own graph of the deviations from neutral tracking, and more in keeping with the original CBS aired estimate of frame z186.

Note: in his article Alvarez noted that Oswald would have had no trouble tracking the limo through the oak tree as one can follow moving objects through visual obstructions despite a contrary impression from still photos. This is true, as anyone who has watched someone walk behind a picket fence can attest, but the z166-210 time frame must be viewed as a singularly odd time for an assassin to chose to fire.

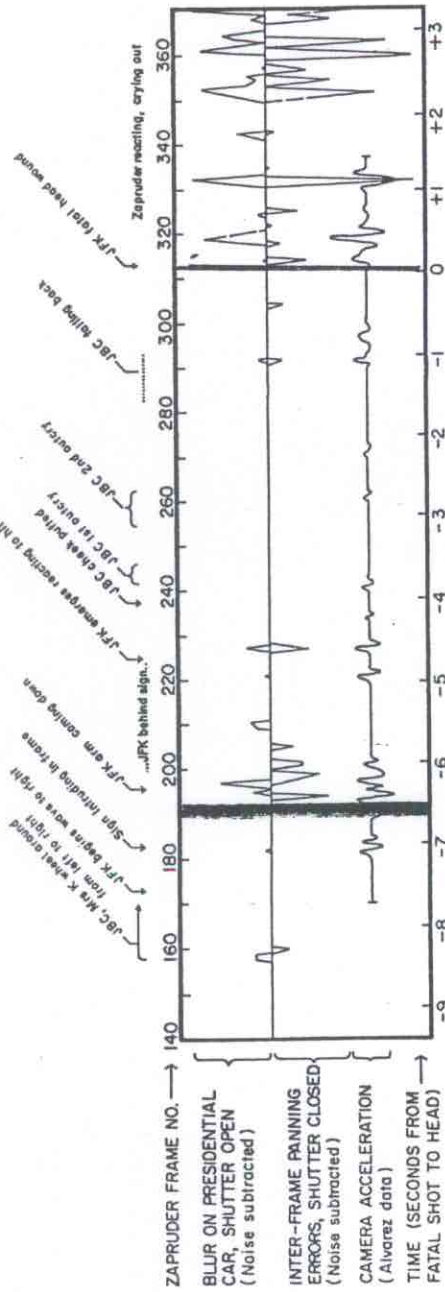


FIGURE II-5.—A comparison of the three independent records of largest blurs or tracking errors, in the Zapruder film, as derived by W. K. Hartmann (top, above line), Frank Scott (top, below line), and L. Alvarez (bottom). Magnitude of blur or panning error is indicated by length of curve upward or downward along direction of vertical axis. Frame numbers and times in seconds are given at top and bottom along horizontal axis.

Z197.
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This is the only two second time interval between the limo's turn onto Houston St and the Triple Underpass down Elm (a 30 second+ time frame) where an assassin's view from the 6th floor window was obscured.

Note: We verified the film blurring in our laser disc review. It would appear that Alvarez's data is accurate. One can verify this with any set of the Zapruder frames.

Many apologists for the Warren Commission, including Robert Blakey who directed the House Select Committee on Assassinations's report, and Gerald Posner, author of Case Closed (which puts forth the dubious notion that one can resolve almost every controversy in favor of the official view), have favored an earlier than z224 shot. A time frame of around z160 or earlier has become the favorite. Some critics such as Robert Groden accept an early shot as well.

One of the most strenuously made arguments for a z160 shot lies in the claim that Phil Willis's daughter Rosemary who was running alongside the limo stops abruptly then. Review of the film shows that she slows momentarily, but then continues coming to a final stop much later. She remains stationary for two dozen frames thereafter. She stops for good around z195. This corresponds to Mr Zapruder's jerk in filming. It is quite reasonable to conclude that both photographer and running child are, in fact, reacting to a shot. On film she looks to her right, where the vast majority of earwitnesses localized the first bang.

It is difficult to gauge the interval from shot to auditory stimulus (sound at the ear) to reaction, but it is important to try. The third-of-a-second interval of Alvarez seems to be a reasonable estimate for the start of a reaction. This is 6 frames of film, the same interval demonstrated at the fatal wounding.

Aside: The acoustic's data, as recreated by the HSCA places the second shot at this time (z188-191). A z188-191 shot means either a shot through the oak tree for a 6th floor Texas School Book Depository sniper or that another assassin fired whose view was unimpaired.

Medical/ballistics sidebar

Many suppose this first shot originated from the front. One must ask those who accept an entry wound to Kennedy's throat, such as author David Lifton, several questions.

First; where was the gun? Researchers note that the line of sight to these positions of the limo are obstructed from behind the "Grassy Knoll" fence unless one is very tall (>6'5") and can peer over it the retaining wall between it and the street (see Betzner's photo). Other positions have been hypothesized for a frontal gunman, but most place him behind the fence on the grassy knoll. In these early frames the knoll represents a difficult, and probably obscured shot.

Betzner's photo has a direct line of sight past JFK to the knoll. Even casual review of this photo will reveal that it appears that foliage, the Stemmons sign or people in the crowd would have blocked the view of a knoll assassin, especially one in what has come to be known as the "badgeman" position.

Secondly: one is hard pressed to understand where such a bullet would have gone had it entered the throat near the Adam's apple. This is not to say that the path of the shot to JFK's torso has been satisfactorily explained. It has not, to the satisfaction of the three physicians involved in this work (DeSalles, Aguilar, Mantik), but we know of no supporting evidence for a body path consistent with a hypothesized neck shot.

A proper discussion, let alone resolution, of such long-standing controversy is beyond the intent of this work, but these points should be mentioned along with two other matters.

Third; that the neck wound was small and sharp according to the doctor's at Parkland does not preclude its being one of exit. Exit wounds may not inevitably look irregular although that is their tendency. My shooting experiments produced on at least on occasion a clean punched-out wound to muscle fascia that was, in fact, one of exit. at least in part.

Fourth; JFK's reaction does resemble a reflex. He assumes a highly unusual posture after frame 225 with arms up and fists clenched. If he was shot in the back and, as allegedly discovered only years later, the 7th cervical vertebrae had a fracture in its transverse process (lateral protuberance) such reflexive action is plausible.

Note: Dr John Lattimer has labelled JFK's position a "Thorburn position" based upon a 19th century article on a cervical spine injured patient. Dr Lattimer's alleged "Thorburn position" is by no means a standard recognized syndrome despite promoting it as such in the pages of the Journal of the American Medical Association. Abnormal posturing after cervical spine injury is well understood. Thorburn's description is not especially appropriate to the Kennedy case, and Lattimer's characterization of the position as something apt, classical, and routine from medical literature is charlatanism. JFK's observed reaction is not something that would be predicted by a "Thorburn" or any modern neurologist (including the ones Lattimer cites as his consultants in JAMA). This is not the same thing as rejection the notion of abnormal posturing following cervical (C-spine) injury. Lattimer may have a point.

JFK's peculiar posturing is consistent with injury involving the cervical vertebra. The nerves that originate in this region go to the arm, shoulder and hand. A stimulation of these nerves from a bullet that nicked the vertebra could have produced the odd posture so obvious on film. On that point medical opinions as divergent as Drs

Gary Aguilar (a critic of the official findings) and Dr Robert Artwohl (a supporter of them) may agree.

Without attempt to persuade that JFK was struck in the back by the first shot we will put together the evidence that the first shot hit President Kennedy. The Warren Commission took no position on this, while the HSCA firmly promoted the notion that the first shot did **not** strike JFK.

Hal Verb presented a paper on this subject at the Coalition on Political Assassinations Washington D.C. Symposium in October, 1994. It forms the nucleus for much of the following.

Timing of Shot #1 (Part I)

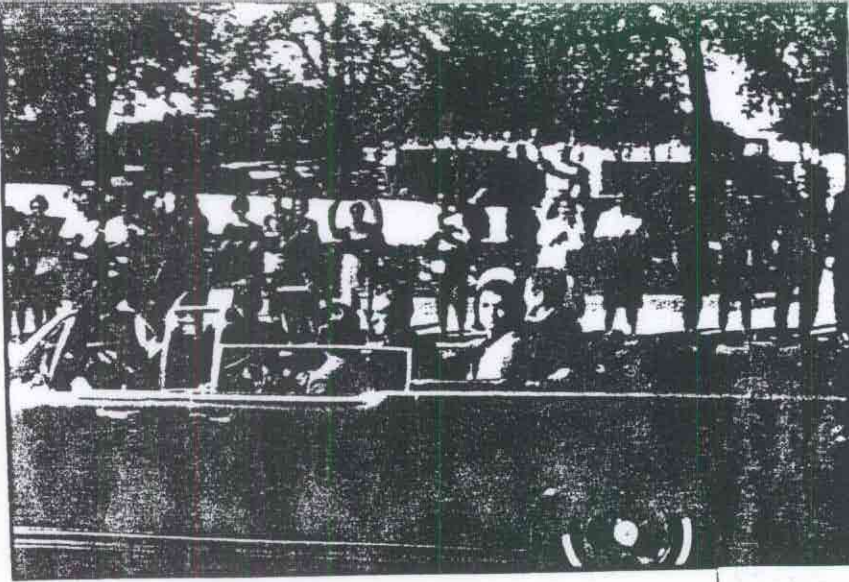
Hugh Betzner Jr, the photographer who took a photo at z186, provides especially relevant testimony. Betzner was standing a few feet to the right of Phil Willis on the south of Elm St (see diagram) while Robert Croft (to the left of Willis) took a clear photo of JFK as the limo passed 15' in front of him. If the HSCA and Gerald Posner are correct, and the first shot rang out at z160, then Croft would have been photographing JFK at the critical moment of impact, while Betzner would have taken his picture well after (.9 sec.) the first sound echoed.

Croft is unable to associate his photo with the shots, but his photo shows an uninjured President at z161. It seems likely that had the first shot rung in Croft's ears as he snapped his photo then recall of the ~~loud~~ report would be associated with the picture.

Betzner, meanwhile, noted that only after his third (and last) photo at z186 did he hear the first shot. The significance of his recollection of this cannot be underestimated. His recall pushes the timing forward into the range we have already noted for Zapruder's startle reaction, and Rosemary Willis's halting.

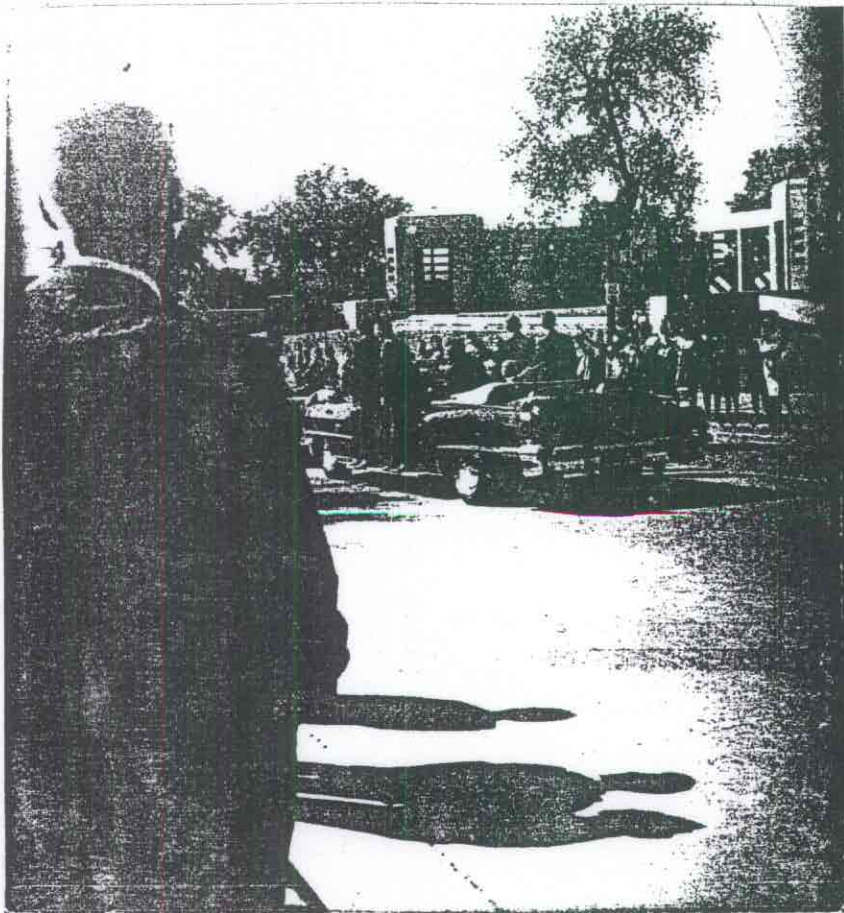
Phil Willis, 30' down the motorcade route from Betzner likewise turned to his left for another shot of the limo pulling away. The men recorded shots of virtually identical perspective. (In both photos SSA Clint Hill, riding on the SS limo, is interposed between the photographer and Zapruder.) Willis's #5 slide was snapped as he heard the shot. Willis noted that it was the sound of the shot which caused him to snap the shutter. Assuming a gun in the Elm/Houston corner area Willis was no more than 100' from the weapon. It is difficult to know how quickly he snapped the shutter in his reaction to the shot, but a 7 frame interval would seem minimal (c. 1 frames for the sound to arrive then 6 frames for the muscle contraction in 1/3 second). The timing on this first shot can be established probably no later than z195, probably a little before.

We encourage readers to test their shutter snapping abilities on a stop watch. A one-third second reaction time would seem to be a minimal interval needed. Longer periods of .4 to .5 seconds are equally possible.



Z-161

Croft's third picture, taken from the south curb of Elm Street



Before
shot #1

Z-186

woman circled
same in 5th
photos

Betzner's photo #3 taken just a moment before a bullet strikes the President in the back

After taking his last photo and hearing a noise, Betzner "looked up and it seemed like there was another loud noise in the matter of a few seconds

A shot at, or before, z195 jibes with 1) Betzner's recall 2) Rosemary Willis's halt Note: repeated viewing of her leg motion on laser disc will convince the reader that she comes to a final halt only around z195) 3) Zapruder's tracking problem at z194-201 which resembles his later reaction in frames 319-321 (see reproduction of Alvarez's 1976 Am J. Physics graph and the work of Hartmann and Scott for the HSCA).

We have then four pieces of evidence converging on the same time frame. We will add a fifth.

Witness Charles Bronson, also snapped his slide immediately upon hearing the first shot, but appears to have been holding up his shot, as the limo was not fully in view from his perspective. His photo comes around z230.

According to author Richard Trask who interviewed Bronson in Dealy Plaza in 1985 the photographer was waiting for the limosine to become completely visible from behind a concrete structure on Elm St in order to snap a slide before filming the passing of the limo down Elm with his movie camera (see photo).

Bronson was a good distance away from the shooting. He was on the south of Main St west of the Houston intersection (see diagram). The limo turned right at that corner, and Bronson had taken a photo then. The limosine was obscured by crowd, however and Bronson was waiting his chance for the unobstructed view he would get on Elm St.

Bronson told Trask: "I was waiting till the limosine got into full view at about right angles, but the shot rang out just before (emphasis added). I wasn't quite ready, but I had my finger on, and I had enough pressure on it so when the shot rang out... I instinctively jumped and snapped it at the same time, and that's the reason you will notice that the picture is a little blurred." Analysis of this statement is revealing. It is not consistent with a z160 time frame but can be seen as consistent with a timing as early as z190 (See Dealy Plaza map).

The limo would have been fully in view around z224. Warren critics and apologists alike agree that the last possible moment for a shot is z224. JFK emerged into Zapruder's view in the next frame and he is obviously hurt. Bronson's statement must be evaluated carefully. It is possible to imagine that a shot as late as z224 was what Bronson was reacting to:

(Sarely)

The limo has cleared the concrete wall by about 1/4 car length in his picture. The shot was audible before the limo cleared that wall to emerge in "full view" - what Bronson waited for. The limo moved at 11 mph (16 ft/sec.). This is roughly 3/4 car length/sec. (the limo measured 21'2"). As it is 1/4 car length past the wall it is 1/3 sec. past that obstruction. This is at least 6 frames of film beyond "full view". Starting at frames z230 we must subtract backwards (while noting that the shot came before this) to find 224 for "full view".

This fails to account for the sound getting to Bronson, however. He was at least 200' from the Elm/Houston corner (or the Grassy Knoll) so we must subtract another .2 sec. (speed of sound = 1,100 fps) or 4 frames, putting us back to z220.

The moment of the limo being in full view came somewhere near z224. Had Bronson snapped the picture at just that instant having heard the sound we would locate that shot to z220. This is one second after Willis recorded his picture upon his hearing this shot. A factor remains unaccounted for which narrows the gap between the two men. It is highly probable that Bronson did not snap the photo exactly as the limo cleared the wall. It seems he was awaiting that moment and hit the shutter the instant it occurred, after being startled by the sound of a shot. While Bronson reacted the car would have travelled that 1/4 car length during the 1/3 second. We have a fudge factor of about one limo length, however.

By assuming that the limo was just coming into view at the sound (when Bronson says he was waiting for the car to come into full view) we may subtract another 1 1/2 sec or 24 frames to arrive at z196 for the moment of the shot. Very close to our suggested time frame.

Bronson's story makes it unlikely he snapped his picture in response to the alleged shot at z224 (see below). A shot at z224 would not have even been heard by Bronson until z228, assuming the minimum reaction time of 1/3 second his shot would have been at z234. It is again splitting hairs, but it appears that Bronson's slide is definitely before z234. Also, the limo was in full view to Bronson at z228 (the time he would have heard a shot ~~at z224~~). ~~But~~ He heard it before then.

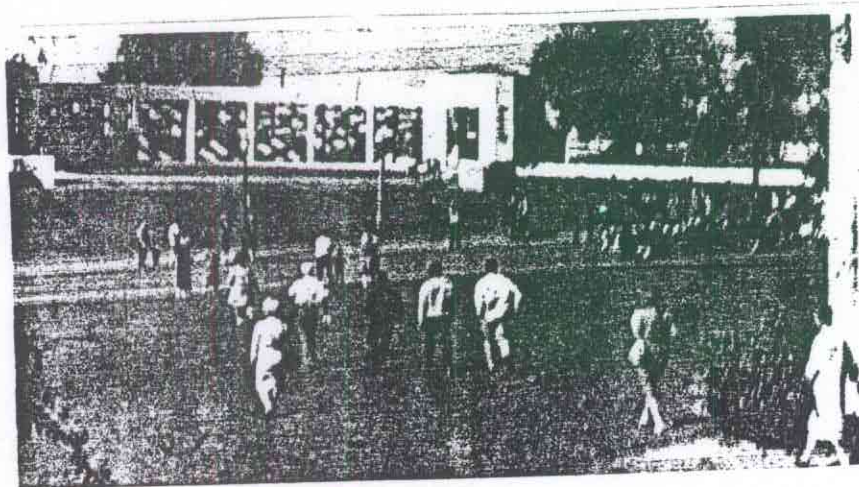
Note: Bronson's statement that he was waiting for the limo to "come into full view" does not state that it was in partial view, but surely implies it. Bronson heard the shot before all of the car was visible - the moment he was waiting for. His tale fits an early shot, say at z160 poorly. The limo was not about to emerge, and Bronson would have had to wait 4 seconds before his photo. This does not fit the quick handed Bronson who, after the slide switched to his movie camera in time to film the head wound - 4.5 seconds later. As Bronson is the only other decent benchmark to the first shot this is worth exploring here in some detail.

Assume a shot at z191. Bronson would have heard it at z195, at which time the limo was barely peering around the concrete wall. The cameraman was surprised by the shot as he waited for the limo to come into "full view" with finger on the shutter. Just as the limo is arriving into full view circa frame z224 Bronson squeezes off his shot. Given an approximately 1/3 sec. reaction time the picture is taken at z230. During that 1/3 second the car moved 1/4 length past full view where it appears in Bronson's photo. What Bronson recalls about the car's position vs sound is consistent with



The Willis slide taken moments before the President is hit

The most important of the series of Willis slides was his seventh in the sequence. Later government research placed this photograph as being taken at about the same time as Zapruder frame #Z202.¹⁷ Less than three seconds after his sixth picture, Willis had moved slightly down Elm towards the departing presidential vehicle. He raised his camera to his eye, and remembers, "As I was about to squeeze my shutter, that is when the first shot rang out and my reflex just took that picture at that moment. I might have waited another full second . . ."



JFM at
arrows

Note ≈ 5h ft beyond wall

[Handwritten signature]

Z-202

upon hearing
shot #1

Man
Woman circled
size in both
prints

He or guy next to
him is John Chism

Z - 230
(perhaps 229 or 228)

after hearing
shot #1

limo not in
full view

this scenario. His "jumping" around z224 is unlikely to have come from a shot which he would have heard at z164.

The evidence from 5 people in Dealy Plaza converges on a c. z191 shot #1. There is more.

Timing of the First Shot (part II)

We may use the testimony of witnesses standing near to the position of the limo in frames z190-210 to firm up this hypothesis. From Six Seconds in Dallas pp 32, Hal Verb, Craig Ciccone's Dealy Plaza Survey, and Pictures of the Pain, by Robert Trask:

Gloria Calverly was about 30' east of the Stemmons Freeway sign where the limo front arrive at around z197. She told the WC: "The car... was almost directly in front of where I was standing when I heard the first shot."

Only a few feet west of Calverly was **Karen Hicks** who also noted to the WC that at the first shot the car was directly in front of her.

Just east of the Stemmons sign, 25' west of Calverly was **John Chism**. The front of the limo would have arrived at his position around z230. Chism told the WC: "And just as he got just about in front of me, he turned to waved at the crowd on this side of the street... at this point I heard what sounded like one shot."

Note: In the z-film JFK's hand is still in the air as he disappeared behind the sign. He can be seen tossing a wave to the crowd on the right side of the street between z165 and z200.

Located between Calverly and Chism was **Karen Westbrook**. She told the WC: "The car he was in was almost directly in front of where I was standing when I heard the first explosion."

All four of these witnesses correlate well with a shot near z188-195. All correlate less well with a shot a second earlier, and still less well with a shot a second later.

A sixth, strategic witness on the north of Elm, **Jean Newman**, was slightly east of Calverly. The front of the limo would have passed in front of her around z195. She told the WC: "The motorcade had just passed me when I heard something... because after he just passed there was a loud report." Newman notes that she heard a shot after the "motorcade had just passed" which would better approximate JFK's position at z205. This still provides reasonably close synchronization to a shot we are hypothesizing while arguing strongly against a shot coming earlier. Newman would be highly unlikely to confuse a position one car length up the road for having "just passed" her.

Position of Shot #1 Part III

The fourth car back from the Presidential limo car was in the turn from Houston onto Elm in approximately the

Building

RECORDS Building

CRIMINAL COURTS Bldg new

DALLAS

Elm

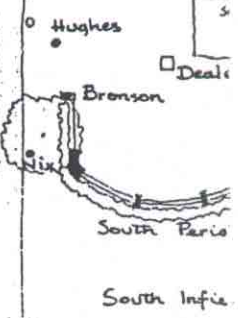
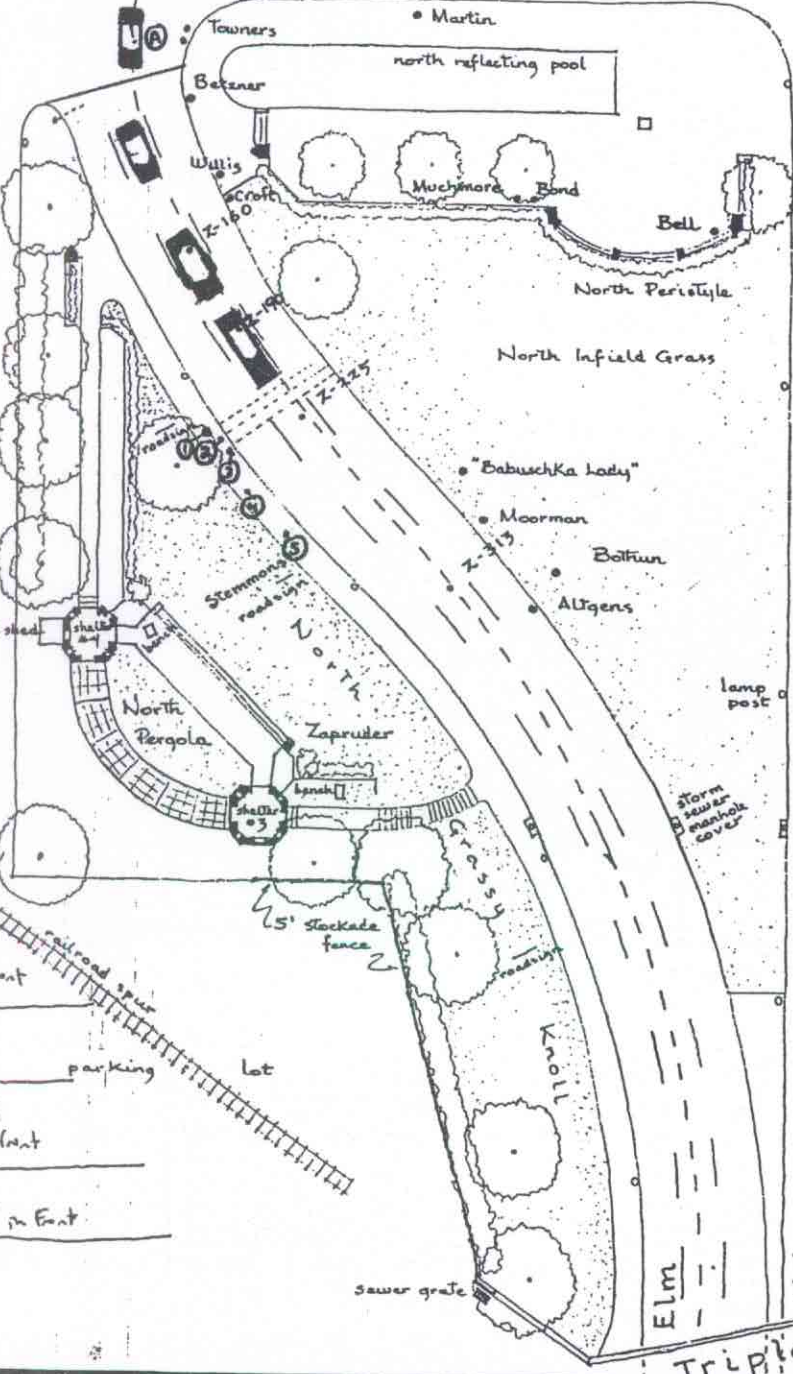
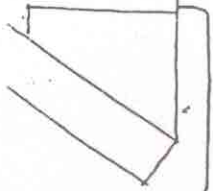
Main

Houston

motorcade route

- (A) Joe Rich - 1st shot while in turn
- (B) Mayor Cabell " "
- (C) Mrs. Cabell " "

TEXAS
SCHOOL
BOOK
DEPOSITORY
Building



- 1) Jean Newman
1st shot
motorcade "just past"
- 2) Gloria Galyer
car almost directly in front
- 3) Karen Miller
car directly in front
- 4) Karen Westerbrook
car almost directly in front
- 5) John Laska
JFH "just about" in front

Elm St Extension (original)

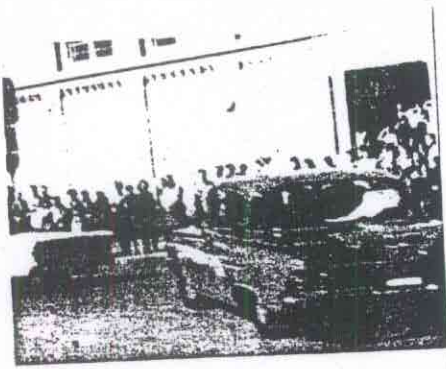
railroad spur

parking lot

sawer grate

Triple Underpass

Commerce



Wiegman begins filming as the crowd in front of the Book Depository reacts to noise

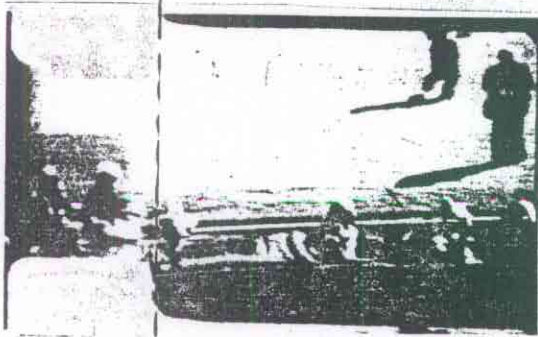
coming
 Car ^ out of turn is
 #5 with Meyer

Foreground car is Radio car #6

Wiegman is in Press car #1

Between sprockets

Projected Area



Frame Z333 as Mrs. Kennedy begins to rise in her seat and Agent Clint Hill is seen at extreme left rushing to get aboard the vehicle

Each frame looks like this
 Area between sprockets will
not copy except on contact
 prints. No "complete" noise
 (of good quality) has ever
 been made. Contact prints
 are not of good quality
 Must come from original.

interval from c. z150 to z220 while the fifth car back did the same during the interval of c. z180 to z250 making the occupants good markers to gauge the time of the first shot. The driver of car #4, Joe Rich, noted hearing the shot while in the turn onto Elm not while proceeding in a straight line down Houston St. This does not localize the shot well for our purposes. In the fifth car, however, Mayor and Mrs Earl Cabell noted hearing the first shot while in the turn onto Elm something they had not entered ~~at~~ frame z160. It is interesting to further note that Mrs Cabell noted that at the shot she looked up to see an object protruding from the TSBD upper floors. Both Cabell's note they were just entering the turn when the shot rang out. (See diagram.)

In the 8th motorcade car White House Photographer Weigand started filming after the first (and possibly second) shot. The Mayors' car is visible just getting out of the turn onto Elm in front of the TSBD. This corroborates the Cabell's positioning just a shot #1 ~~seconds~~. Also, Mrs Cabell noted to the WC she was looking to her right, and glanced up to the TSBD to see something projecting. Early in the turn - around z190 - fits this recollection quite well.

Part IV - The first shot did not miss.

Hal Verb's paper does an excellent job of confirming that the first shot did not miss. It is again the nucleus for the following:

Pearl Harbor veteran Phil Willis told Richard Trask regarding his z202 photo that he "knew the bullet had hit."

Another (wounded) WWII combat veteran Charles Brehm, one of the closest witnesses to the mortal wounding noted to Merriman Smith on the day of the assassination that "The first shot rang out, and I was positive when I saw the look on his face, and saw him grab his chest and saw the reaction of his wife, that he had been hit."

Linda Willis, between her dad and Hugh Betzner noted to the WC that "When the first one hit, well, the President turned from waving to the people, and he grabbed his throat. I couldn't tell where the second shot went."

Abraham Zapruder himself told reporters hours after the shooting that after the first shot the President slumped over. Marilyn Sitzman, steadying Zapruder confirms her boss's observation recalled in a 1966 "nothing unusual until the first sound, which I thought was a firecracker" noting that JFK then "put his hands up as to guard his face and leaned to the left."

Other witnesses besides these five noted that the first shot hit home. Let us mention five more from the Elm St witnesses.

Malcom Summers noted the President's "slump" in response to the first shot. Gayle Newman, standing with husband Bill halfway to the overpass noted that JFK was hit by the first shot. Mr Ramsey (?) standing near John Chism was "certain, without doubt" that the first shot hit JFK.

Jean Newman, who noted the motorcade just passing her also told the WC that the first shot hit Kennedy, and he then raised his elbows in response.

It should be noted - again - that between frames 160 and 200 JFK is clearly seen waving his right hand to the crowd. This would directly contradict the above witnesses had there been a shot in the earliest portion of this interval.

Two other unusually good witnesses confirm that JFK was struck by shot #1. SSA Clint Hill, who ran to the Presidential limo (he is visible in z333 in the portion between the sprockets) arriving at the rear of the car one second too late told the WC that JFK reacted to the first shot. Given that Hill observed JFK react to his wounding to react himself by leaping off the SS follow-up car makes him a particularly credible witness.

Nellie Connally was possibly the best positioned person in the limosine to view JFK. Her often overlooked testimony was that the President indeed reacted to the first shot, while her husband was hit with shot #2. That sequence of events was adhered to by Governor Connally until the day he died. He termed it something he knew absolutely. His wife confirms this adding visual contact with the President in the interval between shots. Although JBC's testimony is written off by Warren supporters as a "delayed reaction" this is an insufficient explanation given his wife's corroboration.

Note: The Warren Commission took no stance on whether JFK and JBC were hit with shot #1 or 2, but the current apologist stance is that JBC's reaction was to the second shot for in this manner Connally can be right about what he heard (shot #1) and which shot hit him (shot #2). The SBT gets preserved. Nellie Connally's corroboration of the Governor's sequence is critical. While JBC did not actually see JFK after the first shot NC did. She observed that he was wounded with shot #1 and her testimony is quite explicit on the point.

Most eyewitnesses were watching the President. Many seem to have failed to notice the wounding of Governor Connally at all. Gayle Newman, favorably positioned to observe the Governor's reaction did so and commented on it to the WC. She corroborated the Connally's statements that shot #1 hit JFK, while #2 hit JBC.

It is worth noting that the FBI's report on the assassination, which reviewed the Zapruder film, concurred with the testimony of the Connally's, and concluded that it was the second shot that hit the Governor. Prior to the invention of the SBT that was what everyone thought who viewed the film.

Two sessions of Zapruder film viewing were subsequently done for the WC. One included the Connally's and the Parkland physicians. Another was done for the Bethesda doctors. In both cases review of the film, led to conclusions that the Governor was hit after JFK, not

simultaneously. There was one dissenter: Arlen Specter, whose dissent carried the day in the writing of the WCR.

The Zapruder viewings done for the WC indicated to the rest of their audiences that a shot hit JBC no earlier than z231. It was known by then in 1964 (after FBI study of the putative murder weapon) that that the Carcano needed 2.3 seconds to cycle the bolt. 42 film frames are required to mark off such an interval. Subtracting 42 frames from z231 put a shot at z189, a conclusion the WC was loath to go to for it was known that the limo was under the oak then (from the TSBD 6th floor window). In this manner, the Connally's testimony was shunted aside.

In 1975 (?) the Itek Corporation had a representative note on another CBS Warren Commission special that just before frame z230 JBC can be seen to flip the Stetson hat held in his right hand. As the bone in the right wrist (the radius) was smashed by a bullet the presumption was that despite there being no definitive reaction until 1/3 sec. later (in z236 JBC is definitely wounded) the bullet in fact smashed JBC's wrist earlier than had been previously appreciated. This brought it closer to JFK's wounding, and was advanced as strong supporting evidence for the SBT on the program. It was also noted in the early 70s that for one frame (z224) JBC's jacket lapel flips. Interpretation of this as the first film evidence of bullet strike allows SBT advocates to synchronise both men's wounding on the z-film to z224.

In 1992 a version of the Z film put out by a Dr West was circulated purporting to show how it proves the SBT. The pages of JAMA then included Dr John Lattimer's article contenting the same thing in which the lapel flap prominently figured in the analysis.

This paper will not attempt to dispute the assertion that JBC was wounded as early as z224. We are forced to think of this a possible explanation for the odd flapping of the lapel. What is interesting is that we are convinced that an earlier shot hit JFK. When we say earlier we do not mean z160, before the limo went under the oak, but while it was obscured from the 6th floor TSBD window.

Note: For two shots to have come from the TSBD carcano with the second at z224 the weapon's sluggish bolt dictates that the first came no later than z182. We do not think it happened that way. We think the first shot came near z190-191, perhaps a little later, but not much sooner. This is supported by:

- The camera jiggle of Zapruder
- The halting of Rosemary Willis
- The Willis photo
- The Betzner photo
- The Bronson photo
- The testimony of 5 favorably positioned people on Elm
- The testimony of 3 people in 2 cars executing turns onto Elm

That this shot did not miss and, in fact, struck JFK is supported by:

- Nellie Connally's testimony
- Clint Hill's testimony
- Phil and Linda Willis's testimony
- Charles Brehm's testimony
- Abraham Zapruder's and Marilyn Sitzman's testimony
- At least five other Elm eyewitnesses testimony

The scenario presented is solid but has problems. We will discuss them.

The second shot

Why is JFK not seen to react on film before z225 if we are correct? Obviously his obstruction from Zapruder's view for a second before z224 does not permit invalidation of a wounding-at-z224 theory. His right hand is visible in z224, and is seen withdrawing from a waving posture over the next few frames. If the alternative scenario of his wounding at z191 is to be advanced then one must ask why is his wounding is not appreciable before the sign? There is good evidence that it is.

Zapruder frame 225 shows unequivocal reaction of President Kennedy to injury. No assessment is possible for over 20 frames previous but a bullet strike came before z225, making z224 the last theoretically possible frame for him to have been hit. There is no science of bullet injury (outside perhaps of that maintained by defense/intelligence agencies) so it is not possible to state that JFK's reaction could be visible in 1/18 second. A visible reaction in .055 seconds stretches credulity, however. What reveals his wounding is the distorted facial expression, and withdrawing right arm. It is not physics, but physiology for this is not an instantaneous physical reaction, but one that requires neuromuscular response time.

Note: it is possible to see motion imparted to the head later in the film at the terrible moment of fatal injury. That is physics, and not physiology. Between frames z312 and z313 the bullet visibly moves the head forward. In this case it demonstrates that a shot originated from behind the President. There is, of course, much more to that story, but our viewing of the z-film at head wounding supports the idea that injury at that instant was delivered from the rear. Further comment on this area will be made below.

As he disappeared behind the highway sign JFK's hand was still raised. The upraised hand appears to stop motion at z200, while JFK's head moves to the left suddenly in z200-202. The HSCA believed that JFK was reacting to the shot that hit him around z190, a surmise we would not dispute. In the HSCA's interpretation Governor Connally was seen as "distressed" as of his reappearance in frame z222. That we do dispute.

The HSCA supported Arlen Specter but did not put a shot in the interval when the car was behind the sign. The HSCA's

reconstruction of the SBT has it occurring around z-190 instead - at the second shot in the HSCA's reconstruction.

Note: earlier than z200 the men do not line up well for a TSBD assassin. This played a role in later Warren supporters going to the z224 timing for reconstructions supporting the SBT (including that of researcher Todd Vaughn and Dr Pizziali of Failure Analysis both of whom build a case for the SBT around z224).

With some tinkering, a fit between the two men can be stretched for a 6th floor bullet path, but it does not work well. Frames afterward or before seem to work much less well. To understand this review the photograph of the FBI reconstruction of frame 191 (see photo). Keep in mind that the SS car was used in this reconstruction - not the Presidential limo. In the limo JBC's jump seat was inboard and a lower than the rear seat. It may still be appreciated that the men's positions do not fit for a shot at this time. Todd Vaughn and others have a better match up for a moment 29 feet further down Elm Street, but by then as the prior analysis shows a shot had already rung out.

The case for JFK being struck prior to z224 has been presented. If Governor was struck as early as frame z224, then the case for this hinges upon motion of JBC's right lapel which is seen to quickly move in that frame. That this scenario may represent the only frame in which the SBT can, in fact, work may account for the zeal with which its advocates promote it. (Supporters of the WCR maintain that this is itself an argument for its veracity.) Conally's wounding is not excludable from frame z224 although it is interesting that the exit hole in JBC's jacket preserved in the National Archives contains no hole in the lapel, but rather inches away.

Conally is visibly injured in a sequence from z234 to z38 by which point his expressions become unequivocal. If JBC is hit at z224, then he took a minimum of a half second (10 frames to z234) to react obviously. (Some would argue 12 frames or 2/3 second is more like it.) Even at z234-5 JBC is less obviously an injured man than is JFK at z225. While proponents of the current version of the SBT, ask one to accept a 10 (or 12) frame delayed reaction time for JBC (a reasonable .55 - .66 sec time period) they simultaneously couple this with a reaction time for JFK of just .055 seconds which is extraordinarily fast.

The case for JBC being hit at z224 is without merit. Between the lapel flip and the head/facial motions that make his injury obvious JBC demonstrates that dramatic jerk of his right hand. He is holding his Stetson and the motion of the hand is violent between z226 to z230 (?). It is reasonable to assume that the bullet to JBC's wrist could and should have produced the dramatic jerk of the wrist and hat flip? Yes it is.

Note: Josiah Thompson in 1967 graphed the angle of the Governor's shoulder to note a sudden steepening of its angle at z238. Having fired many rounds through melons I can

attest to the fact that a military round imparts little motion to a much heavier object even when a hard surface is involved. I will not dispute Thompson's measurements, but they cannot represent a bullet's impact so much as the body's reaction to the penetrating injury. Connally is obviously reacting before this (by z236, if not z234) thus the sudden drop between z237 and z238 cannot be from impact. Connally's cheek puffs in a dramatic way in this frame. Robert Groden has informed me that this measurement is due to an artifact in the print used; Mrs Kennedy's arm is superimposed in JBC's shoulder.

The viewer is not denied an analysis of JFK's reaction for an alleged shot around z191. He stays in view for 14 frames afterwards. Note: Both men suffered torso injuries that were far from trivial. No one can doubt that JBC was injured by z236, but before this frame there is cause for doubt. As a shot at z224 seems likely, to imagine that JFK unmistakably shows signs of impact in one twelfth Connally's interval seems ludicrous? Connally's injuries were, if anything, more severe than JFK's.

That JFK was hit by a shot fired around z190 while Governor Connally was hit by in frame z224 seems to be the best explanation for shots #1 and 2. The unyielding stance of Connally that he was hit by the second shot is affirmed. Nellie Connally witnessed the two impacts on both men. So did at least one eyewitness.

: It would be nice to correlate JBC's very specific recollection of his turning to his right after hearing the first shot to action on the z-film. Unfortunately, he is looking right from the earliest portions of the film and we were unable to verify a rightward glance after z191 partly because he is obscured, partly because there are fewer frames to work with before JBC disappears behind the sign at (?).

It is contended that he makes a rightward look around frames (?)170 (after a presumed shot at frame z160) but we did not discern this (?)

If we assume that JBC and JFK were struck by the first shot at z224 (but JBC's perception of pain was delayed) we would still expect him to demonstrate the motions he clearly recalled before feeling the shot. After frame z224 there is definitely no rightward motion of the Governor. He is turning left having already gone right.

If JBC was hit by the second shot, regardless of whether the first hit JFK, then what is seen after the sign is consistent with his testimony. Again, as he turned back to the left, and was just about facing ahead he reacts to that "punch" in his back. This fits the action on film exactly. JBC is rotating leftward and is almost straight ahead when he reacts.

Is this sequence consistent with a first shot around z190? We should see at least the start of a rightward glance. XXXXXX)

Plan one [↑] more review before

Print Print #2

WC apologists, from Robert Blakey to Gerald Posner have claimed that a missed first shot is why JBC heard the shot prior to the one that hit him. The first shot did not miss.

Note: JFK's right hand is visible in z224 and in subsequent frames moves upward into a highly abnormal posture. The left arm demonstrates an even more abnormal motion, which by frame z230 has both elbows elevated to above the shoulder. From a medical standpoint Dr John Lattimer's "Thornburn position" was disingenuously presented in JAMA in 1992. There is no such generally recognized "position". Kennedy's strange posture, so clear in frame z230 may well represent a reflexive action of the upper extremities just the same. It is consistent with injury at the 7th cervical vertebra region. Altgen's clear photo coincidental with z255 confirms JFK's abnormal posture: his left arm is seen through the windshield with wrist flexed with perhaps some ulnar deviation (angled toward the pinkie side). The forearm is flexed, the arm is horizontal.

In z224 JFK's right hand is visible though his face is still behind the sign. It is oddly held and thereafter in contrast to the wave posture frozen back at z200 it is pulled inward. One cannot assess JFK's expression, but one can confirm that an abnormal arm posture begins that then becomes fixed and lasts until the fatal moment. It is important to note that the right arm is in an abnormal posture as of z224 simultaneous with the lapel flip (chest impact?) on JBC which implies still earlier injury.

It should be noted that most earwitnesses in Dealey Plaza felt there was "bunching" to the shots - they were not evenly spaced. Three was the number of shots heard most often. Many witnesses including reporter Mary Woodward, and the Connally's felt that shots 1 and 2 were bunched (although JBC did not hear the shot). More witnesses disagreed and thought the 2nd and 3rd shots were closer. Witnesses who heard four shots generally thought that shots 1 & 2 were bunched, as were 3 & 4.

The scenario proposed here: a shot at c. z190 followed by another at z224 means that 1.9 seconds elapsed between shots. The interval to the z312 shot would then be 4.8 seconds, a decidedly early bunching (excepting the possibility of the nearly simultaneous 3rd/4th shots).

Regardless of the readers acceptance of the JBC hit at z224 it is universally accepted that JFK is hit no later than z225. The HSCA, attempting to put forth its acoustic reconstruction while hanging on to Oswald in the window, allowed for a short interval between shots 1 & 2 of 1.6 seconds by claiming that deletion of aiming via the side-mounted telescopic sight allowed Oswald to shoot faster. He just used the iron sights so went the reasoning. The FBI did not factor aim into its 2.3 second timing of the bolt mechanism on the carcano, however, but worked the bolt mechanism and timed it. Robert Blakey's solution to his timing problem for Oswald is as novel as it is impossible.

The scenario proposed here: a shot at c. z191, then a shot at z224 requires two guns of course for it at least a third of a second too short to work the bolt, let alone aim. The first shot could have originated from the TSBD, but its timing is at a moment of visual obstruction. The shot that hit JBC may have come from the TSBD although WCR apologists would argue if it came around z224 it would have hit JFK in the way (thus requiring the SBT). It seems clear that a shot from the TSBD just over JFK would have hit Connally. Note: Robert Groden has noted that the hole in JBC's jacket is so high and to the right that it is actually in the sleeve. It is possible to contend that either of these shots was from the TSBD, but not both. Passing mention should be made of a possible figure in the southwest corner 6th floor window seen in the Powell photo as JBC's wound seems to line up with such a position perhaps even better than the southeast corner "snipers nest". At least one Dealy witness noted a man with a rifle in that window before the motorcade.

Torso Injuries

This paper will not attempt to address the forensics evidence except to say that a path through JFK's body from back to rear was never completely established, and remains controversial. It is unclear that a bullet exited the neck, and the fact that the alleged exit wound is higher than the alleged entrance wound is a well known conundrum for WC supporters.

A shot from the rear hitting JFK works better or worse than the TSBD 6th floor depending upon its proposed site of origin. One site often suspected - the Dall-Tex building second floor window (which is seen on Altgen's photo to be open) works much better than the 6th floor as it is a much flatter shot.

Note: given the toughness of human tissue and its arrangement in planes of muscle a slight apparent rise in trajectory does not seem to be an impossible feat for a down-going projectile. The planes of muscle will offer greater resistance to a bullet seeking to punch through it than one moving in parallel. Without attempting to promote this argument I will only note that bullets take strange paths through substances of varied densities. One round took a seemingly impossible 90 degree turn in our newspaper bullet trap. The nearly spent round entered its last layer of folded newspaper and turned an 8 inch hard left to wind up poking out the fold rather than continue on course straight ahead to penetrate layers perpendicular to its flight path. We were taken aback by the unexpected finding upon digging that bullet out of the pile. To infer that the upward angle through JFK's body requires a frontal assassin in my view incorrect. Many, many ear witnesses identified the first shot as coming from the TSBD area. I believe it came from the rear.

Slight

The wounds to JBC have allegedly been angled back to the TSBD in computer simulations. Despite great reservations about such claims we would not dispute them. It makes sense that a shot from there would have gone through JBC in the right-left, high-low direction he was actually injured in although one must wonder if the opposite corner is not a better trajectory match.

The HSCA Acoustics Evidence

The Dallas Police dictabelt produced by researcher Mary Ferrell for the HSCA contained 6 impulses felt to be shots. Although no shots are audible on the tape one curious cluster of sound impulses was detected. These were suspected as being shots recorded on the open microphone by one of the police officers in the motorcade.

Acoustic reconstructions were made in Dealy Plaza to look for acoustic matches to the impulses on the recording. The first and sixth event produced no matches and were, apparently based upon no further consideration than this, thrown out of the analysis. Some have argued that they could represent other shots from other locations (the HSCA examined the TSBD and GK sites only). This is highly unlikely given the poor synching of shots 2-5 to the action in Dealy Plaza. An earlier and later shot would aggravate this timing further. The timing of shots 1 and 6 remain a mystery as they have not been published. although they are noted to be from the same time frame one wonders how big a spread the entire cluster was. Shots 2 to 5 cover 8.3 seconds.

The DPD recording is alleged to contain an acoustic "shock wave" of the bullet, and to match a know motorcycle officer's position behind the Presidential limo, which, in fact, progresses in matches to test microphones at the same speed as the motorcade. A change in sound character was even alleged to match a change in directional orientation of the motorcycle as it rounded the turn onto Elm at the time of the "last" (5th of 6 actually) shot on the tape. All of this sounds convincing, especially the matches advancing at 11 mph.

The most convincing argument against the authenticity of the recording of shots has been the "cross-talk" recorded from the other police band that comes at the same time as the impulses. It is of dialogue known to come one minute after the shots. I have yet to hear a convincing argument to explain this discrepancy away. I believe I can offer further compelling evidence to invalidate these recordings as gunshots.

The tape impulses #2 to #5 come at the following times. Their HSCA matches to location are included:

0.0	First impulse	TSBD
1.6	Second impulse	TSBD
7.6	Third impulse	Fence on grassy knoll
8.3	Fourth impulse	TSBD

It seems inescapable that either impulse 3 or 4 would coincide with the fatal shot. Blakey chose the synching of #4 to the head shot. This possibility requires a first shot at z-157 to 161, something we have made a strong case against. (see included time line). Blakey's reconstruction of sound #4 to the fatal wounding calls for shot #2 in the z188-191 range. This is one we film reviewers can advocate except for the compelling evidence that this was the very first shot. Blakey's scenario also requires a shot at z295-296. We can cite not one single witness who recalled a shot coming just before the fatal one. The interval (1.6 sec) should have made it very obvious. A few witnesses noted a curious double sound to the fatal shot, but some seemed to be noting the audible impact which was commented on by many.

The alternative synching: sound #3 to the head shot still requires a shot earlier than the z191-224 I propose. A z173-177 shot is required, followed by a second shot at z205-208, with a 4th shot at z328-329. This last, it should be noted, fails to explain JFK's macabre backward motion after the mortal injury. This has traditionally been felt to be the strongest argument for a frontal shot despite Luis Alvarez's "jet effect" (something my shooting experiments casts doubt upon).

The notion of two close together shots at the time of fatal wounding is appealing to conspiracy advocates for it has long been hypothesized that two wounds to the head could account for some of the puzzling forensic evidence and the strange motion observed on the z film. A synchronization of shot #3 to frames z312/313 does not jibe with z film action however. JFK is hit from the rear in frames z312/313 though his body is moving backwards by frame z314 (and proceeds dramatically backwards for 7 frames -see next section). Neither a Grassy Knoll shot coming first, nor a TSBD shot coming second can explain this.

Even if the identified sites of acoustic matches were reversed a GK shot at z328, so long after the backward motion still cannot explain it. We thus suggest, that one should regard the acoustics evidence with suspicion.

That two other impulses carry the mark of alleged sonic boomlets of the bullets, yet come at times even more deviant to film evidence, to say nothing of eye/earwitness descriptions, cannot reassure one that these taped impulses are sounds related to the assassination.

The Head Wound

This paper is mainly directed at the earlier sequences of the film, but the fatal wounding, as viewed on projected laser disc, proved highly illuminating and comment should be made regarding it.

The injury to the rear of the head is more visible than we had realized. There has been great controversy in the past over the extent, and rearwardness of the fatal wound. It is surprisingly obvious that there is missing skull

behind/above the right ear. Shifting between z312 and z313 demonstrates clear loss of mass. There is a shadow from the curb across the street that forms a line across the top of the first couple. It becomes much more visible as what had been obstructing it is removed in z313-316 i.e. the rear of the skull.

As mentioned earlier it is clear that there is a blow delivered from the rear at z313. This was originally pointed out to David Lifton in the 60s when he consulted with famed Nobel Prize winner Richard Fyneman on the matter. Blood goes forward in a spray that lasts for 3-4 frames. The dramatic backward shift starts by frame z314 and continues to frame z321, at which point the President literally bounces off the rear seat.

There is no comparable spray of blood going rearward, although a white object clearly does fly backwards between frames z(?)320 and (?)328.

There are four possible explanations offered for this dramatic motion. None are completely satisfactory. They are:

1. A shot from the front
2. A "jet effect"
3. A "neuromuscular reaction"
4. Alteration of the film itself

Each is briefly discussed.

*different
around*

1. A frontal shot - JFK is clearly moved forward under impact of a shot from the rear. There is matter moving forward including a spray of blood. The site of the bloody spray's origin appears to be forward and above the ear where a skin flap is observed. This flap looks to be hanging over the right cheek. It seems clear that a rear originating shot has punched out its exit relatively forward. Many of my shot melons demonstrated similar injuries.

The very next frame (314) shows a nearly equal motion, backwards. Josiah Thompson put forth the idea that JFK was struck by a second shot in this interval in 1967. Support for this idea can be derived from later measurements done by Alfred Olivier for the Rockefeller Commission in 1975. Olivier included a fixed reference point in one set of measurements. The limo passes exactly parallel to Zapruder in this key sequence which produces an apparent forward, then backward motion of the reference points due to perspective changes I am not mathematician enough to explain. When these reference point measurements are simply subtracted from the measurements of head motion they offer a correction factor (albeit a crude one).

As can be seen in the attached graph some of JFK's backward motion seems to be derived from the changing perspective of the limo passing, but the dramatic shift forward, followed by a dramatic shift backward appears accentuated after factoring in this correction.

There are two problems with the frontal shot idea. First, there is no comparable spray of blood or obvious exit site from such an impact. There is simply no such visible

wounding perceptible let alone one as dramatic as at z313.

Second, such a shot must not only knock the President back it must also overcome the forward motion imparted by the rear shot, both reverse it, and overwhelm it in its reversal of body motion. Furthermore, we know from the Moorman photo that JFK was knocked to his left dramatically, something not evident on the z-film as Zapruder was perpendicular to such motion. If most of the motion vector went across the limo rather than towards the rear then the second bullets imparted acceleration must be manyfold the first bullets.

This latter is not an insurmountable physics problem. Different types of bullets would have different abilities to impart motion to their targets. Military jacketed rounds have about the worst ability to do this among various ammunition types - by design. More troubling is the lack of an exit wound in frames z314-7.

2. A "jet effect" - I made every effort to reproduce the experiment of Luis Alvarez and failed to show any significant "jet" effect on 29 trials while Alvarez contended that he got 6 of 7 melons to go backwards. We do not believe that this can represent the reason we see JFK blown backwards. Melons, free to roll generally showed little motion upon impact. A tiny backward motion appeared once, but was mostly the melon tumbling off its perch. The notion of having sufficient extra energy to move a human torso in the opposite direction of bullet path is absurd based upon my experiments.

Jacketed rounds were utilized for my tests it should be noted. Such military bullets are used per Geneva convention agreement due to the nature of their jackets. They tend to penetrate (and pass through a target) rather than mushroom or fragment. In this way they transmit less energy and do less damage. We shot one melon with a hunting round and it blew to small pieces despite being wrapped in hard casting plaster. Dramatic differences in imparted momenta due to different ammo remains a way out of this dilemma. A frontal shot coming right after a rear shot could still solve the puzzle of the backward motion of the President.

3. A neuromuscular reaction is rejected by all three physicians involved in this paper, and all physicians we know (as far as we know). It is true that the right brain being destroyed might be expected to send nerve potentials to the muscles, but it is impossible to envision the specific motions seen as being the result of a contraction of the back muscles, plus relaxation of those of the abdomen. The area that controls the muscles of the left side of the body were surely destroyed for the post-central gyrus, the region in question, is in the parietal lobe.

Given the brain destruction signals might have gone out to the muscles. It is not easy to imagine how such impulses would have the right (and especially the left) back muscles

extend the body of the President while the abdominal muscles that would normally counter them were not similarly activated.

4. Film alteration - If one supposed that frames were excised from the Zapruder film then the remarkable reverse acceleration of JFK makes more sense. The motion would be exaggerated by missing frames making it seem to go faster than it does. This could also explain the absence of a rearward spray of blood as being due to its presence in the now missing frames.

Supporters of such an idea see too-rapid motions in the film. Although Dr Mantik adheres to a belief that driver Greer turns his head too rapidly (2 frames) others of us (DeSalles and the Deans) reviewed this sequence several times and are convinced that the turn takes place over 4-6 frames.

The main problems with the film alteration notion are that 1) this would require synchronous alterations of the Nix film and Muchmore films 2) it requires having to recreate the scenes that appear between the sprockets.

Note: There is a match between the sprockets, and the frames of film. The full width of the film contains exposed portions that are to the left what is projectable. This non-projectable area is not copiable by an optical printer. In a contact print the area can be retained but the film quality will suffer. Modifications of optical printers were attempted for the HSCA, but it proved an impossible task. Deletions would produce jumps in the action of figures in the film which are not seen except for some (possibly) unusually rapid motions e.g. Greer's head turn and Nellie Conally pulling down her husband. We observed a laser disc (incomplete) version of the Nix film and noticed no jumps in it either.

It seems too much to ask of any conspirators that they alter Nix, Muchmore, Zapruder (and Bronson) films in synchronous fashion, at any rate.

If none of the four reasons above appears to explain the backward and to the left motion of the assassinated President we must simply state that it remains an enigma in 1995. I am happiest simply letting it go at that for now.

Of the four explanations offered we (except Dr Mantik) lean towards a second shot from the front at z314/315 as the least implausible.

We admit we have no explanation for why it is not evident on the film while the z312/313 event clearly is.

Final Note:

Rex Dean has constructed a simple stereoscopic slide viewer. Using the clear frames z335/337 it is possible to obtain a good stereoscopic image which reveals definite right rear damage where it was to be noticed minutes later at Parkland Hospital. The loss of tissue appears entirely consistent with the descriptions both from Parkland, and the

autopsy at Bethesda. It appears to argue against any notions of "body alteration" such as that proposed by David Lifton. The missing rear skull seems to conform to all descriptions.

One of the most curious things about the z film is that although it shows a flap of skin forward of the ear such obvious forward injury was not noticed at Parkland. It was noted at autopsy that injury extended past the ear towards the front, but perhaps because Mrs Kennedy tried to pull the scalp together this injured area was re-approximated and not observed in Texas. It is often surmised that there was some change in the skull injury between Texas and Bethesda autopsy, but an infinitely more logical argument is that what is seen on film - a more forward extending wound, noted at autopsy - was simply not appreciated in the Emergency Room at Parkland.

A final note: our viewing of the z film supports the explanation of Jackie reaching far to the rear for a bit of tissue that had been blown backward onto the trunk. It appears that she cups a small object then scrambles forward with it.

I hope some of the observations above will shed some new light on mostly very old controversies. Thinking about them has permitted me to make some decisions as to what makes the most sense. Further viewings of the z-film will be done in the future.

Special thanks go to Rex & Rebecca Dean for the use of their great laser disc viewing system. Hal Verb's COPA paper formed the original ideas I set out to evaluate. Josiah Thompson's work is to be commended - it is still fresh and insightful after 28 years.

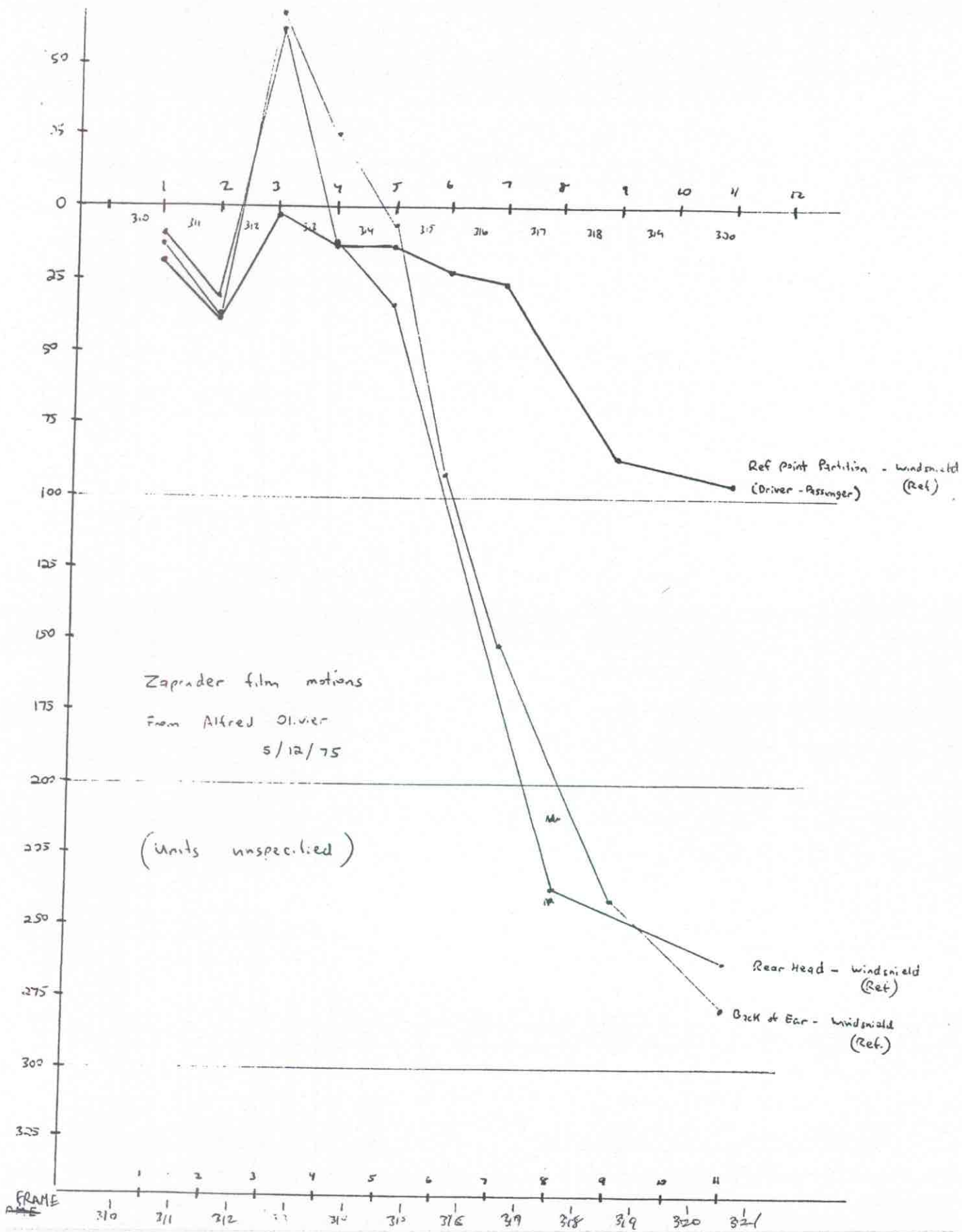
Robert Groden was helpful in discussing several points with me. My conclusions are at odds with **The Killing of a President** but we agree on much.

Drs Aguilar and Mantik are always a pleasure to work with and I hope they will add a few paragraphs for addenda esp regarding the medical evidence. Both have been to the National Archives to examine the autopsy materials.

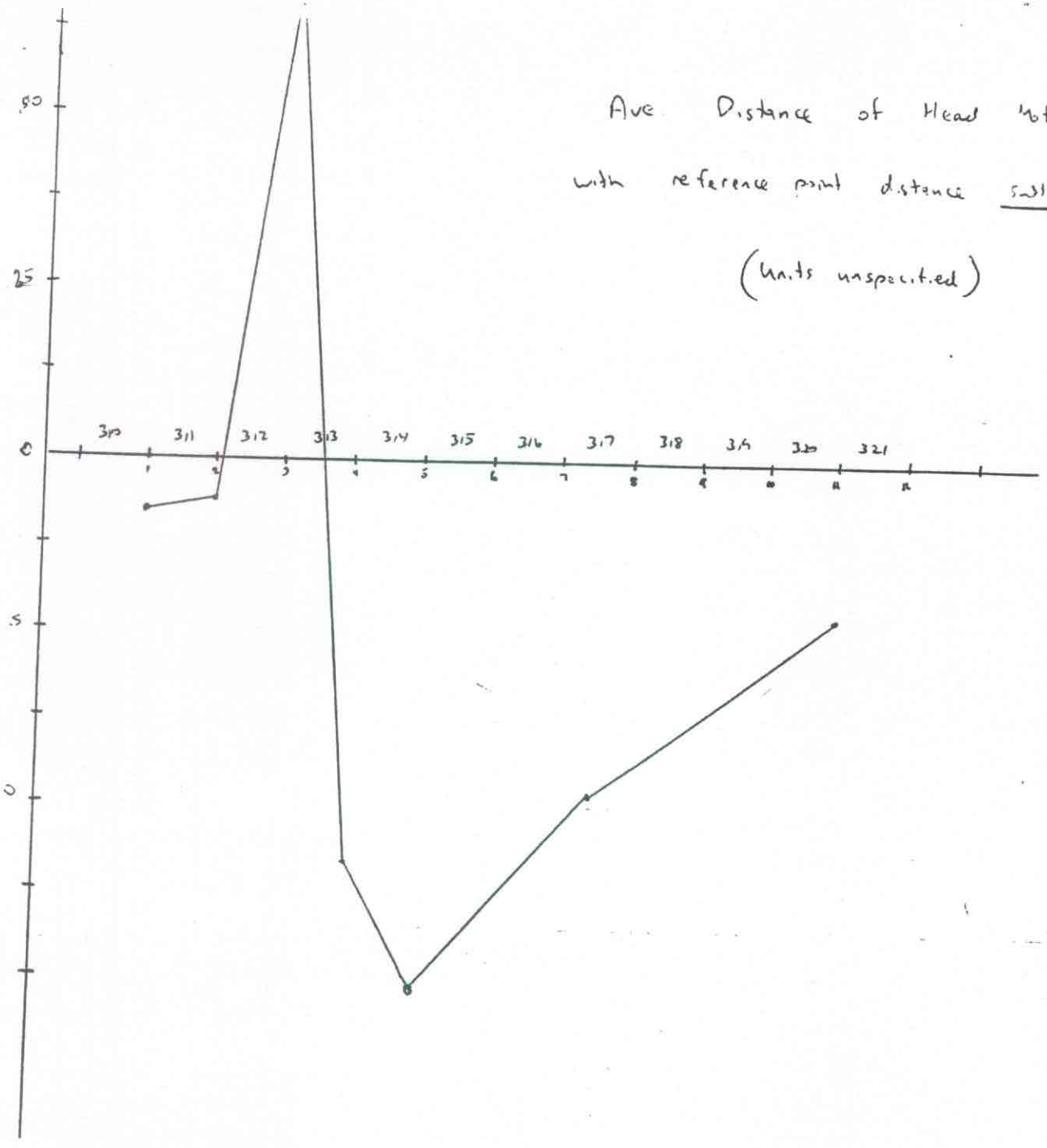
Final thanks to Kathy Cunningham who always supplies me with whatever information I have temporarily misplaced.

THIS IS DRAFT #1. I HOPE TO REFINE THIS A BIT.
SUGGESTIONS WELCOME FROM ALL. I hope Rex and or Hal will take this to COPA.

KC the visuals I have are better than these two dog-eared Dealy Plaza's. Still in the film can tho..... I think you have ALL the necessary pix, even my acoustics scale.



Ave. Distance of Head Motion
with reference point distance subtracted
(units unspecified)



ADDENDUM

Included are several z frames. Several points are illustrated.

Further evidence against a shot before z188 comes from the facts that:

- In z161 the VP follow-up car, #4 is seen still on Main. This confirms that Driver Rich (let alone the Cabell's in car #5) could not have heard the first shot while in the turn, neither car has commenced the turn onto Elm. This refines the estimates in the text.

- Between z161 and z188 JFK is clearly waving to the crowd. Please compare the z film to Croft vs Betzner. The 8+ black spectators on the north of Elm show up again in Betzner's photo. **Between the two pictures they have returned the President's wave.** This is strikingly obvious in the prints though these xeroxes are not clear. Such activity leaves little room for gunfire in this interval, especially gunfire that hits its mark (which shot #1 did!).

- Willis was clearly seen in our laser disc viewings to only get his camera to his face at z187. He is outlined in orange in z188. The camera is clearly up at his face. His testimony is clear about having the picture framed at this point, the responding to the shot by snapping the shutter. This first shot comes between z188 and his finger triggering the shutter at z202.

- Rosemary Willis is seen with legs together in frame 200. Between z188 and z200 she stops running.

- Although JBC clearly does look to his right between z161 and z188, so does JFK, indicating that the two men are interacting with the crowd. (Does anyone recall any of these witnesses commenting on JFK returning their wave, in response to a shout etc? John Chism notes that JFK waved to the crowd to his right just before shot #1, but what about those in that part of the crowd?) JFK turns slightly rearward in z188 from just previous.

- JFK has his hand freeze between z200 and its disappearance behind the sign around z207 (the upraised hand is visible for a couple of frames after the face dips below the sign). Its position is not terribly different from that of its reappearance at z224 after which JFK's posture becomes very abnormal.

Note: JBC collapses around z238 and over the next 1/2 second his posture is highly abnormal (see z242). Working on the premise of a z190 shot we would see that if JFK responded like JBC then his visible wounding would only have been evident after disappearance

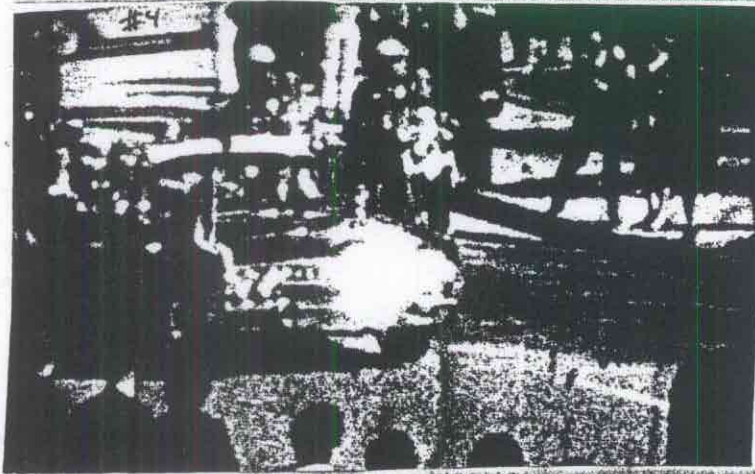
- After review of these photos (another session at Rex's is needed) it is clear that JBC may be looking right, then commences his turn left by z200 (?). He surely is more leftward at z222, his reappearance, then he is in z200, which may reflect his going right, then left testimony. Again, further review is planned.

Re: Bronson slide. It seems that the estimates in the text are very good, but it would seem that the limo was only visible starting at z200, based upon the photo being z230. If it is really z225, then everything would fit amazingly well to a z190 shot.

The problem is not that a shot came earlier than the limo being visible Bronson does not say that it was partly visible, only that he was waiting for it to be so. It seems he must have started his reaction right when the limo was fully visible for he recorded the picture 1/3 sec later (again, try a stopwatch trial on yourself). We are very close to a match of my hypothesized time frame here.

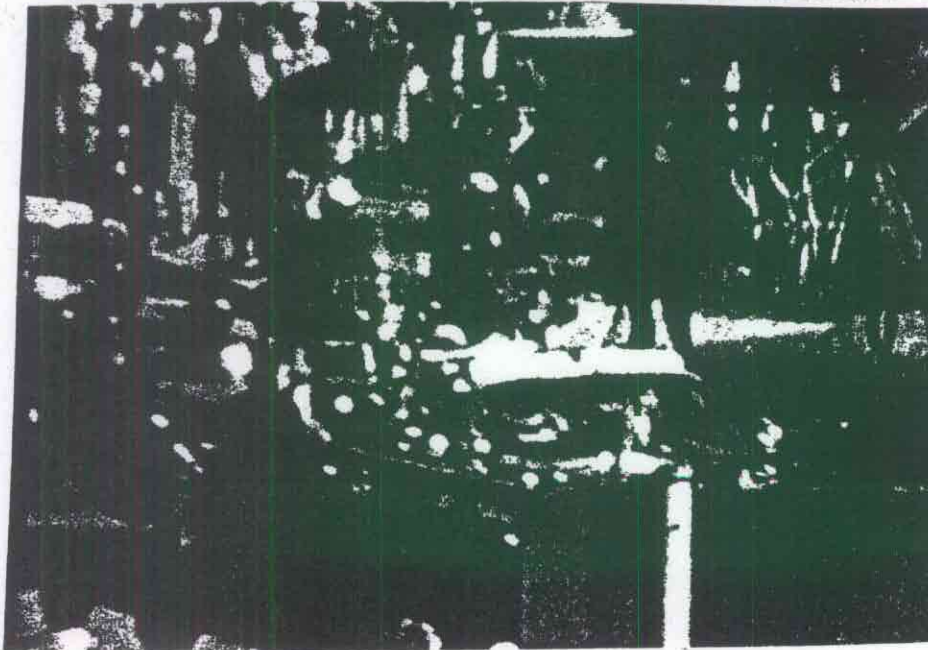
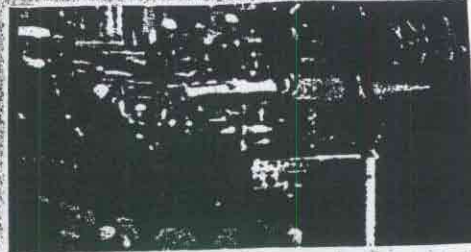
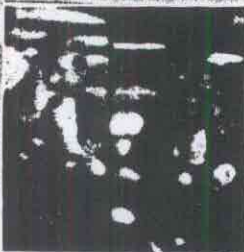
Note: It has long been contended that a shot could have come as late as z224 (despite the implausibility of a 1/18 sec reaction time on JFK's part). Bronson had the entire limo visible to him at z224, however. He reacted no later than that frame to snap the shutter (discounting superhuman reaction time) to get his shot 6 frames later. Since he was .2 seconds, or 4 z frames away from a rifle near Elm then it is clear that shot #1 cannot have come that late. Z220 would be the last possible moment for shot #1. When Bronson heard the shot the limo was not fully visible, and might not have been visible at all for a split second.

Bronson, Willis and Betzner correlate best to a shot between z188 and z195. They correspond very poorly to an earlier shot for all the reasons delineated, and not as well to a shot later than this.

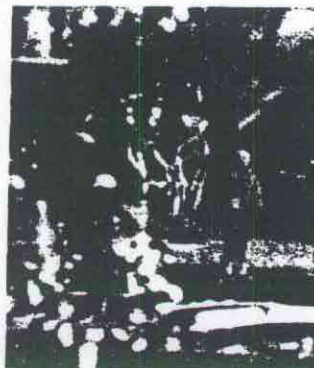


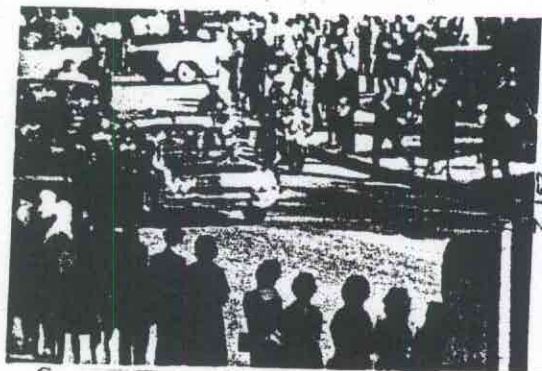
Frame 161

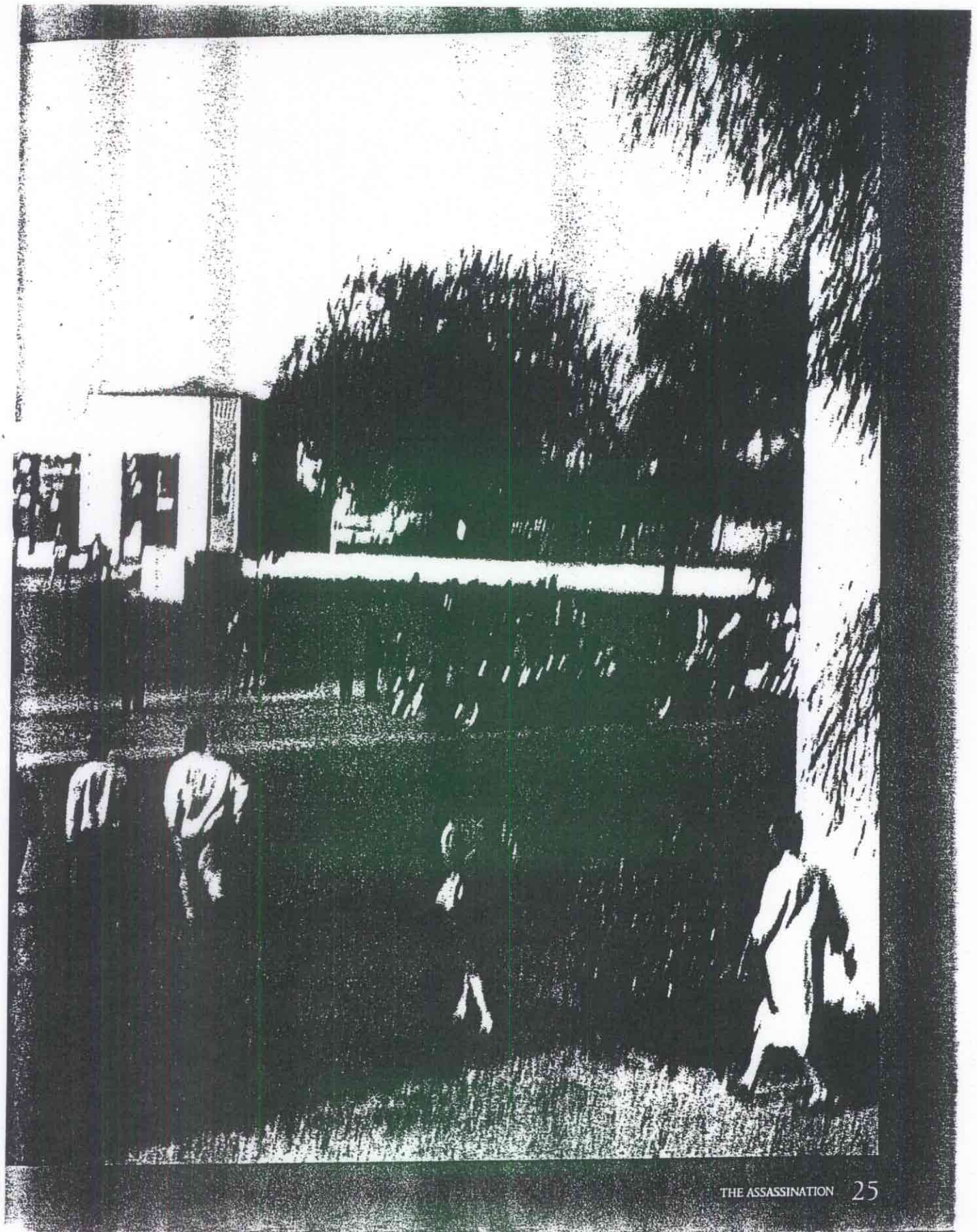
John Kennedy
waving to the crowd.

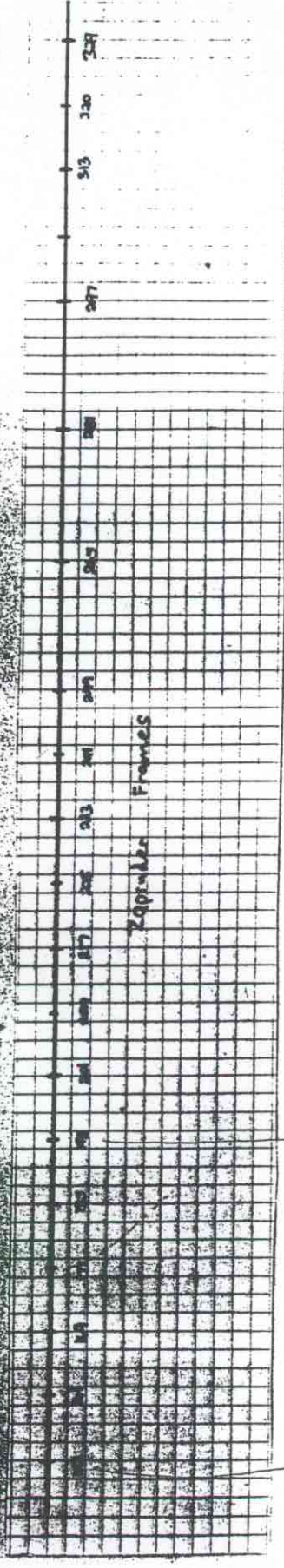
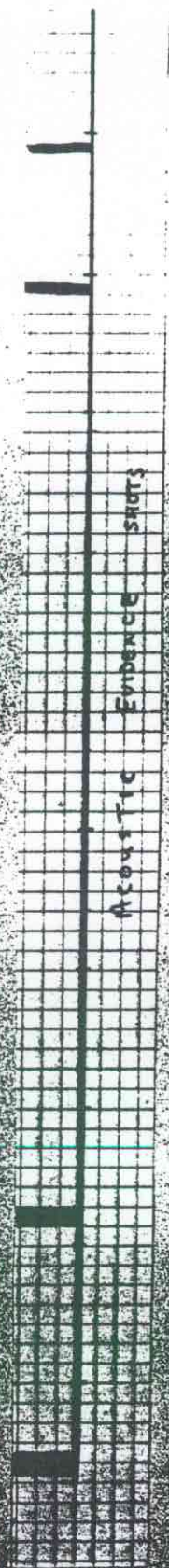
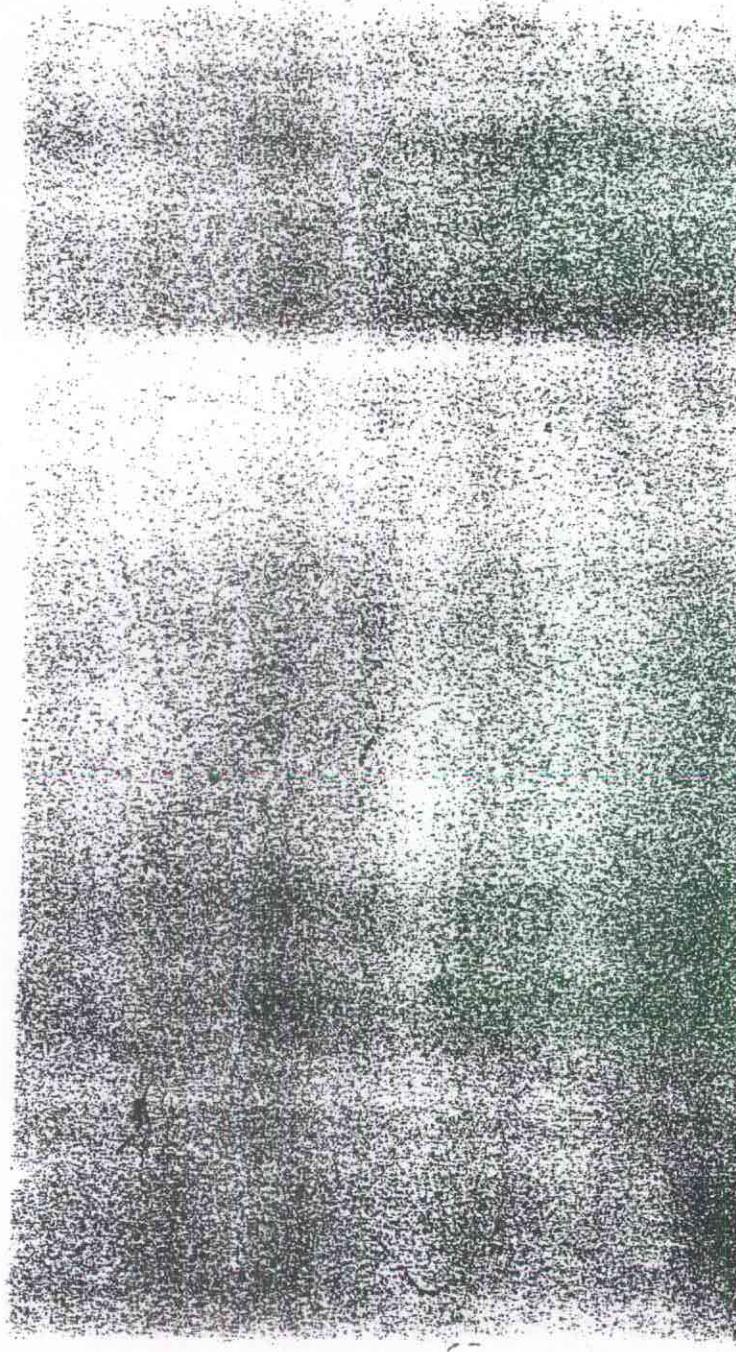


By Zapruder frame 200,
the President's right hand
has stopped waving, and
the next few frames show
the succession of rapid
head movements from right
to left.









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