

NOTE: This is the last portion of a first draft of a long chapter on the Z film. At present it is solely for the use of the ARRB and is not to be circulated elsewhere. It will appear in a book this fall published by Open Court Press of Chicago. I will be happy to share the rest with you, if you like.

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Personal Observations at the National Archives

In order to settle these many issues, a review of the original film at the National Archives would be ideal. I therefore requested the support of the ARRB for this purpose. Although I received a sympathetic reply from the board, further events were already in place. Within a very short time after my letter, the ARRB officially recommended that the film be made public property. Although a request could still be made to the Zapruder family attorney for such a review, the implications against authenticity might not be cheerfully received, particularly since the purchase price could be adversely impacted. I resolved instead, for the moment, to review only the May 1964 reenactment film and, for a second time, to review the FBI and Secret Service copies of the film, all of which are held by the National Archives. I am grateful to the Archives for permission to view these items. My two visits to the Archives took place in October 1996 and in June 1997 (shortly after my letter).

In an attempt to simulate Zapruder's effort on November 22, 1963, a reenactment film was shot on May 24, 1964, through Zapruder's camera. As I looked at this film, I was immediately surprised--it contained no intersprocket images! This was fairly conclusive proof that this film is not the original, but rather a copy. Staff members assured me that this was the only copy in their possession and that they did not know where the original was, or if it existed at all. Additional evidence that this is a copy is that the emulsion side faces the viewer. Even more evidence is that images appear to be out of sequence (spliced in) yet no physical splices are visible. There are actually two successive reenactments, i.e., the vehicle is filmed twice as it travels down Elm Street. This was also noted in testimony by Lyndal Shaneyfelt, the FBI expert (5 H 162). A third sequence was also filmed--at stationary points en route.

Despite the fact that this film was a copy, the image color and clarity were excellent. To my amateur photographer's eye, I could not easily distinguish it from an original. (Such comparisons, of course, are best made with known originals side by side; I did not have that opportunity.) Unlike the film shot by Zapruder, there are no anomalies such as portions of frames alternately going in and out of focus, and there is minimal blurring due to camera or subject movement. Some of this may be explained by the use of a tripod--which Zapruder had not used. Otherwise, I could identify no other noteworthy features. It was, of course, a great loss not to be able to view any intersprocket images, since these would have served as remarkably good controls on the numerous odd phenomena that have been described in the Zapruder film.

There are two FBI copies and two SS copies of the film in the Archives. One SS copy is an excellent, with very good color and clarity. In the second the color is faded. The two FBI copies are likewise of inferior quality, with notable loss of color. These observations by themselves bear some discussion. Recall that three copies of the film were supposedly made at the Jamieson laboratory on November 22. Since they were all made at the same time, they should therefore be of similar quality--even after all this time. Based on this alone, only one of the above copies would seem to qualify as a first generation copy. The ARRB has indicated (letter to Noel Twyman, July 11, 1997; copy to me) that a third ("LIFE magazine") copy is in private hands but is in degraded condition. This would imply that the poorer quality SS version is considered a first generation copy, despite its differences from the better quality SS version.

But there is more information on this point. To my great surprise, I quickly saw that none of these four copies of the motorcade sequence contained any intersprocket images. Not only was this disappointing to me, since my anticipated controls were now missing, but I had expected to see them! This conclusion derives from a recent interview with Bruce Jamieson by Noel Twyman (*Bloody Treason*). Jamieson was at the laboratory on November 22; he reports that the three copies of the Zapruder film were made by a contact print process. Unlike an optical printer, this process should include all visual information that appears within the intersprocket area. Therefore, all such first generation copies should contain intersprocket images. If this is accepted, then it can be concluded that no first generation copies of the film have now been identified.

There is one possible explanation. If the contact printer included only one intersprocket area but not the second one, then the SS copies might be authentic. For this reason it would be most useful to locate the actual printer. One possible reason for excluding one intersprocket area would be to reserve it for the sound track.

LIFE magazine admitted to damaging frames Z-207 to 211 during its initial work. Later, however, Time-Life released these missing frames. They are reprinted by Thompson in his 1967 book (page 216). But these replacement frames contain no intersprocket images. Had intersprocket images been present, they would have provided overwhelming evidence that these images were also present on first generation copies. The fact that Time-Life released frames without intersprocket images merely raised a different question: did Time-Life deliberately withhold these, or had they been lost, or had there never been any intersprocket images?

The remainder of these copies revealed no more surprises. I did, however, search for--and find--the purported register mark on Z-28 that has been discovered by Roy Schaeffer near the center of the Elm Street. I did not make a thorough search for other such marks, as that would have been extremely time consuming and lay well beyond the scope of my goals for those visits.

According to Zapruder (FBI File #DL 89-43), he shot the first side of the film earlier and then had reversed it so that he would be ready to shoot the second side. The first few frames on the second side were taken in Dealey Plaza, before the motorcade arrived; the remainder of this side contains the motorcade. The first side, however, is

present in the Archives and is full of images. To my delight, the intersprocket areas were all intact--including the left portion of the scene in the main image area. So, at last, some controls were available.

On this first track, I noted that there were two sets edge prints within the intersprocket area. One set was printed upside down and reversed, so that there could be no question about this conclusion. Furthermore, the phrase, "Processed in Nov 1963," appeared more than once across this area. So here was yet a third piece of evidence that the first generation copies must have included the intersprocket area, i.e., this sequence on the first track was obviously a copy (it had two sets of Kodak IDs, also called edge prints) and yet it did contain intersprocket images of scenes! Therefore, the first generation copy did include intersprocket images. Furthermore, the copy that I saw was made shortly after the original--the copying date was explicitly stated to be November 1963. What was still not completely certain was whether the first copy of the motorcade sequence had included the intersprocket area.

I also noticed that the quality of the intersprocket scenes (especially near the center of this small area) was similar to that of the projected (central) image. In fact, for the large majority of these frames, the color, clarity, contrast, and shading of the intersprocket image seemed indistinguishable from the adjacent projected image. This seemed true over the entire 32-33 feet (including leaders and splices without images) of film, for both indoor and outdoor sequences. This similarity is quite different from the intersprocket images of the motorcade in either the WC prints or in the slides housed in the National Archives. In these latter images, the intersprocket areas are distinctly darker--almost uniformly so--than the central image. (I am grateful to David Lifton for first bringing this issue to my attention.) I am told by staff of the ARRB that the intersprocket area on the "original" film, on the other hand, shows less color intensity and seems more washed out.

I looked for anomalies in the intersprocket area (as discussed above for the motorcade sequence)--these also were not evident: no frame to frame alteration in resolution was seen, no missing portions of images, no blurring due to a hand held camera, no single and double images in the same area.

In the 16 frames immediately before the motorcade (Editor's note: see Pincher and Schaeffer) three figures are present. The central figure raises a hand to wave from just above the waist level to chin level in four frame intervals. In the last of these frames the hand was blurred. That would all seem compatible with a film speed of 18 fps. The blurring was especially interesting--particularly when compared to similar movements in the motorcade sequence where similar movements do not produce blurring (I've cite Jackie's hand above; also note the Brehm's clapping hands in Z-277 to 295.)

[need to check this on a better image]

Nearly all (possibly all) of the intersprocket images as published in the WC volumes and in the slides at the Archives contain an overlapping image in the upper one-third (approximately) of the intersprocket area. When visible, each such image seems to

be an extension (not a repetition) of the bottom of the preceding frame. For example, in the WC Hearings, from about Z-310 through 334 (the last one printed) the image of the motorcycle wheel and tire on the *right* side of the limousine can be seen. This is particularly well seen in Z-327. What is odd is that these images never appear anywhere as part of the projected (or central) image--they appear only in the intersprocket area. But the most peculiar feature is the apparent absence of such an effect in the first track. Why such an overlap occurs only on the motorcade sequence and nowhere else--unless an artifact of alteration is accepted--is a mystery.

The Kodak edge prints within the intersprocket area, as printed in the WC Hearings, contain two solid triangles. According to Noel Twyman, who discussed this with the Zapruder attorney, this identifies the film as produced in 1961 in Toronto. The ARRB agrees with this date. All of the other symbols, both on the reenactment film and on all copies in the Archives, contain the symbol of a solid triangle and a solid circle. Again, according to information from Twyman, these films are thereby dated to 1963. The ARRB also agrees with this date.

To my great surprise there were no symbols that would permit dating the "home movie" portion--none anywhere! If symbols appear on the motorcade track, why would they be absent from the motorcade portion?

One other point can be made. In the reply I received from the ARRB, it was explicitly stated that the original copy of the first track (the home movie portion) has not been located, nor, apparently, has any information about its whereabouts. If that is true, then the copy that I saw must be at least a third generation, and, as such, it might be expected to contain three sets of edge prints--i.e., one from each generation. My recollection, however, is that only two sets are present. But that is less pertinent than the fact that, once again--like so much of this material, expected film elements (sometimes early copies and sometimes originals) are missing.

To summarize all of this curious data, the following table may be useful.

Summary of Films

<u>Film</u>	<u>Expected</u>	<u>Actual</u>
Re-enactment	original version	copy
SS copies A	first generation	second--or later
B	first generation	third--or later
C	first generation	privately held
Time-Life (1967)	intersprocket images	none
Z film, first track	original	third generation

	dark intersprocket images	normal images
	partial image overlap	no overlap
	1961 date	no dates
Muchmore	original	copy
Nix	original	copy

In this table, the SS copies A, B, and C, refer to the three that were made at the Jamieson laboratory on November 22. I list the actual results under the assumption (still not finally proved) that the motorcade track should include an intersprocket image. The partial image overlap refers to the intersprocket area. The expected features of the first track are predicted from the second track (the motorcade sequence).

Ordinarily, none of these oddities should occur. That so many are present, especially in addition to all of the points made above, is quite astonishing. The evidence for film alteration is, at the least, highly suggestive. A few investigators regard such alteration as proven, while a good percentage of those familiar with the data, if not totally convinced, are at least highly skeptical of the film. Nonetheless, even yet, several well informed individuals still believe that the case has not been proved. For these, more evidence will be necessary.

SYNTHESIS

It is time to try to draw all of these threads together. Although every thread of the tapestry will never be seen, a view of the landscape may now be emerging. All of these data point consistently toward film alteration. There are simply too many threads out of place, too many scenes (and whole film copies) missing, and too many peculiar features. Precisely what was done, which frames were excised and which frames were retained (but altered)--may never be completely clear. What follows is a current best guess, subject to revision based on new evidence. What is proposed here, however, does already explain a wide array of bizarre features.

Incriminating frames were excised--particularly those that showed posteriorly flying debris. Such frames would have provided overwhelming proof of a frontal shot. There is too much evidence for frame removal at other sites as well. Frames showing the limousine stop also were removed. Whether these latter frames were coincidentally the same as for the airborne debris is impossible to say with certainty--it is conceivable that some of them were. Whether any independent reason required removal of frames of a stopped (or slowed) limousine is debatable. The Secret Service, of course, may have wished such action (or lack of action) removed simply because it was potentially embarrassing. And, of course, if the limousine did stop, or slow a great deal, then a large number of frames could have been excised during that interval (or intervals). These could then have been made available for insertions into other scenes, as needed.

A large block of frames may have been excised from the top of Elm Street to the first limousine frame. This may have been done to eliminate an embarrassing limousine turn, or simply to minimize the overall task of editing the film.

Most likely the original film was shot at 48 fps. A 25 foot track of film would contain about 2100 frames (7 frames/inch), or a about 44 seconds of action at 48 fps. This should be sufficiently long, enough even to encompass one or two limousine stops and an initial limousine speed as low as 3 to 4 mph. Zapruder could easily have shot the sequence at this speed. If he knew this, and in view of the above discussion of the first 16 frames on the motorcade side, it is even possible that he switched speeds, from 18 fps (normal) to 48 (slow motion) just after he shot these 16 frames--in order to catch the motorcade in slow motion.

The direct arguments for 48 fps are limited at present. The major one is the blinker light cycle time. Several more minor arguments have been alluded to above. It is possible, now that this issue has come to the fore, that further direct arguments for 48 fps will still be discovered; this is a rather new area of exploration. At the moment, however, the most powerful arguments for 48 fps are indirect. A film shot originally at 18 fps would make frame excision quite difficult--without being too obvious. Such an abbreviated film made from an 18 fps original would yield too much jerkiness--or, if this were corrected (if possible at all) by fabrication of new frames, then a great deal of effort would have to be expended for many such frames. Furthermore, the 18 fps scenario would still leave unexplained the lack of blurring during rapid movements--where some blurring would be expected.

Recognizing that Zapruder's camera had only two speeds (18 and 48 fps), the film editors would quickly have recognized that elimination of frames so as to produce an 18 fps film would have to be their goal. If frame had to be excised, they had no other reasonable choice. As a first step every other frame could have been excised--at least for much of the film. This would immediately eliminate a large number of undesirable frames and yield a 24 fps film. The work of Pincher and Schaeffer on the emergency blinker rate is compelling evidence that some portions of the film may simply have been left just like that. The eyewitness accounts of JFK's movements, the airborne debris, and the limousine stop(s) would require excision of more frames. Removal of frames during a limousine deceleration has been explored in some detail by Art Snyder by use of computer modeling. His conclusion was that an original 48 fps film could be cut down to 12 fps and then filled in with extra frames to return the speed to about 18 fps. He concluded that acceptable results could be obtained in this fashion. The chief reason that this approach could work is the limited resolution within each frame--this is so limited that effects of tampering (of the type being discussed here) could be hidden within the existing uncertainty of position within each frame. The uncertainty issue has been explored previously by Paul H. Salamanowicz for the HSCA (Record Number 180-10102-10425). He concluded that positions from frame Z-151, 173, and 193 could be determined to within 0.5 meters; frames 272, 313, and 410 are accurate to within 2.0 meters. If the limousine moved at about 1 ft/frame, then the first inaccuracy would be about 1.5 frames, but the second is about 6 frames!

It appears that the two head shots have been combined into one. The witnesses saw a bloody spray and tissue debris with the second head shot (near Z356 in the first reenactments) but apparently no halo (and little debris) with the first head shot (near Z276 in the first reenactments). That such a halo is seen with the second shot, but not with the first one may also be explicable. Only after disruption of major intracranial blood vessels and passage of a brief period of time (during which blood could accumulate) could there be sufficient blood to yield such a halo.

The other puzzle that this may solve is the apparent absence of JFK's right occipital defect in Z-313 and immediately afterwards. Most likely it was not there--at least not yet. What Jackie saw flying through the air was a bloodless bone from the skull vertex. Only with the second shot, did the remainder of the skull explode with a halo of blood and a blow out of the right occipital area. In fact, close inspection of the top of JFK's head at frames in the mid Z-330s shows a distinct change in contour. The light is reflected off in a manner that suggests missing skull--and this effect extends well posterior to the skull vertex. This defect is seen in multiple frames in a consistent manner. (It must be remembered that, even if this is believed, it would not prove that the second head shot occurred at this particular frame number--this image of JFK's head could have been extracted from a frame around Z-358 and simply inserted here as a composite image.)

In addition, it would be reasonable to place such a fabricated (or perhaps conflated) head shot somewhere between the two actual head shots; in fact, Z-316 is the halfway point between the last two shots of the first reenactments. That is very close to the currently visible head shot at Z-313. Such a midway choice would also be less likely to clash with the memories of eyewitnesses than would a total removal of one or the other head shot. It would have the additional advantage, if Hepler is correct, of removing another closely spaced shot (at Z-315) that hit Connally. Such a visible shot to Connally would be uncomfortably close (for a lone gunman theorist) to both head shots. It would also be a fourth shot, one too many for the WC conclusions.

In the film, except for the final acceleration, the limousine advances uniformly for much of this interval between the two last shots in the first reenactments. En bloc removal of frames could not be done without causing the limousine suddenly to leap forward. It seems likely, therefore, that frames were left in so that the limousine would appear to be progressing uniformly. However, JFK's positions in the limousine would require alteration, at least for some of these frames, in order to eliminate the impression of two separate shots.

This problem could have been solved by transparency retouching (**Editor's note:** see Jack White's article), which was a well developed skill by this time. Jack White notes that he frequently had to rely on this process in his own work and that the results were typically undetectable. Such a process (imprecisely done) could explain the apparent absence of facial features in Jackie in one frame and the inexplicably (and temporarily) missing portion of JFK's head in several frames. An alternate possibility is the use of some portions of already excised frames--or a combination of the these two options.

In addition, portions of some frames may have been repeated over and over in order to replace necessarily excised frames. The head snap may have resulted from this maneuver. This may have been done for JFK (and possibly for Jackie, too) in that long, apparently stationary, sequence preceding Z313. Another place where this may have occurred is for the bystanders to the left of the Stemmons Freeway sign. The peculiar absence of magnification changes for this intersprocket area has already been noted. Regarding these bystanders to the left of the sign, it is extraordinary that Weatherly, via his analysis of streaks and camera motion, independently concludes that these bystanders have been inserted as a composite image.

The intersprocket area has been of particular interest in many of these queer observations. There is a specific reason that it may have posed unique problems. The Kodak edge prints (IDs) are located along the film edge in the intersprocket area. In the WC images these edge prints are *Kodachrome II 1. 1: 37 ... Safety Film*. Where the dots appear here there are symbols on the film: a solid (white) vertical bar followed by two identical solid (white) triangles. These latter two triangles date the film to 1961.

If every other frame had initially been eliminated (or any other regular pattern) then this entire intersprocket pattern of edge prints would have been interrupted. A loss of a portion of any of these IDs would have been obvious evidence of tampering. So a decision had to be made: either to leave the intersprocket area out entirely, or to replace it so that it looked like the original. If the first option had been chosen, it might have worked. We have so little intersprocket information today that we might not have known what to expect. (In this case, the first track may also have been discarded.) When Zapruder's camera was used to shoot the May 1964 reenactment, the sudden appearance of intersprocket images would have been embarrassing; but perhaps only the FBI would have known. Nonetheless, the original film is not now available--there is only a copy with no intersprocket images. It is possible, however, that copies of individual frames had been made by then. Such copies were made for the surveyors. (At a February 25, 1964, WC meeting, Herbert Orth of *LIFE* volunteered to make 35mm slides. Whether such slides existed before that seems unknown.) If any copies of individual frames included the intersprocket areas the first option may have been considered too dangerous. That the 4 x 4 transparencies were made from the original film is strongly suggested by Thompson (p. 17). He cites the testimony of FBI agent Lyndal Shaneyfelt for this likely conclusion. In any case, there could still have been concern that any subsequent film shot with Zapruder's camera would show an intersprocket image. If so, a question of authenticity would immediately arise.

It is likely, therefore, that the second option, of reproducing these symbols correctly, had to be chosen. This probably required the simultaneous projection of an intersprocket image and the main image onto a single surface. (See *Basic Animation Techniques* by Brian G.D. Salt or *The Special Effects of Cinematography* by Raymond Fielding. I was able to obtain many of these out of print books at a used book store in San Diego.) Appropriate image masking and matching at the junction would be required. (I believe that Lifton has proposed a step of this nature). Artifacts from such a process may have been left behind: the shadow discontinuity at Z-317 discovered by Marler, the entire 8 mm film that was loaned to me by Lifton that shows so many composite frames, the

magnification changes that commonly occur across this interface, the double images that are sometimes seen in the intersprocket area (often only in a portion of it), the leaked image into the top third of the succeeding intersprocket image, and the fact that the image is darker in the intersprocket area (not seen on the first track). Weatherly even offers a compelling explanation for the double images and for the blurred images. He reports that it is common in cinematography to replace missing frames with either a composite frame--one that includes an overlap of images from the frame on each side. In any case, this is a surprisingly long list of oddities--where none at all should exist.

Frame excision can explain multiple curious features: the absent limousine stop, the altered movement of JFK's head (including the contraction of two head shots into one), the loss of Connally's left turn, the disappearance of obvious blood on Connally's shirt front, the excessively rapid movement of multiple individuals, the disappearance of tissue debris from the limousine trunk and from the air.

New Proposals

Other than those issues addressed above, what additional evidence might be forthcoming? It should first be recognized that additional studies of the purported original film are unlikely to occur until it becomes public property. There is one possible exception to this, however--these studies could occur if the government itself should question the authenticity of the film. In that case, the purchase price of the film could be adversely affected and the government, for that reason alone, might wish to consider such studies. The assistance of optical physicists and engineers would doubtless be recruited for such an effort. Some possibilities would include spectroscopic and densitometric studies from the intersprocket area vs. the projected image--for both the first and second tracks of the Zapruder film. Location of other developed Kodak film containing two solid triangles (from 1961) and comparison to the Zapruder film could be useful (I have not even completed my review of my father's collection from about that era.) Sophisticated physical techniques for dating or for identifying such film might be used. Or, if this is not possible, then at least direct comparisons of the Zapruder film to these concurrent controls could be carried out. These comparisons, by themselves, could prove definitive.

The first track of the film should be re-examined as discussed above. New questions should be asked: Is the spacing of the edge prints similar to what is printed in the WC volumes? Is the frequency of the edge prints (on the same film) consistent? Is the spacing of the individual symbols constant? Is the spacing of the entire edge print similar (or identical to) other film of the same type? Do the 16 frames immediately before the motorcade (on the second track) show an superimposed image in the upper one third of the intersprocket area? What is the quality of the image in the intersprocket area of the first 16 frames? (If these 16 frames were shot at 18 fps and the motorcade at 48 fps, then the exposure times would be different and the image brightness might also be different. Optical density studies might be useful for this comparison.)

Finally, a straightforward test, requiring no special expertise, could be done now. Simply shooting a new roll of film with the Zapruder camera (at both 18 and 48 fps) would answer some very basic questions:

- (1) Does the camera produce an intersprocket image?
- (2) Is there a partial overlap of images in the intersprocket area?
- (3) Is the intersprocket image darker or lighter than the projected image?

A negative answer to either the second or third questions--and especially to both--would provide powerful evidence (some would say proof) of Zapruder film alteration.