# REPORT: THE BRONSON KENNEDY ASSASINATION FILM INVESTIGATION

By

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### **PROJECT GENESIS**

In early February 2019, Mike Hillman attempted to contact Ken Weissman at the Library of Congress Motion Picture Preservation Laboratory. Having retired in December of 2017, the phone number he used was successful in reaching his successor at the Library of Congress, Heather Linville. Hillman asked that she send him his phone number, so that he could speak about a project related to the Sixth Floor Museum in Dallas. Linville forwarded Weissman the phone number that Hillman provided, but was unsuccessful in reaching him at that number. Linville checked her caller ID, which had a different number and Weissman was able to reach Hillman on February 15.

The two discussed the possibility of Weissman's participation in a project that involved the physical inspection of an 8mm film that was gifted to the Sixth Floor Museum (SFM) in 2017, referred to as the Bronson film. Weissman was definitely interested in hearing more about the project and what it might entail, and provided Hillman with his business contact information.

A few days later on February 19, author Bonar Menninger contacted Weissman via email, and explained a bit more about the project. He provided Weissman with a <u>link</u> to an article he'd written in 2017; Hidden in Plain Sight. The two agreed to get back in touch after Weissman had a chance to review the article. Once reviewed, the two discussed the project further, and Weissman agreed to participate in the project to evaluate the 8mm film on site at the SFM, if they would agree to that approach.

Weissman provided Menninger with biographical information regarding his background and qualifications for evaluation by the staff at the SFM. This included background on Weissman's involvement in the National Geographic Television film called JFK: The Lost Bullet, directed by Robert Stone. That project involved the scanning of a number of JFK assassination home movies, but predated the donation of the Bronson film, so it was not included. Weissman also provided some questions about the facilities and equipment at SFM, as well as questions about the scanning effort undertaken by SFM shortly after the film was donated to them in 2017. The information was sent to Stephen Fagin at SFM (on or around February 25), who shared it with colleagues including Lindsey Richardson (Curator of Collections) and Mark Davies (Rights and Reproduction coordinator). Mark Davies responded to Menninger on March 11, asking for further information due to the request for access to the original Bronson 8mm film.

While awaiting project approval by SFM, Menninger and Weissman came to terms regarding his participation on April 3 and the formal project proposal requested by the SFM was sent to them by Menninger shortly thereafter. The central objective of the project would be to assess, as well as insure the integrity and quality of the Bronson film . The effort would focus in on the actions of the Secret service agents in the back of convertible trailing the car where President Kennedy was seated. At issue were the actions of Secret Service Agent George Hickey before, during, and after the fatal head shot.

Davies responded on Thursday, April 11 that the proposal had been received but because the Museums CEO and Director were out of the office the following week, it wouldn't be reviewed until their return. Menninger followed up on April 29 asking if the proposal had been reviewed and was told that this would happen at a meeting on May 1.

On May 3 Weissman was contacted by Lindsey Richardson (with a copy to Megan Bryant) asking for more specific information about what his role would be, how he planned to inspect the film, what kind of equipment would be used, who might be assisting him, and how long the inspection might take. She also provided a list of some equipment that was the property of the SFM, including an Elmo 8mm film viewer/editor and a light box that would be available for use on the project. Weissman responded shortly after receiving the email, as it seemed that the SFM management team had "approved" the project. Richardson indicated that she would begin looking for a suitable space for our work once she had the answers. She also promised that she would send me some photos of the Elmo 8mm film viewer. The photos were received on May 15.

A series of emails were exchanged between Menninger and Richardson over the course of the next few months, as Richardson worked on finding a space suitable for the inspection of the Bronson film. Finally on July 31, Richardson notified Weissman & Menninger that she had found a working space located at the Dallas Public Library, and indicated that she was searching for a time frame that would work for the project. She indicated that she was looking at early October as a possible time frame.

Eventually the dates of November 7 & 8 were determined to work for all parties involved. Plans were made for our team of 4 (myself, Bonar Menninger, producer Douglas Maxwell Stone, and videographer P.H. O'Brien) to meet in Dallas on November 6, conduct the inspection of the film on November 7, with November 8 in reserve should extra time be needed. On the morning of November 7, our team met at the Dallas Public Library (DPL) with the team from the SFM: Mark Davies, Stephen Fagin, Lindsey Richardson, and Megan Bryant.

### **BRONSON FILM INSPECTION**

Shortly after meeting at the DPL, the SFM and Project teams were escorted up to the sixth floor of the Library and brought to a large research/utility room in the back of the floor. Four tables in the room were grouped into a large rectangular pattern, perfect for setting up the film handling gear that was rented for the inspection. This included two 8mm film rewinds, and the connecting board that fixed them in place approximately 3 feet apart. Between them was placed an LED light panel (supplied by SFM) that provided back lighting for viewing the film. The SFM staff also brought the Elmo film viewer/editor, but it was not utilized during the inspection of the film. A spare 8mm plastic reel was used for winding up the film as it was unspooled. Additional supplies included nitrile gloves for using while handling the film, and several Bausch & Lomb magnifiers (3x, 14x, & 20x) for use while examining the individual frames of the film. A 24mp Sony A-65 digital SLR (APS-C imaging chip) with a 30mm F2.0 prime closeup lens were also available for use.

After setting up the rewinds and LED light panel, Lindsey Richardson brought out the Bronson film. The approximately 50 foot long film was wound onto a new plastic 8mm film reel. The reel was placed on the left hand rewind, with the spare reel placed on the right hand rewind. Film is typically inspected from left to right, regardless if it is wound heads or tails out on the reel or film core. The film on the end of the reel consisted of white threading leader that was spliced onto the end of the 8mm camera original, Kodachrome movie film. The end of the white leader was threaded onto the empty reel, and manually advanced several revolutions to insure that it wouldn't slip or become unspooled. The right rewind was then used to further advance the film, and as the imagery recorded on the film came into view, it was determined that the film was in a "tails out" configuration. That means that the last part of the film was on the outside wraps of the film on the reel. From a practical matter this meant that the portion of the film that was of particular interest to our project was closer to the end of the film on the reel, and thus would require less winding of the film onto the right side reel.

The film was wound slowly onto the right reel, and the images checked every few feet to determine progress on the position of the film. The key sequence of the film, which contained the images of the motorcade making its way down Elm street in Dealey Plaza was located fairly quickly. From the camera stop at the beginning of the sequence of frames to the camera stop at the end of the sequence, the total number of frames exposed was 26. In an article written by Kent Biffle of the Dallas Morning News in 1978, Charles Bronson indicated that he had changed the camera's operating speed from 16 frames per second to 12 frames per second in order to conserve film. Assuming the setting speed of the camera was accurate, this means the entire sequence filmed by Bronson lasts just 2.17 seconds. Physically the entire sequence measures a less than three and a half inches in length. This was the area of the film that was inspected in more detail.

Going into the inspection, it was hoped that with the magnifiers would allow a very close focus on the portion of the image that showed the secret service agents in the back seat of the car in back of the presidential vehicle. Specifically sought was any evidence that the secret service agents in the back seat of the trailing convertible might have been holding a rifle. Unfortunately the level of magnification needed to determine if a weapon was present in the vehicle was not achievable, even using the 20x power magnifier.

The closest focus achieved on the film using the Sony DSLR, allowed for images that contained a series of 5+ film frames. In processing these images in Photoshop, individually cropped frames were created, but the overall resolution of the images was still not enough to determine if there was a weapon in the hands of the secret service agents in the back seat of the trailing convertible.

During the physical inspection of the film in this area, some scratches were apparent on the base and emulsion of the film, as well as some minor emulsion digs. There was also a very small tear in the film on the next to last frame of the sequence.



This type of damage is typical of virtually all movie films that have been through a camera and/or a projector. In addition, this film was scanned at least twice in laboratories, once in 2017

and then again in 2019. There were no splices or other physical damage of note in the area of this sequence. There was also no evidence that the film had been tampered with in any way.

### **COMPARISON ANALYSIS OF BRONSON & ZAPRUDER FILMS**

A direct frame by frame comparison of the Zapruder and Bronson films is complicated by several factors. First and perhaps foremost is the fact that the two cameras operated at very different speeds. The Zapruder camera and film were studied extensively by forensic specialists and it was determined the frame rate that the camera was actually operating was 18.3 frames per second. To my knowledge, no such analysis was made of Charles Bronson's Keystone Olympic K-35 movie camera to determine exactly what speed it was operating on that fateful day. As a result we must rely on the statement from Bronson in the Biffle article that he used the 12 frames per second setting on the camera. As a result of the speed difference, Zapruder's camera exposed half again as many frames during the same period of time as Bronson's.

In addition, Bronson was standing quite a bit further away from the action on the street than Zapruder, on the opposite side of Dealey Plaza across Main Street. Additionally he states in the Biffle article that he was mistakenly using the wide angle lens on the camera rather than the telephoto lens that he had intended to use. The result is that unlike the Zapruder film, which focused in closely on the Kennedy's and clearly shows the couple in the car, Bronson's film has a wide angle view of Dealey Plaza with the two convertibles occupying a small fraction of the total frame.

Finally, the MP4 video copy of the Zapruder film currently on the SFM website is speed corrected to run at the typical North American standard definition video speed of 29.97 interlaced frames per second, per the metadata contained by the file. The film was framed in a 4x3 matrix, 640 pixels by 480 pixels, which is the normal aspect ratio for standard definition television. This results in a lot of video artifacts if analyzed frame by frame, such as the example shown in the sequence below, which shows 6 consecutive video frames.



1

3



2

Access to the most recent scan of the Bronson film was provided to the project team by Mark Davies a few days before the scheduled visit in Dallas. An email with a link to the 2019 scan of the Bronson film was received on October 29. The downloaded video contained 2K formatted frames, 2048 pixels by 1556 pixels. While the film was scanned frame accurately (1 scanned frame for every frame of film), each scanned frame of the film was repeated twice in the video, so that the movie would play back properly at 24 frames per second.

The following approach was used to analyze the two films. Both videos were loaded into Apples QuickTime media player as it would play both the MP4 of the Zapruder film as well as the .MOV of the Bronson film. QuickTime also allows the user to step through the movies one frame at a time, which was very useful when trying to synchronize the action within the two films. A "common motion" was looked for in both films so that they could be "synced" together. The motion chosen was the woman in the brown "trench coat" walking towards the motorcade.

She is in the upper right of the frame, facing the camera in the Zapruder film frames shown above.

Careful analysis of the movement of the woman shows that her left foot contacts the ground in the 6<sup>th</sup> frame of the Bronson film (at 3:52 of the video), which very closely matches the movement seen in the Zapruder video at 1:06. On the next frame of both videos, the woman's right leg begins to rise as she continues to walk forward. The sixth frame of the Bronson film is DPX frame number 91973 (and 91974, as each frame is repeated in the DPX sequence provided by SFM). This also coincides with the Costella frame number 2305. The following two pictures show the frames synchronized side by side:



Bronson/Zapruder video comparison



Bronson/Costella frame z305 sync comparison

From this point, the Zapruder film was advanced forward to the point of the fatal shot. This turned out to be 13 video frames, which represents a time sequence of 0.43 seconds, based on the playback rate of 29.97 frames per second. This same period of time is represented by around (just over) 5 frames of the Bronson film, or DPX frame number 91983 (remember the doubling of the frames!), and Costella frame z313.

While the Bronson sequence of frames no doubt covers the period of time that included the fatal shot, there is no obvious visual evidence of it on the film like there is in Zapruder. The primary reason is no doubt due to the distance Bronson was from the vehicles, and the fact that he inadvertently used the wide angle lens on the camera instead of the telephoto. In spite of what is shown on television, film has a limited amount of resolution, and can be enlarged only so much before the grain structure starts to overwhelm the image details.

However there is a secondary reason that may account for why the visual evidence is not there. This has to do with the frame rate of the camera (12 frames per second) versus the speed of a rifle bullet. The camera was only exposing a frame every twelfth of a second, with the shutter on the camera being closed\* in the time interval that the film is advanced between each frames exposure. It is quite possible that the bullet struck Kennedy in the time between DPX frame 91981 & 91983, or 91983 & 91985. That combined with the long distance away, makes it difficult if not impossible to see obvious visual evidence. Here are the frame comparisons:



Bronson/Zapruder fatal shot comparison



Bronson/Costella frame z313 sync comparison

The following are close-up enlargements of the Bronson frame areas of interest for DPX frames 91983 and 91985. The portion of the frames shown are enlarged to the point where the image details are just starting to fall apart due to pixilation of the digital scan. Unlike the Zapruder film, there is no obvious impact or blood spray.



DPX Frame 91983



DPX Frame 91985

The Bronson sequence of frames then goes on for another 14 frames, or for just over a second in time. Overall the sequence begins nearly second or so before, to just over a second after Kennedy was mortally wounded. Thus the statement contained in a number of accounts about the film that say it "...captured the fatal shot to President Kennedy" is no doubt technically true, the visual evidence is just not obviously recorded on the Kodachrome frames.

\* <u>Here</u> is a reference for a general explanation of how a movie camera operates

### COMPARISON OF 2017 VERSUS 2019 SCANS

For years, SFM was the caretaker of the Bronson film as it was on deposit there by the family. In 2017 the film was formally converted to a gift to the Museum, and as a result the decision was made to scan the film, and make it accessible on the SFM web site. This work was done by the Media Asset Preservation (MAP) (https://mediaassetpreservation.org/) division of Showcase Productions (http://www.showpro.com/media-preservation/) in Dallas. When queried by Richardson regarding what was used to scan the film, Showcase responded with "Our machine is a LaserGraphics ScanStation. Your film was likely scanned at a resolution of 2048 by 1456 pixels. It's hard to remember a file format, but we tend to use ProRes 422 for quality and compatibility". The ScanStation is available in several maximum camera resolutions, but it is unknown which configuration is in use at MAP. The ScanStation also has the capability of several output file choices (eg. H.264 in MP4 or MOV wrappers, ProRes422.MOV, etc.), as well as choices for the resolution of the output files. The scanner operator can also choose the framing for the film being scanned, as well as a number of other specifications.

During the visit to Dallas, Richardson brought a copy of the digital movie file provided by Showcase, which she allowed to be copied on the laptop that Weissman brought to the meeting. The file is named "Bronson HD ProRes422-corrected.mov". The modification date stamp on the file is shown as June 22, 2017, 1:26pm, and the size is 1.74GB. Metadata on the file as reported by Windows 10:



As noted in these screen grabs, the file is indeed HD, which is 1920 pixels by 1080 pixels, presented in the standard HD aspect ratio of 16:9, and the run time of the video is 2 minutes and 8 seconds. This differs from the recollection reported by Showcase, which was 2048 x 1456 – or essentially what is known as 2K resolution for film. Note that film 2K is actually 2048 x 1556 (not 1456), but this might have simply been a typo in the email. Another important piece of information reported by the metadata is the frame rate of 23.98 frames per second. In analyzing this scan frame by frame, it was determined that every SECOND frame is repeated, rather than every frame, like the 2019 scan. This is significant when viewing the films as "movies" regardless of what media player is used, because if played side by side the action of the two films will not precisely match. It is presumed that this approach was 16 frames per second. Finally the framing of the scan is important as well, as it shows virtually all of the 8mm camera frame and most of the film, but not quite fully edge to edge.

Here is a sample frame as shown in QuickTime:



Note that the corners of the lens circle is shown on both sides of the frame, which is not unusual in working with wide angle lenses. Here is another view of the same frame using the 2020 version of Photoshop CC.



Both views show all of the image information available on the left side of the film frame, including the imaging between the two film perforations. As it turns out the top, bottom, and right edges are all slightly cropped. In other words, there is image information in the film that is not shown because it was not captured by the scan. How was this determined?

In 2019 the SFM had the Bronson film scanned again. This time the ProRes 422 version of the film was done in 4:3 aspect ratio, 2048 x 1556 resolution, or full film 2K resolution. SFM also received the full resolution, uncompressed DPX files of the film as well. Look closely at the following frame and you will see some notable differences.



Although the left edge of the frame has part of the image between the perforation holes cut off, the other three edges of the frame are clearly visible, as is the black area between the frame edges (AKA the aperture mask, or frame lines) that represents areas of non-exposure by the camera. Although the difference in extra image on the top, bottom, and right side is slight, the combined imagery of the two scans does insure that all of the image captured by the camera is contained within the two scans.

Perhaps more importantly for the purpose of this analysis, the vertical resolution of the 2019 2K scan contains 476 more pixels (1556 vs. 1080) than the 2017 HD scan. Some of these

extra pixels are taken up by the black frame lines between the frames, which when measured represented 6.5% of the total vertical interval. The total extra pixels available vertically within each frame of image area was calculated at 445.

Horizontally there are some extra useful pixels as well. Measurements of both frames indicate that over 98% of the horizontal pixels contain imagery in the 2K DPX frame, resulting in 2010 usable pixels, versus 84.3% of the HD frame as measured from the left edge of the image to the beginning of the lens circle. This was calculated to yield in1619 usable pixels across the frame. The total useful extra pixels horizontally was calculated to be 391. Thus each frame of image contains 173,995 (391 x 445) extra pixels of resolution in the DPX frames versus the HD frames. The real question is whether or not the extra pixels will yield any information related to the theory that a secret service agent wielding an AR-15 accidentally fired the shot that killed President Kennedy.

Prior to the visit to Dallas, Menninger sent Weissman background information and supplied several images of interest. These became known as the "stick" images. Here is the double stick:



You will notice just to the right of the woman in the red coat's head, a pair of horizontal black lines. This image comes from the 12<sup>th</sup> frame of the Bronson film. There was also a single "stick" image, which comes from the 9<sup>th</sup> frame of the Bronson film:



This image appears to show something between the heads of the two secret service agents in the back seat of the trailing convertible.

These images came from the Bronson gallery posted on line by Kennedy assassination researcher Robin Unger at: <u>https://www.jfkassassinationgallery.com/index.php</u>, the specific gallery can be found <u>here</u>. The source of the Bronson frames is presumed to be the 2017 video posted by SFM, as noted in the press release issued shortly after the film was gifted, and can be found <u>here</u>. In the media notes at the bottom of the release the film was posted on YouTube at

this location: <u>https://youtu.be/PWvkgMDWf8s</u>. Searching that link now indicates that the video is unavailable as it has been reclassified as private.

Per an analysis done by Menninger, the Unger frame 9 is the same as the Bronson DPX frame 91985, and Unger 12 is the same as DPX frame 91993. As mentioned above the timing of DPX frame 91985 is just after the fatal shot, DPX frame 91993 occurring about a quarter of a second later. Thus it seems to be quite a coincidence that these images line up appropriately with the assassination timeline.

Without knowing the exact source of the Unger images, or how they were processed, it is difficult to determine exactly what the "sticks" are. They could be evidence that the secret service agent did have the AR-15 in his hands at the time of the fatal shot or they could just be a collection of video artifacts that coincidently form a shape similar to that of a rifle barrel. However having received both the 2017 and 2019 scans, an effort was made to try and replicate the work done by Robin Unger using those known files.

The following workflow was used in this effort:

- 1. The 2019 DPX files were loaded into Adobe Photoshop CC, 2019 edition.
- 2. DPX frame 91993 was enlarged and cropped, then saved as a JPG

Here is the result:



#### DPX 91993, same as Unger 12

Even though both images are from the same frame of the Bronson film, the DPX frame does not show the double sticks that the Unger frame does. However it does appear to be a bit sharper and has a well-defined film grain structure that is not present in the Unger frame. Here are the two images on the same page for easier reference:



Unger 12



#### DPX 91993

In addition to the lack of sharpness in the image and the less defined grain structure, the Unger frame also exhibits a number of digital compression artifacts in the green grassy area above the heads of the Secret Service agents, as exhibited by the lighter green vertical streaks, and the swirling patterns.

The same exercise was performed for frame 9:



Unger 9



#### DPX 91985

In this instance, it is clear that the DPX frame shows the heads of the two secret service agents in profile, but not much else. The shape in the Unger frame that might be a raised rifle, does not appear in the DPX frame. The DPX frame does have some grain clumping just above what appears to be the hair of the agent that was sitting closest to Bronson. Compression effects might be the cause of that shape appearing in the Unger version of the frame.

For the 2017 scan, the ProRes422.MOV file was also loaded into Photoshop, and the 2 second portion of the movie that was of interest was clipped from the full file, with frames 9 & 12 also then clipped from the 2 second clip. The individual file clips were then saved as JPG files, and magnified to look at the region of interest in each frame. Here are the resultant images:



ProRes422-Frame 9



#### ProRes422-Frame 12

Neither the single stick in frame 9 nor the double sticks in frame 12 appeared in either of the frames generated from the ProRes422 movie file. As previously noted the press release from SFM indicated that the 2017 scan was available on YouTube. SFM has now confirmed that the file posted on YouTube was not the ProRes422 but rather an H.264 encoded MP4 file, and made that source file available for this project.

This movie file named 2017.015.0001.mp4 was downloaded from the link supplied by SFM on December 9. The metadata on the mp4 file was reviewed and indicated that the file was created on June 27, 2017, while the metadata on the ProRes422 was created on June 22, 2017. SFM issued its press release notifying the public of the Bronson film gift on June 27, 2017, so it appears that the mp4 was created to enable viewing of the film via YouTube the same day. SFM confirms that their video department created the mp4 from the ProRes422 using Mpeg Streamclip <u>software</u>.

Upon viewing the mp4 movie file, the "double sticks" can be clearly seen in several frames of the video, as in this example:



As the images created from scanning the film to the ProRes422 do not contain the double stick images on them, the conclusion of the author is that they were created as part of the compression of the images when processing them using the Mpeg Streamclip software.

## CONCLUSIONS AND RECOMMENDATIONS

This investigation proved to be most challenging. The size of an 8mm movie frame, the inherent resolution of Kodachrome film, The location of Charles Bronson as he filmed the events of the day, his camera settings, the difference in the digitization efforts over the years, all had an impact. The overall goal of definitively answering the question of whether or not George Hickey accidentally fired the shot that killed President Kennedy remains unanswered in the opinion of the author of this report. However the overall results of the investigation are very interesting none the less. Let's look at some of the key questions and answer them individually.

- 1. Does the Bronson film show the fatal head shot?
  - a. The time frame of the 2 second clip filmed by Bronson as the motorcade traveled down Elm street definitely covers the period of time before and after that of the fatal shot. However no visual evidence of the shot can be discerned on the film. The comparison of the Zapruder film with the Bronson film confirms the timeline, but subsequent looks at extreme enlargements of the Bronson film frames does not show the obvious impact of the bullet that killed Kennedy like on the Zapruder film. Potential reasons for this include:
    - i. The location of Bronson as he filmed the events. He was on the opposite side of Dealey Plaza, which results in a view of Jacqueline Kennedy's back and head, which shields the view of the President.
    - ii. The fact that he was inadvertently using the wide angle lens on his camera rather than the telephoto lens, which resulted in the view of the Presidential couple being just a very small portion of the film frames.
    - iii. The small size of the regular 8mm movie frame. The standard dimensions for a regular 8mm movie frame was defined to be 4.5mm across by 3.3mm tall in the Society of Motion Picture and Television Engineers (SMPTE), the standards creating body. As with many 8mm cameras, this standard was loosely applied in the Keystone camera used by Bronson, however the imaging area extended into the area between the perforations.
    - iv. The "timing" of the shot relative to the frame rate of the camera.
      - The intermittent movement of a movie camera (the mechanism that advances the film) has a period of time where the "shutter" is closed. This allows for the film to be advanced without exposing the film. If this was not working properly, then the camera images would exhibit vertical smearing and multiple exposures within each frame. The images do not exhibit these movement artifacts indicating the camera was operating properly.
      - 2. The period of time when the bullet impacted the Presidents head was 0.43 seconds in the Zapruder film from the time the woman in

the brown coats foot was on the ground as she walked towards his car. This was calculated to have likely occurred between 5 or 6 Bronson film frames after the same frame in the Zapruder film.

- If the Bronson camera was actually operating at the 12 frames per second setting on the camera, the shutter might have been closed at the time the bullet struck the President.
- Extreme close-ups of both frames DPX 91983 (frame 5) and DPX 91985 (frame 6) show no obvious signs of the bullet striking the President.
- 2. Did George Hickey have the AR15 in his hands at or around the time of the fatal shot?
  - a. Kennedy assassination researcher Robin Unger captured frames from the 2017 video posted online by SFM. Extreme close-ups of those frames seem to show what could be a rifle being held by the Secret Service agents in the back seat of the trailing convertible.
    - Frame 12 of the Unger frames (DPX 91993) shows double horizontal black lines that could possibly be evidence of a rifle in the car. This would be a fraction of a second after the fatal shot occurred.
    - Frame 9 of the Unger frames (DPX 91985) shows what might be a rifle in the hands of the an agent in the car. This frame coincides with the fatal shot.
  - b. Extreme closeups of the DPX frames do not show the same lines as the Unger frames, but rather clumped grain patterns.
  - c. The clumped grain patterns do not necessarily mean that the film debunks the theory rifle in the hands of the SS agent, because it might just be that the film was not able to resolve the image of the gun clearly because it had reached the limits of its capability.
  - d. The DPX frames clearly show the SS agents in profile in the back seat, with the head of one agent appearing somewhat higher than the other. Neither appear to be standing, so it could be that the two agents were of significantly different heights, or that one of the agents was leaning down. Could he have been reaching

for the rifle at this point? Or perhaps he had slumped forward do to the sudden and unexpected breaking of the car by the driver. Nothing is conclusive based on the visual evidence provided by the scans of the film.

- 3. What were the results of the physical inspection of the Bronson film?
  - a. The film was in very good condition, with only typical wear and tear exhibited from the tail end of the film to a portion of the film before the 2 seconds of interest.
  - b. The portion of interest exhibited some minor scratching on the base, and a small "nick" on the emulsion side of the film on the next to last frame of the sequence as shown above. Both scans of the film show this damage, so it occurred at some point in time prior to the scans being made.
  - c. There was no evidence what so ever (unexpected splices or other damage) to indicate that the film had been modified or otherwise tampered with.
  - d. The magnifiers brought by the author were not able to sufficiently enlarge the image in order to see clearly the agents in the back seat of the car or verify (or debunk) the potential presence of the rifle in the car.
  - e. The photographs taken by the Sony digital SLR with the 30mm prime lens were also not able to adequately magnify the area of the agents. The best images to view the area of interest that shows the secret service agents are the 2 scans made from the film.
- 4. Is there anything else that can be done to try and "bring out" more details in the image recorded on the film.
  - a. There is a remote possibility that a higher resolution 4K scan (4048 pixels by 3112 pixels) of the film frames of interest could bring out slightly more detail, although 2K scans of 8mm film are generally considered to be more than enough to capture all the details that are contained by an 8mm film frame. The 2K scans done by Colorlab clearly show the film grain patterns, so additional scanning at 4K will not likely achieve a more satisfactory result.
  - b. Post processing of the DPX images using sophisticated software that utilizes image clarifying algorithms might yield interesting results. However this kind of approach will not be without controversy in its own right.

c. Viewing the areas of interest on the film with a properly lensed microscope might also bear fruit. Typically microscopes are designed to magnify subjects much smaller than even the portion of the film frame that shows the secret service agents or the Presidential couple. It might be possible with a lens specifically chosen for the proper amount of magnification needed to focus in on those areas and determine if there is anything else to see. However, in order to work properly, a microscope requires that the subject be firmly fixed in place on the scopes table. This does pose a risk of damage to the film if not done carefully.

#### ACKNOWLEDGMENTS

The author of this report would like to express his gratitude to all of the persons involved in the project. All were and continue to be extremely professional, and helpful to the author and contributed profoundly to the project effort.

Mike Hillman's effort to contact him after retirement from federal service bore fruit, and provided the introduction to Bonar Menninger. Bonar's ceaseless effort to try and determine the truth of that fateful day, and his passion for the project continue to be a source of great inspiration. Video Producer Douglas Maxwell Stone and Videographer P.H. O'Brien were an integral part of the team that traveled to Dallas, and provided intelligent and sometimes contrasting views of what happened in Dealey Plaza.

The staff of the Sixth Floor Museum continue to be helpful and gracious, in spite of being peppered with many emails both before and after the project teams Dallas visit. Stephen Fagin's support of the project effort was instrumental in providing access to the Bronson film. Lindsey Richardson was ceaseless in her effort to locate a safe space where the project team could inspect the Bronson film and in providing answers to many "in the weeds" questions. Mark Davies help in providing access to the actual scans of the film was instrumental in assisting in the analysis of the film. Megan Bryant's internal knowledge of the author's prior involvement with SFM helped provide much needed gravitas to his qualifications. A sincere thank you to all!