

FORENSIC ANALYSIS
METHODOLOGY OF INDIVIDUAL AND
SERIAL DIGITAL IMAGES FOR LAW
ENFORCEMENT

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Forensic image analysis came about as photography moved from old silver plate to newer “high speed” negative processes. Police departments began to use photography to identify criminals as early as the 1880s. By the turn of the twentieth century, crime scene photography was being used to record high profile cases such as the Whitechapel murders (1888).

WHITECHAPEL MURDERS

Mary Jane Kelly
murdered Friday,
November 9, 1888

Not all murder scenes in the White Chapel murders were recorded, but by 9 November when Ms. Kelly was found, it was an important tool, as it was felt juries would not understand the brutality of the crimes.



Single images can be used to:

- Identify witnesses to a crime
- Identify or reject suspects to a crime
- Identify spacial relationships between subjects
- Identify objects used in crime
- Identify victims

The still images are commonly used to identify suspects and to record crime scenes. The use of mug shots and crime scene photographs has become a common and accepted practice in law enforcement.

WITNESS IMAGES

The widespread ownership of photographic equipment has led to a massive increase in available data to police investigators, but also brought into focus the problem with poor quality images. Technology exists to manipulate images using digital tools. The courts have been wary to accept this, but have been coming around as television shows like *CSI: Las Vegas* make them more comfortable with the technology.

State of Washington vs. Hayden, 1995

Defense objected to the use of digital images, especially those digitally manipulated, in the case. The complaint was subject to a Kelly-Frye hearing, and the defense's complaint was judged unwarranted. This was upheld on appeal. With some significant caveats about professional handling, digital images may be used in court, even if they are subjected to some reasonable manipulation, as long as the images are not redacted, and chain of evidence is maintained.

A significant document for image presentation and manipulation guidelines in the FBI's *Draft Recommendations and Guidelines for the use of Digital Imaging Processing in the Criminal Justice System.*

FBI Standards for Image Manipulation

1. The original image is preserved.
2. The processing steps are logged when they include techniques other than those used in a traditional photographic darkroom.
3. The end result is presented as an enhanced image, which may be reproduced by applying the logged steps to the original image.
4. The recommendations of this (the FBI) document are followed.

Technical work is limited to:

1. Image enhancement
2. Image restoration
3. Image compression
4. Image analysis
- (5. Image Recovery)

Acceptability in Court Depends on:

1. Reliability
2. Reproducibility
3. Security
4. Discovery

The victim, suspect, your fellow officers, and the community deserve only the highest quality of work from you. Making the facts fit your desire for a conviction, or when working for the defense, for an acquittal, will ruin your career, the lives of the victims of the crime and their families, the life of the suspect, and the faith of society in your work.

- Single Images are mostly used for identification. They are ordinarily not useful in building an accurate and precise timeline, in identifying actions, or in finding relationships.

ATM SURVIELLANCE IMAGE

- This still image creates a positive identification of a subject, the victim's card, objects the subject owns, and shows a second actor (dark place in the back seat)



ATM SURVIELLANCE IMAGE

- This images does not say what happened before it was taken, or after it was taken. The people could have entered the car minutes before, ignorant of the crime.



ATM SURVIELLANCE IMAGE

- The image does connect the people with the crime of stealing and using another person's ATM card. The murder of that person is circumstantial.





AP & Dragon Models USA

After this image was posted on an Iraqi insurgent website, numerous family members recognized their loved one in the image. Identification can also mean rejecting fakes or false identification.



Reuters



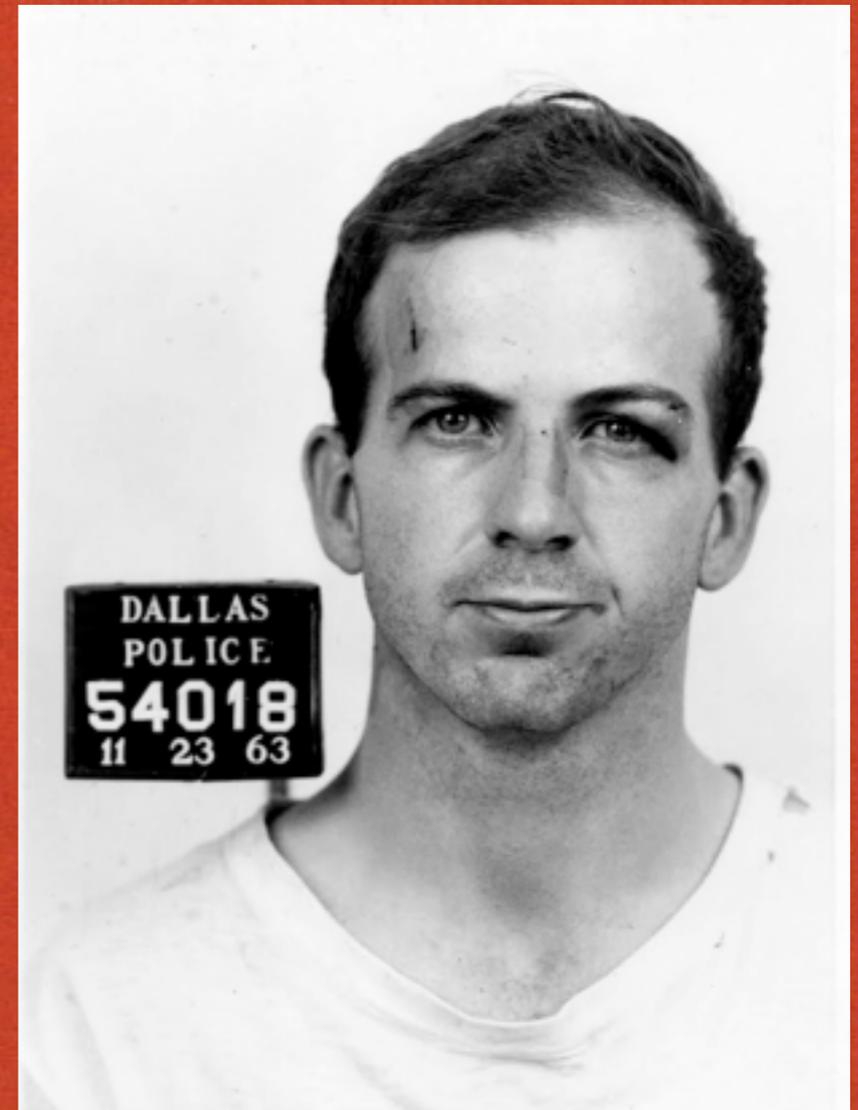
Reuters



Wikipedia

Image swirl used
to obscure a
child
pornographer, it
was easily
reversed

Image Comparison
allows identification
or rejection of
subjects.



In this case Lee Harvey
Oswald is positively
identified with his
photograph holding the
rifle used in the
Kennedy assassination

Serial images, including film and video, are images that have an identifiable time base. Unlike still images, they show events in relationship to each other. As such, they allow for accurate creation of timelines.

SPACIAL AND EPOCHAL

- Spacial: The Relationship between objects and subjects in space.
- Epochal: The Relationship between objects and subjects in time.
- Serial images such as video and film show both spacial and epochal relationships.

The Most famous serial image, and the one most often misused by amateur investigators, is the Zapruder film of the assassination of John F. Kennedy on 22 November, 1963. As the most complete film taken of the assassination, it usually forms the timeline of the assassination.

ZAPRUDER FILM DETAILS

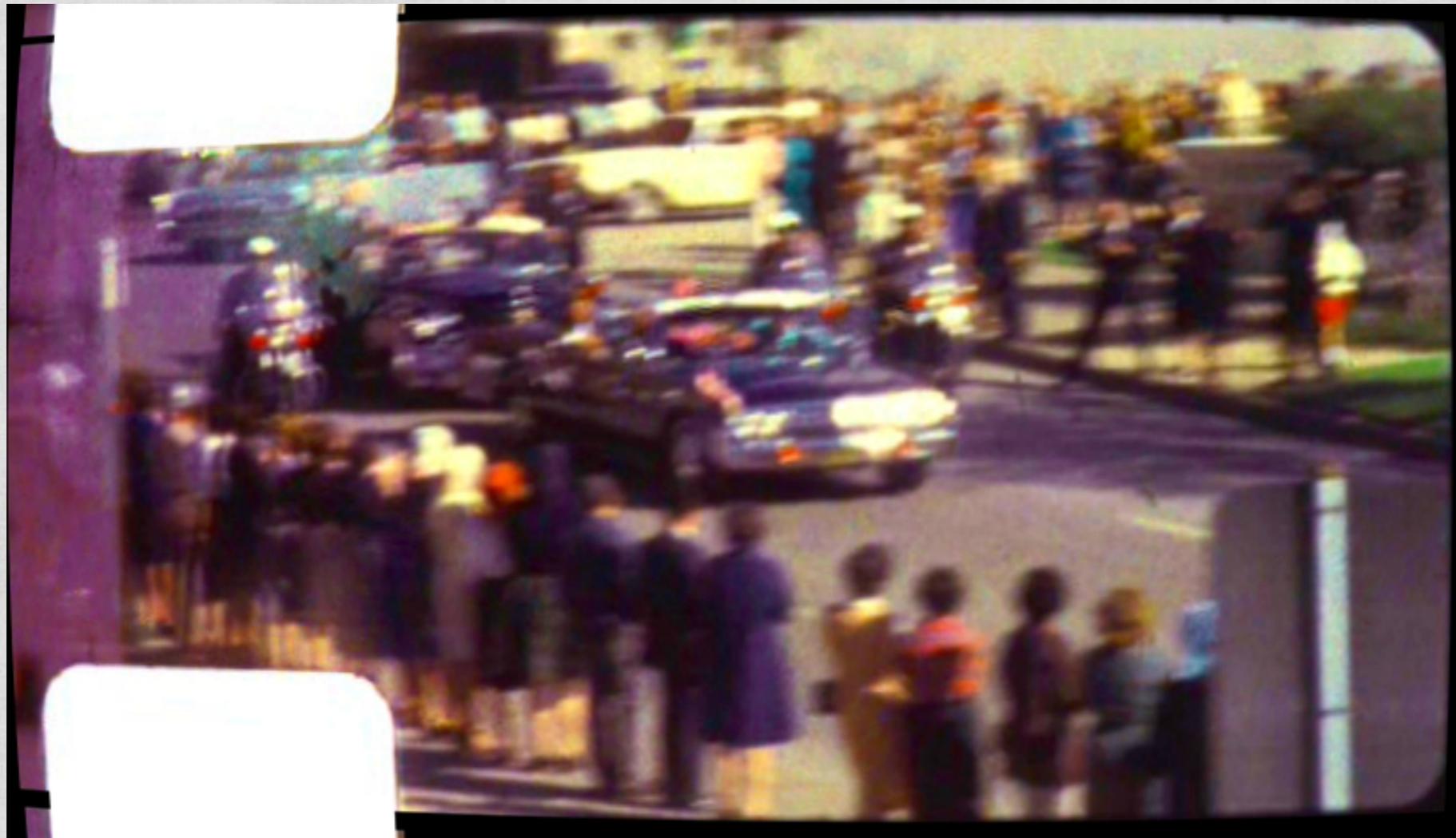
- Standard 8mm color film shot hand held using a model 414PD hand held Bell and Howell camera using Kodak Kodachrome II 8mm safety film.
- One of 32 known existing image series of the assassination. One of three films which show the final shot that killed President Kennedy.
- Camera produced 486 usable frames at 18.3 frame per second, for 26.6 seconds of evidence.

ZAPRUDER 140



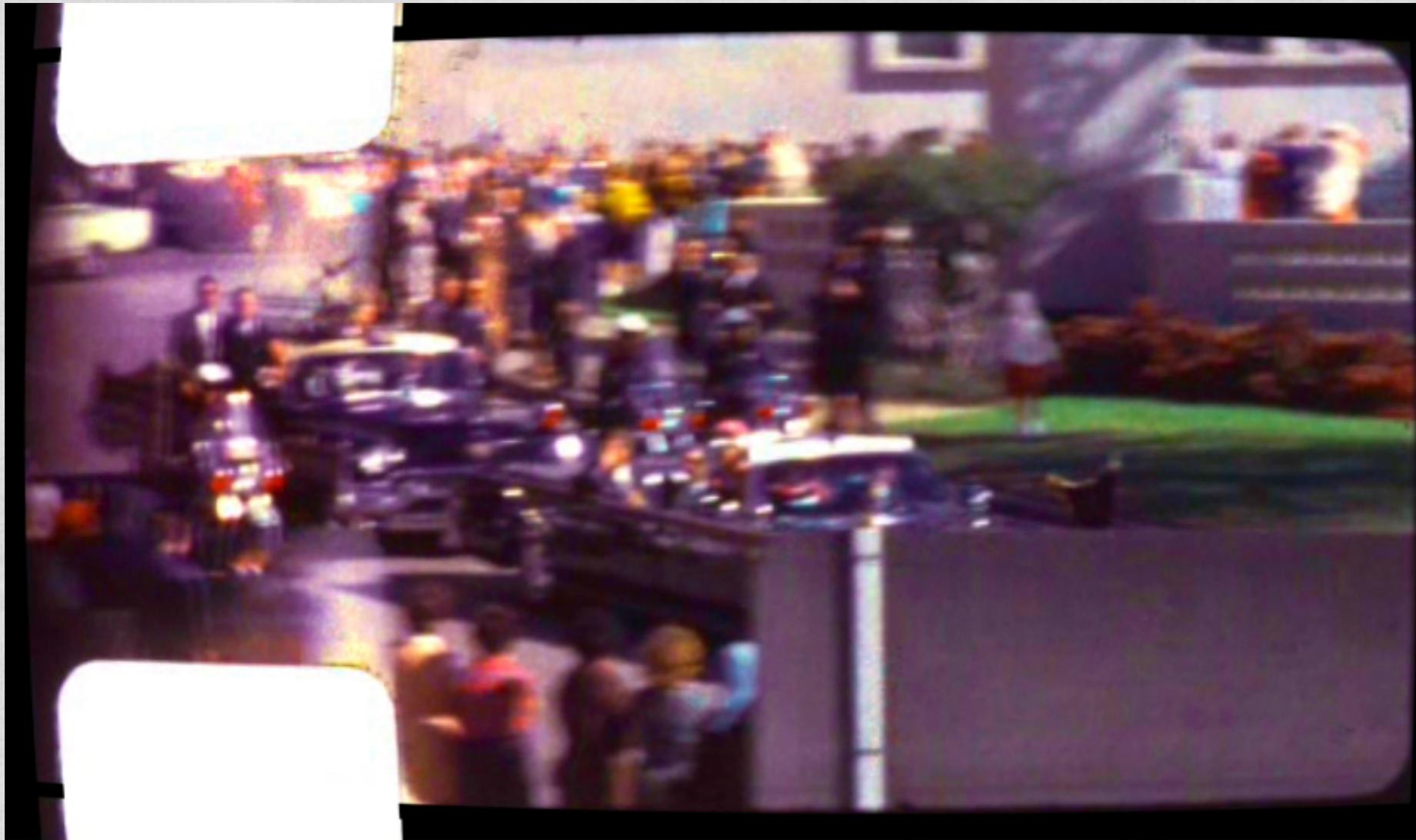
- Kennedy's limo turns onto Elm Street giving Oswald a shot from the book repository.

ZAPRUDER 158



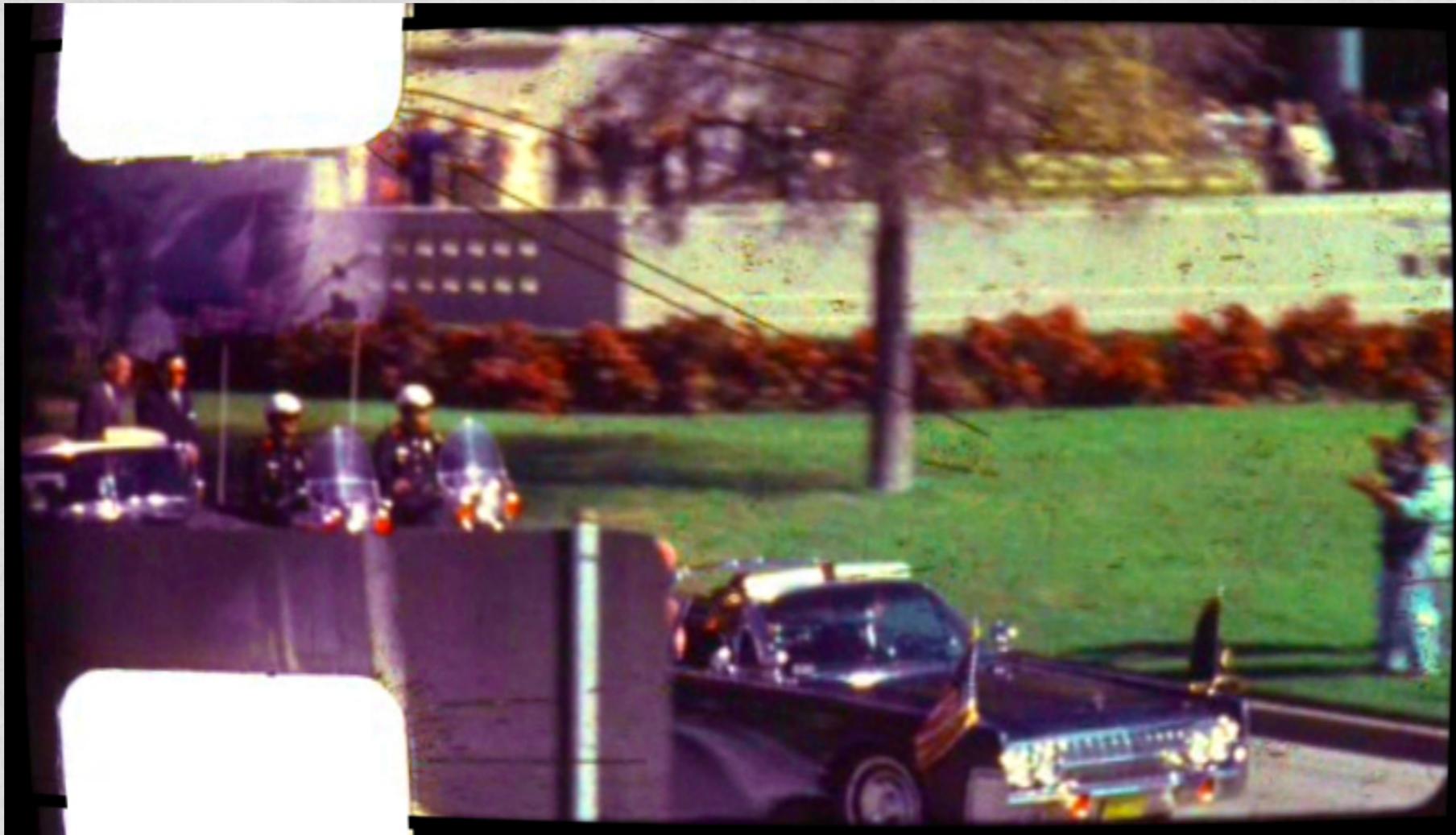
- Zapruder jerks his camera. This is likely the first shot made by Oswald. It misses, shrapnel from the round strikes a bystander.

ZAPRUDER 190



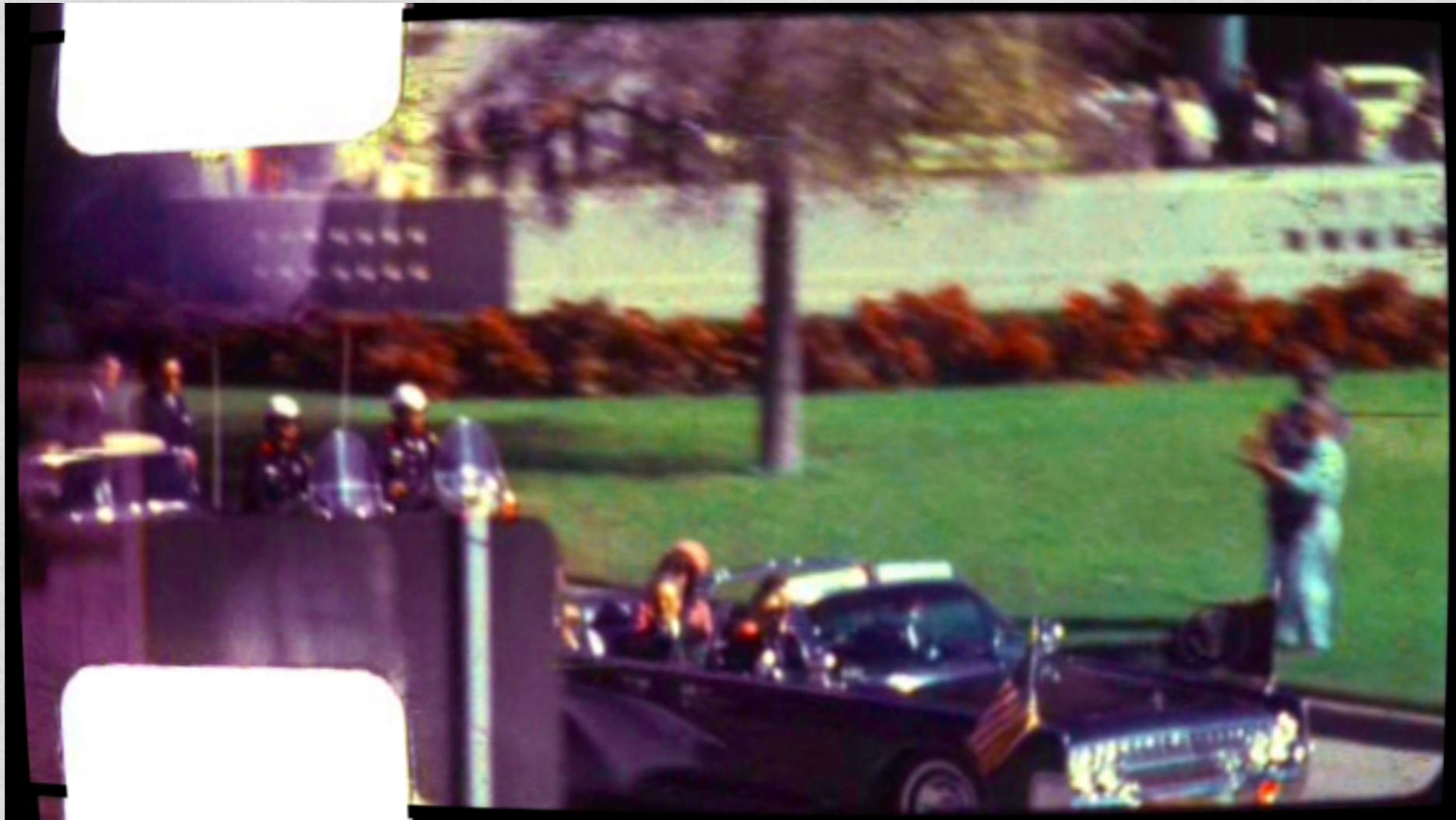
- Several people (such as Connolly) react to the popping sound of the first gunshot.

ZAPRUDER 220



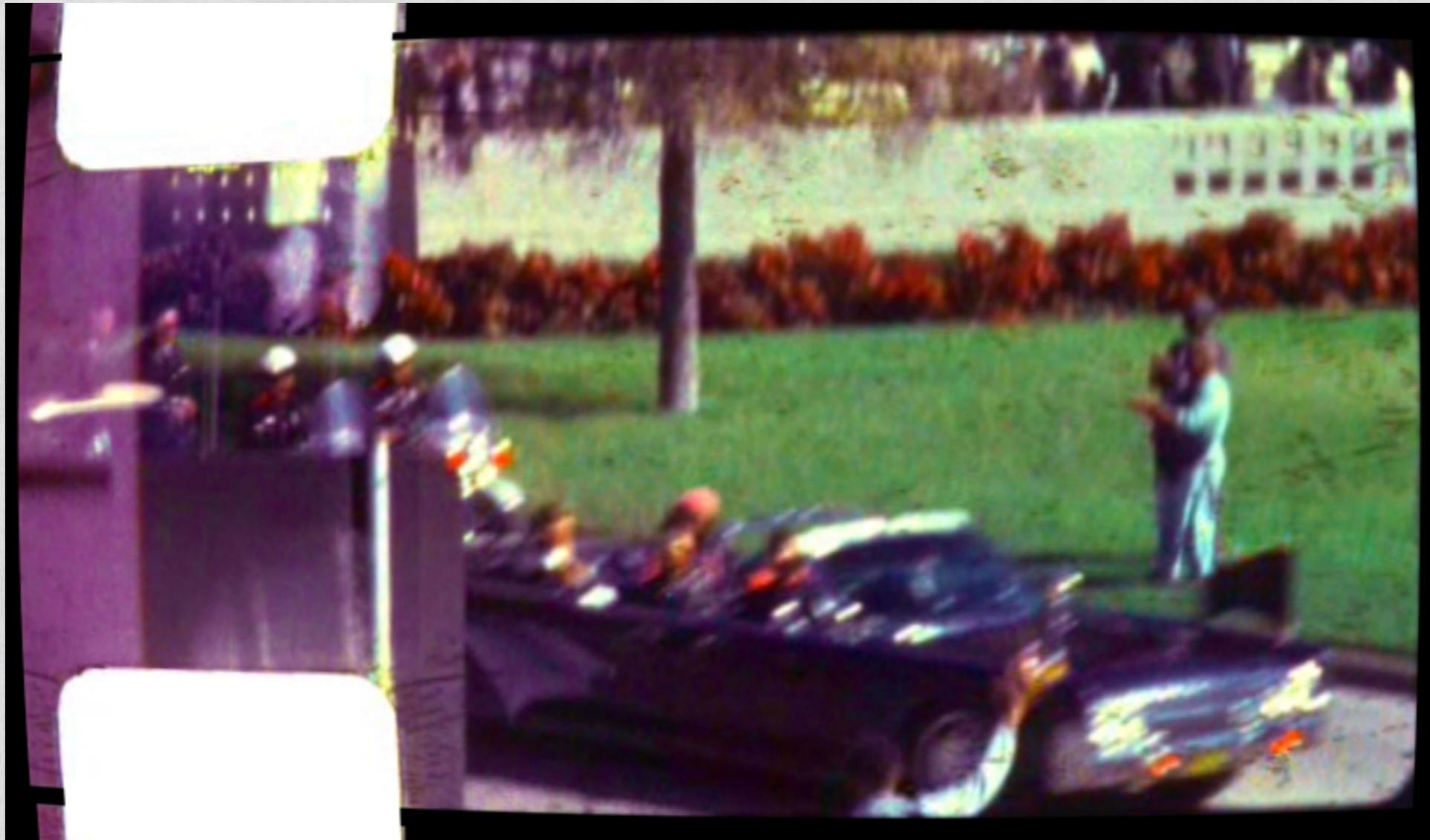
- Zapruder jerks a second time, representing Oswald's second shot which strike Kennedy in the upper back.

ZAPRUDER 224



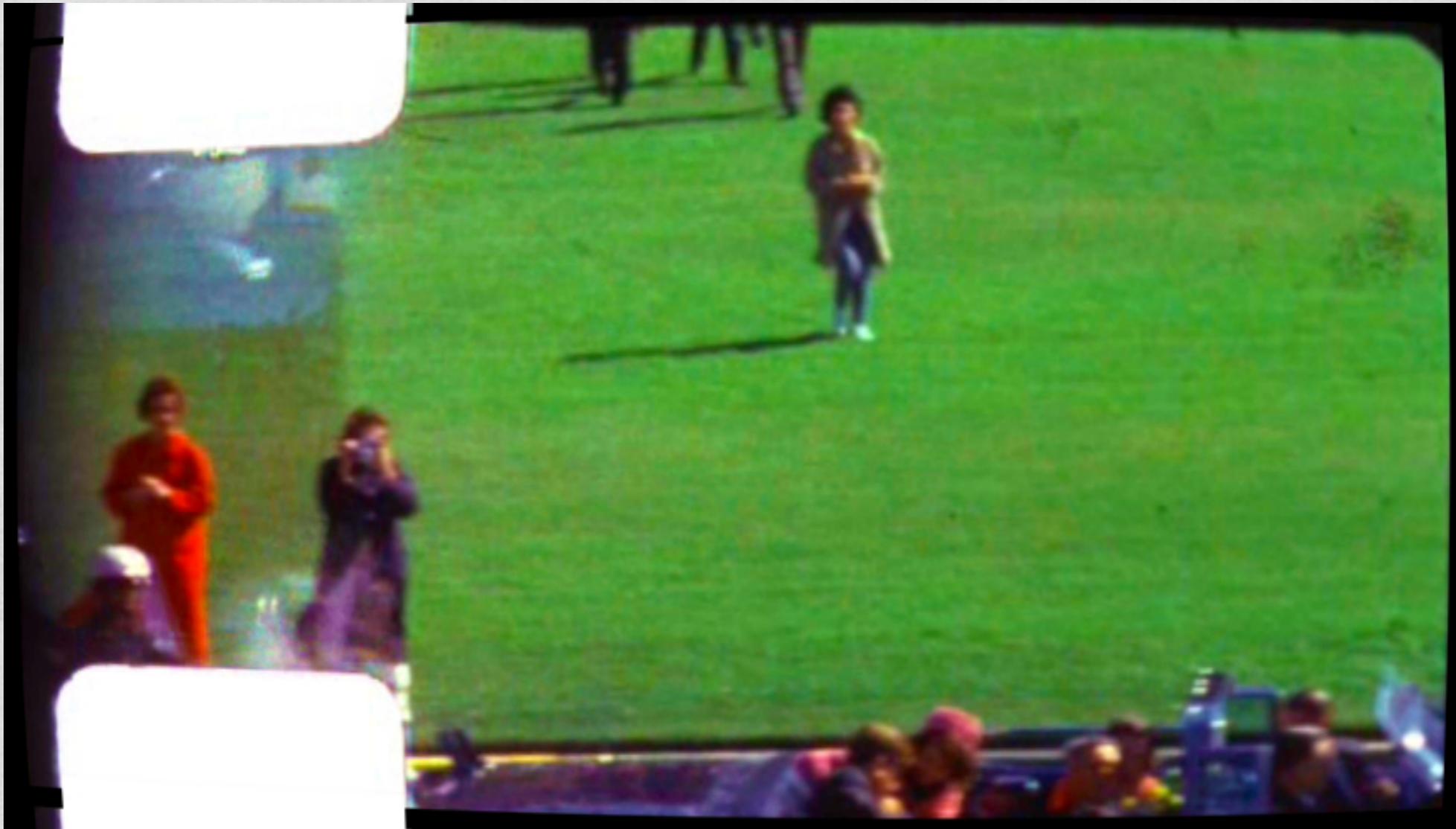
- Jackie Kennedy is seen reacting to shot two at Kennedy.

ZAPRUDER 227



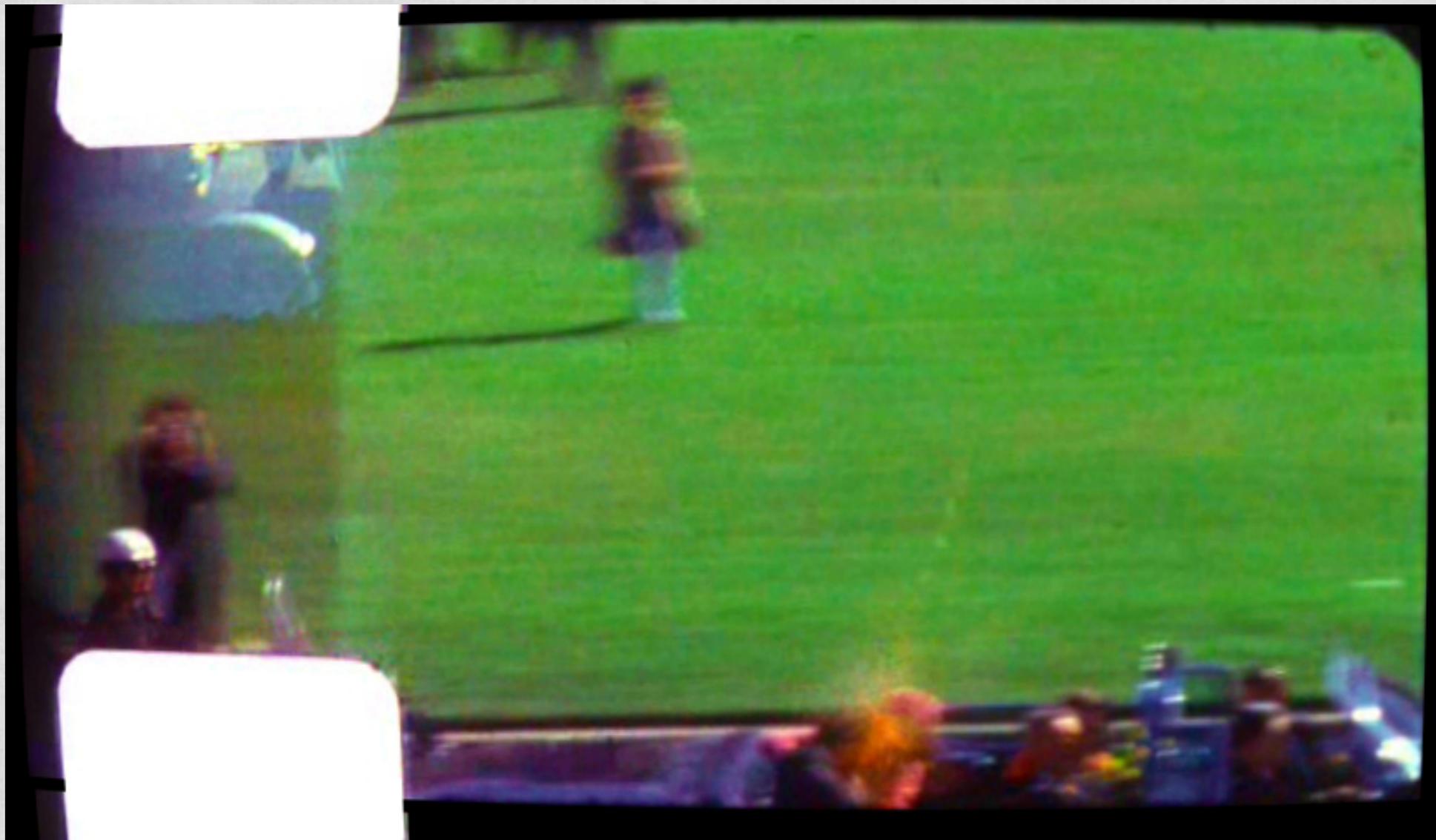
- President Kennedy enters Thorburn's position, Governor Connally reacts to collapsing lung.

ZAPRUDER 310

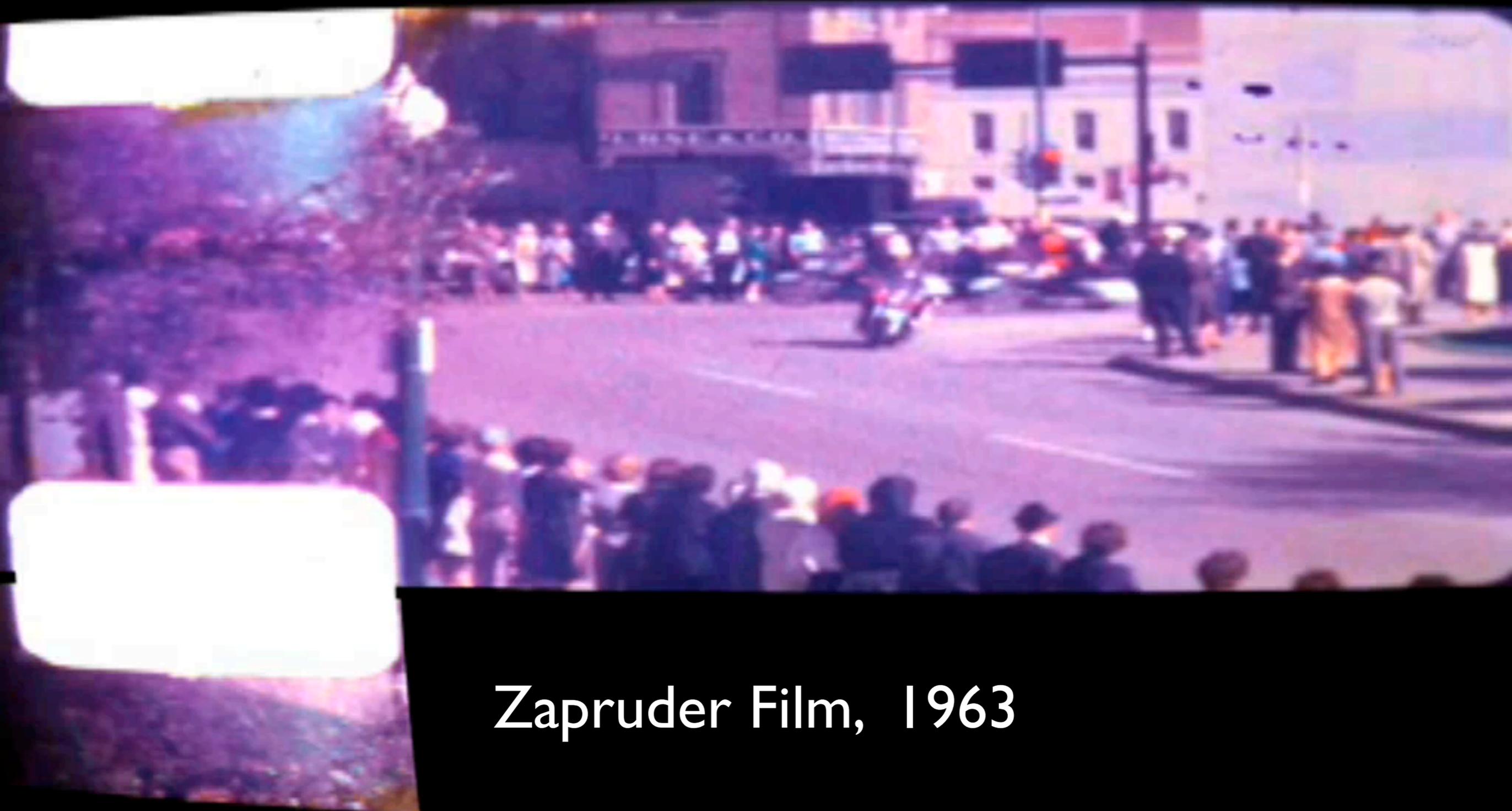


- Mr. Zapruder jerks for the third and last time, reacting to audible gunshot.

ZAPRUDER 310



- Fourth shot strikes and kills President Kennedy.



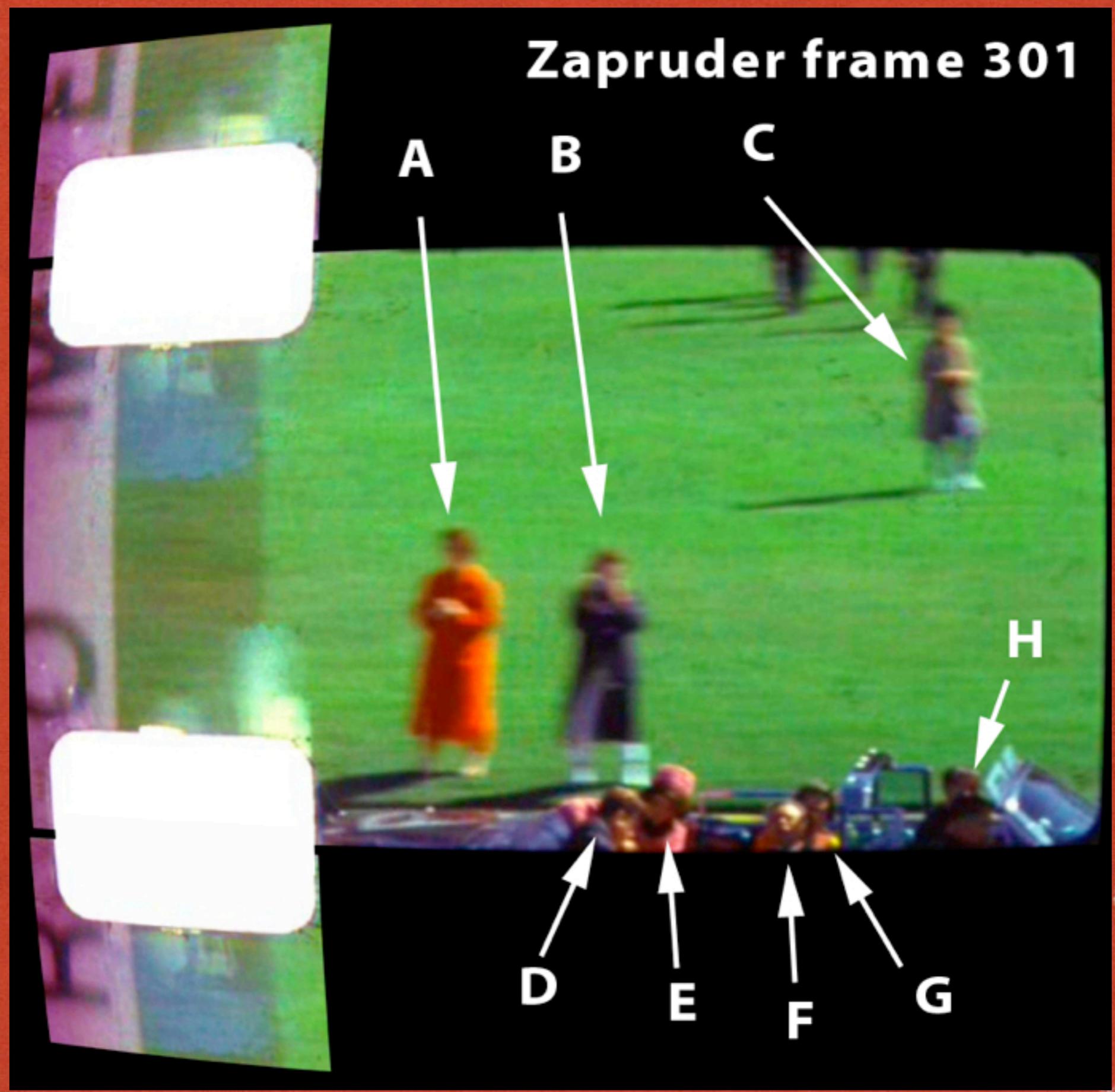
Zapruder Film, 1963

Zapruder frame 301

(A) Bystander
LOS but not
looking

(B)
bystander
with camera

(C)
bystander
with
LOS who is
looking



A

B

C

H

D

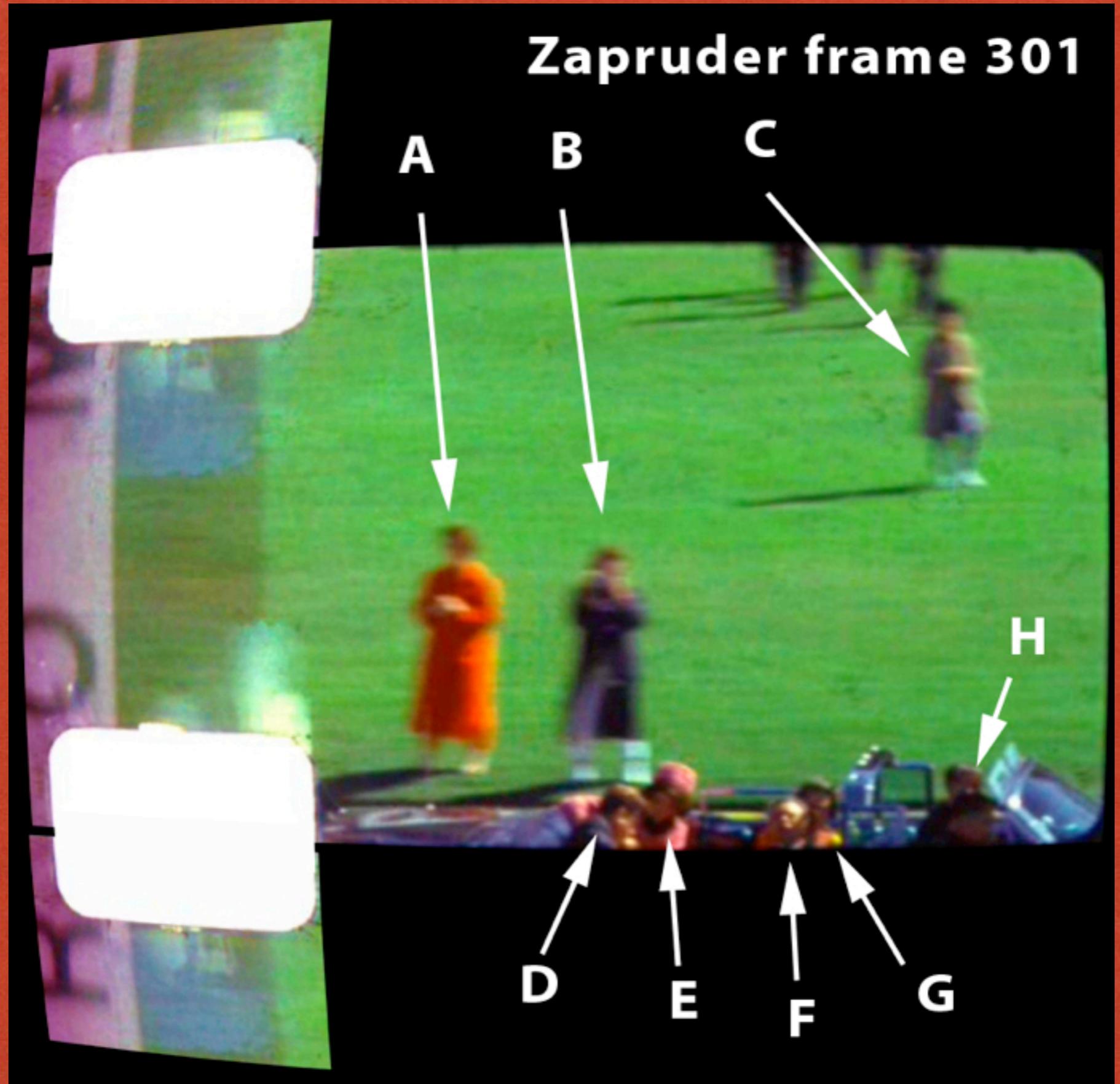
E

F

G

(D)
President
Kennedy
wounded
(in classic
Thorburn
position)

(E)
Ms. Kennedy
examines
President



(F)
Governor
Connally
wounded

(G)
Ms. Connally
holds
Governor
Connally

