

Report to the ARRB - President John F. Kennedy Assassination
Analysis of Selected Photographic Evidence

STUDY 1

Edge Print Analysis and Supporting Technical Information

Note: This Study corrects and updates the analysis of the Zapruder movie film and the Secret Service copy contained in the "Follow-up Report" 19 Dec. '96 to Mr. James Milch¹ referenced in the introduction and appended.

Objective:

Write a technical report on the exact meaning of the edge print and date-code found on the Zapruder films at the National Archives designated as "out-of-camera" original and the two first-generation Secret Service copies; and, address to the extent possible, what the edge and date codes, and unique numerical codes either punched into the films or photographically copied, reveal about each film's pedigree. (Per ARRB request)

Examination Dates: To gather data to fulfill ARRB's objective, Mr. James Toner, Image Science Resource Laboratory, Eastman Kodak Company, accompanied me to the National Archives, College Park, MD, September 8 and 9 1997.

Films Examined: With the cooperation of Mr. Douglas Horne of the ARRB, and Messrs. Alan Lewis, Charles Mayn and Steve Tilley of the National Archives, we photographically verified our visual examination of the Zapruder films edge print. Neither measurement of scene lengths nor documentation of specific scene content was made during our visit. The "Film Map", prepared by Mr. Horne of ARRB and provided to Kodak prior to our visit², was our accepted reference. The films examined were:

¹ See "Follow-up Report" 19 Dec. '96 to Mr. James Milch, appended.

² Received from ARRB, 21 Aug. 1997. Hand written and identified as Attachments 5, 13 and 14 (No date), copy appended.

- *Zapruder "Out-Of-Camera" Original* - an 8mm-movie film that had processing identification code perforated as number 0183 in 1963 and was the side two exposure of the double-8mm camera film³. The scenes on this half of the film contain a short test shot, the Kennedy motorcade and blank film. Mr. A. Zapruder's family pictures, representing all of the scenes taken on side one (the first half) of the camera roll, are assumed to have been returned to the Zapruder family.
- *Secret Service copy #1* - appears complete containing side one, the first half of the film, of Zapruder family pictures; and side two containing the second half of exposures - a test shot, the Kennedy motorcade and blank film. The processing laboratory perforated identification code was not retained. This copy contains a "print-through" photographic record of the processing identification perforated code number 0183 from the original film.
- *Secret Service copy #2* - had been cut and reassembled - apparently to provide "looping" to facilitate repeat examinations of selected scenes. It includes both the home movie scenes and the motorcade sequence but begins with the limousine traveling down Elm Street. The copy contains processing identification code perforated numbers 0186 and a "print through" photographic record of the processing perforated identification code number 0183 from the original. The emulsion orientation was the same as copy #1, however the print density was significantly lighter and a closer density match to the original. (See Study 3 for further comments on the printing parameters of the original movie film.)

³ A spool of 8mm camera film is supplied in 16mm width and run through the camera twice - first exposing one side (8mm wide) and then rethreading is required to expose the second half.

Part 1

Edge Print Examination of the Zapruder "Out-Of-Camera" Original 8mm Movie Film

Edge Print Code Synopsis⁴:

Edge print on the film showed the word KODACHROME II within a clear field, a machine code as thin vertical lines and dots (1.1:), "37" as 16mm slitler strip location, a vertical bar followed by two small solid triangles (**■▲**) and the word "S•AFETY".

The photographic edge print is added to the film as it is "finished" (slit, spooled and packaged) during manufacturing. A supplementary photographic edge print was also applied during processing to identify the laboratory providing the service. Numbers or letters are usually perforated in the film by the laboratory prior to processing to ensure identification of the customer and to match the processing order to the film.

Note: Kodachrome II is a direct reversal film such that the greater the exposure, the lighter the resulting density and an absence of exposure will yield maximum density. Thus edge print is light or clear within a maximum density area unless that area has been exposed to image or fog.

The Identification of Edge Print Markings:

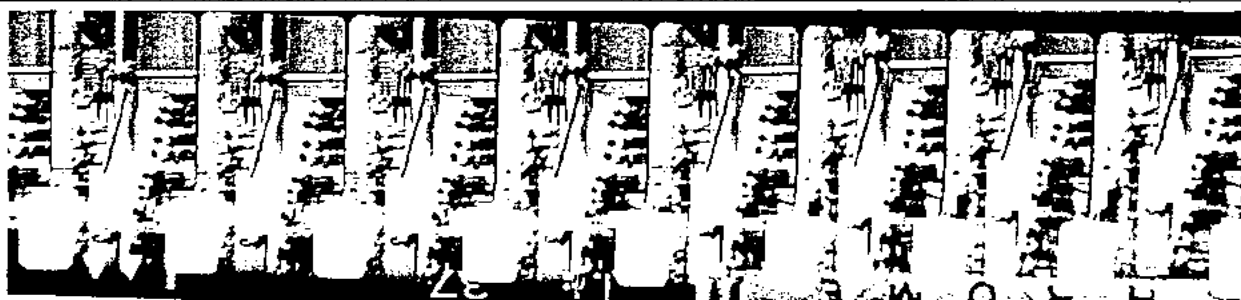


Figure 1-1 Manufacturing Markings on Zapruder "Out-of-Camera" Original Film Showing: Product, Machine, Strip and Date Markings

⁴ Caution: In the text of this report, words and symbols are used to reference specific edge print information. The symbols and font used are selected to appear similar, but are not identical to that found on the film.

Edge Print

Significance

KODACHROME II **Product Identification:** Kodachrome II within a clear field identifies the film type. (A daylight color reversal film ASA 25)

1.1: **Machine Code:** Identifies the slitting machine applying the edge print as machine #36.

Figure 2-1 Manufacturing Edge Print Markings Shown on Zapruder "Out-of-Camera Original"

37 **Strip Number:** Numbered during slitting as 16mm wide strip #37 of 83 strips slit from a standard width Kodachrome film stock roll.

▲▲ **Date Code:** Since 1916, Kodak has been using symbols to identify the year of manufacture of its film products. The symbols of two small solid triangles (▲▲)⁵ establish that the film was finished⁶ in 1961, the year Kodachrome II was introduced. The bar is not significant and may or may not be applied. It does serve to orient and aid in reading the symbols. The symbols may repeat every twenty years. Beginning in 1982 three markings were incorporated as the year symbol.

S•AFETY FILM **Safety Film:** If the film product is produced on a "safety base film", a slow-burning film as defined by meeting the test requirements of American National Standard ANSI PH1.25-1989⁷, the term *Safety or Safety Film* may be edge printed on the product. In fulfilling this accepted practice, Kodak adds a dot (•) within the word to identify the country of origin. The dot (•) following the letter "S" in "S•AFETY" indicates USA - Rochester manufactured film.

⁵ See *Eastman Professional Motion Picture Films*, KODAK Publication No. H-1, CAT 155 2280, Date Code Symbols, p48.

⁶ Finishing is the process applied to an emulsion coated stock roll to: slit, edge print, perforate and package in customer salable units.

⁷ American National Standards are reviewed and reaffirmed or revised every five years. An earlier version of ANSI PH1.25 was in effect in the 1960's.

Repeat Interval: The above manufacturing applied edge identification is printed on both sides of the 16mm strip so that it will appear in the perforated edge area of each half of the resulting 8mm after processing and slitting. The identification repeats at approximately 10¹/₂ inch intervals.

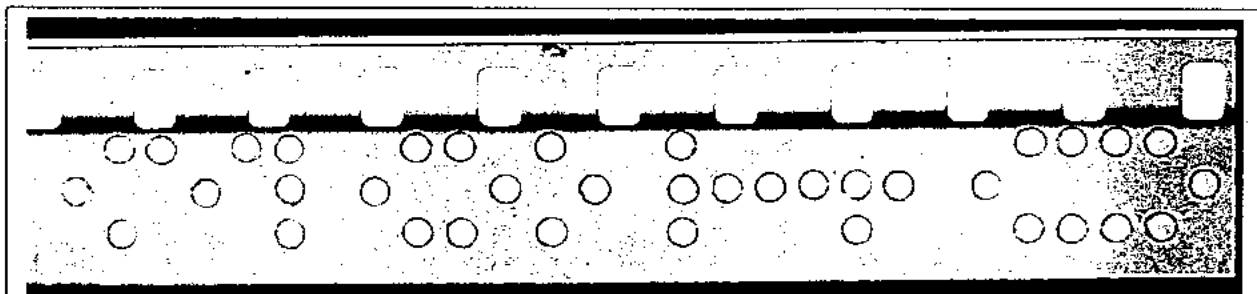


Figure 1-2 Processing Laboratory Perforated Customer's Identification Code. Perforated Number 0183 of the "Out-of-Camera" Original Printed-through onto Secret Service Copy 1. (Neg. 4526, frame 6) Also Printed-through onto Secret Service Copy 2. (Neg. 4527, frame34A)

Perforated Number: The Zapruder 8mm film was identified during processing with a number - 0183 perforated vertically within the 8mm width as a part of company standard practice for customer identification - a control system to match the processing request or order to the film. Typically it would be located at the core of the returned 8mm reel, thus placing after the scene exposed last - the customer tails end. (See Part 3 of this Study)



Figure 1-3 Print-through of Zapruder Original Processing Laboratory Identification onto Secret Service Copy 1. Note Manufacturing Edge Print of the Original is Behind the Processing Edge Print. (Neg. 4526, frame 9)

PROCESSED BY KODAK *Processed by:* No processing laboratory edge print was seen on the motorcade section of film we examined. The processing edge print: "PROCESSED BY KODAK • D NOV 63 (month and year)" did appear on the family scenes half of the original roll as evidenced by being printed through onto the Secret Service copies. (See Figure 1-3)

NOTE: Supplementary Photographic Documentation: It important that the reader of this Study be aware that all of the identified manufacturing edge print can also be seen in the perforation area of selected frames of the Zapruder original film published as exhibit 885 of the *HEARINGS Before the President's Commission on the Assassination of President Kennedy*, Executive Order 11130 and S.J. Res. 137, 88th Congress, Volume XVIII.

The exhibits that apply are:

Zapruder Film Frame Number	Page Number	Edge Print
173	2	part of KADACHROME II
171 and 172	1	part of KADACHROME II
301 and 302	64	part of KADACHROME II
299 and 300	63	part of KADACHROME II
295 and 296	61	date code
234	30	Machine Number
233	30	Strip Number
294	60	S*AFETY FILM

Copies of the identified pages are appended to this report.

Part 2

First Generation Copies of the Zapruder "Out-of-Camera" Original Film

According to the affidavits signed by Tom Nulty of Kodak Dallas Processing Laboratory and Frank R. Sloan, Manager of JAMIESON film company⁸, three KIIA copies⁹ were printed from the Zapruder "Out of Camera" Original by the JAMIESON film company¹⁰ onto 25 ft. camera rolls of Kodachrome IIA and were identified by laboratory perforation identification as 0185, 0186 & 0187 when processed by Kodak. (These may also be referred to as "first generation" reversal prints¹¹.)

Mr. A. Zapruder's letter¹² to Mr. C. D. Jackson of Life Magazine reveals he gave two copies to the Secret Service and one copy together with the original were sold to Time Publishing Inc., Publishers of Life magazine. It is documented that one of the copies was used by the FBI to print second or subsequent generation reversal prints and that Time Life Inc. made prints of the original. Two prints - identified, as Secret Service (first generation) Copies 1 and 2 - were available for inspection at the National Archives. The copy provided to Life Magazine of Time Publishing Inc. by Mr. Zapruder in 1963 was not available for examination at the National Archives.

Comments on the photographic quality of the prints are covered in *Study 3 - Initial Motion Picture Printing of the Zapruder 8mm Original Movie Film*

Secret Service Copy 1 Synopsis:

Secret Service Copy #1 - complete, (approximately 32 ft. prior to slitting) containing side-one, the first half of the film, of Zapruder's family pictures, and side-two containing the second half of exposures consisting of a test shot, the Kennedy motorcade and the balance, unexposed blank film.

⁸ Copies of these Affidavits are appended to this report.

⁹ It is the process of printing that produces "copies" of a film. Therefore the term "print" and "copy" may be used interchangeably throughout this report.

¹⁰ 1963 letterhead for the JAMIESON film company uses capitalization and lower case for the company name as shown.

¹¹ The KIIA camera film as the print medium was direct reversal. Therefore contact printing emulsion-to-emulsion was used without the need for an intermediate step. See Study 3.

¹² A copy appended to this report.

Manufacturing Edge print on the film showed the word KODACHROME IIA within a clear field, thin vertical lines and dots (1.1), "7" as slitter strip location, a vertical bar followed by a dot and a small solid triangle (I●▲) and the word "S●AFETY". (See Figure 1-4)

The Identification of Edge Print Markings:



Figure 1-4 Manufacturing Edge Print on Secret Service Copy 1, Motorcade Scene of the Original. Showing: Portion "KIIA" of Product Name, Machine, Strip, Date and Safety Film Markings. (Neg. 4526, frame 20)

<u>Edge Print</u>	<u>Significance</u>
KODACHROME IIA	Product Identification: Kodachrome IIA within a clear field identifies the film type. (A tungsten balanced reversal film of ASA 40)
1.1:	Machine Code: Identifies the slitting machine applying the edge print as machine #36.
7	Strip Number: Numbered during slitting into 16mm wide strips, #7 of 83 strips slit from a standard width Kodachrome film stock roll.
I●▲	Date Code: The symbols of a small dot and small solid triangle (I●▲) ¹³ establish that the film was finished ¹⁴ in 1963 ¹⁵ .
S●AFETY FILM	Safety Film: The dot (●) following the letter "S" in "S●AFETY" indicates USA - Rochester manufactured film.

¹³ Note: On the film, the dot and the triangle are the same height.

¹⁴ Finishing is the processing applied to an emulsion coated stock roll to; slit, edge print, perforate and package in customer salable units.

¹⁵ The twenty-year repeat of date symbols does not impact the establishment of 1963 as the year of manufacture. Kodachrome II was not introduced until 1961 and the date code was changed to three symbols in 1982. Also see previous footnotes.

Repeat Interval: The identification repeats at approximately 10¹/₂ inch intervals.

Perforated Number: A processing perforated number was not available to be photographed. Based upon the Kodak affidavits mentioned above, the number 0185 or 0187 (because number 0186 is found on SS copy 2) should have been included but may have been lost in the splicing or looping application.

PROCESSED BY KODAK Processed by: The processing edge print: "PROCESSED BY KODAK • D NOV 63 (month and year)" appeared on the family scenes half of the roll. This edge print was not on the motorcade - camera second half of the roll we examined (See Part 3 of this Study)



Figure 1-5 Manufacturing Edge Print on Secret Service Copy 1, Home Movies, Camera Side One Showing: Product, Machine, Strip, Date and Safety Film Markings and that Manufacturing Edge-Print appears on Both Sides of the Double 8mm-Film. (Note - Portion of Laboratory Processing Edge-Print also shown.) (Neg. 4526, frame 13)

Print Through Edge Print:

Synopsis: The footage number or edge-print area printed during the copying of the Zapruder original allows the reading of some "print-through" manufacturing and laboratory edge print contained on the original film. These appear only on the family half (Side 1) of the roll. Understandably the print-through sometimes appears superimposed and underneath the processing lab edge print. (See Figure 1-3) The print-through edge print shows the manufacturing identification of the Zapruder "Out-of-Camera" original identical to that reported in Part 1 as: KODACHROME II within a clear field, "37" as 16mm slit strip location, a vertical bar followed by two small solid triangles (▲▲).

The Dallas Lab processing edge print is also printed through and can be seen coincident with the processing edge print of the copy film in Figure 1-3. The laboratory perforated identification number, 0183 in the Zapruder original, was printed-through onto this Secret Service 1 copy as seen above in Figure 1-2.

The printed through information described above, reveals that the JAMIESON film company printer aperture setting was selected for picture only (settings for picture plus sound track area or sound track only were also available). In addition the printer had been modified from its original design to incorporate footage number printing at the printer sprocket or by a separate aperture. For details, see: *Study 3 - Initial Motion Picture Printing of the Zapruder 8mm Original*.

Secret Service Copy 2 Synopsis:

Secret Service Copy 2: Upon examination we found that the copy had been cut, spliced and reassembled. Our attention was focused on the part containing the Kennedy motorcade section - side two only of the Zapruder "out-of-camera" original. *As a personal opinion: The sections used and the heat damaged frames indicate that splicing, to achieve "looping", was used to facilitate repeat examination of selected scenes. Still framing without proper projector light source heat dampening was the probable cause of the damaged frames.*

Manufacturing Edge print on the film showed the word KODACHROME IIA within a clear field, thin vertical lines and dots (|·|), "26" as 16mm slitler strip location, a vertical bar followed by a dot and a small solid triangle (|●▲) and the word "S•AFETY".

The Identification of Edge Print Markings:

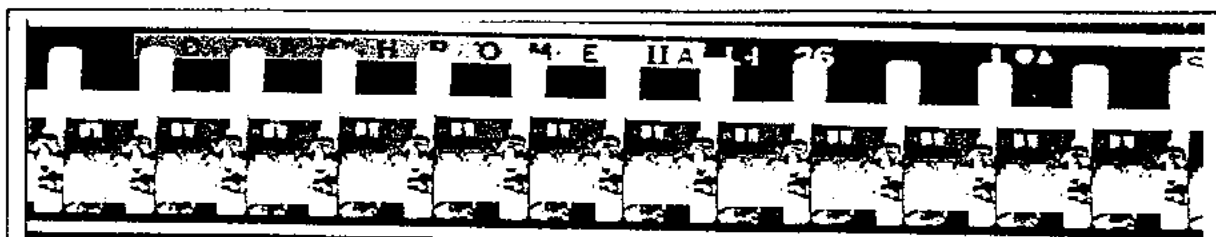


Figure 1-6 Manufacturing Edge Print on Secret Service Copy 2, Test Exposures Prior to Motorcade Sequence on the Original. Showing: Full Product Name, Machine, Strip, Date and Beginning of Safety Film Markings. (Neg. 4527, frame 23A)

Edge Print

Significance

KODACHROME IIA	Product Identification: Kodachrome IIA within a clear field identifies the film type. (A tungsten balanced reversal film of ASA 40)
1.1	Machine Code: Identifies the slitting machines applying the edge print as machine #34.
26	Strip Number: Numbered during slitting as a 16mm wide strip. #26 of 83 strips slit from a standard width Kodachrome stock roll.
I●▲	Date Code: The symbols of a small dot and small solid triangle (I●▲) establish that the film was finished in 1963.
S●AFETY FILM	Safety Film: The dot (●) following the letter "S" in "S●AFETY" indicates USA - Rochester manufactured film.
Repeat Interval:	The identification repeats at approximately 10 ¹ / ₂ inch intervals.
0 1 8 6	Perforated Number: The Dallas Processing Laboratory perforated number per referenced affidavits. (See introduction and Figure 1-7)

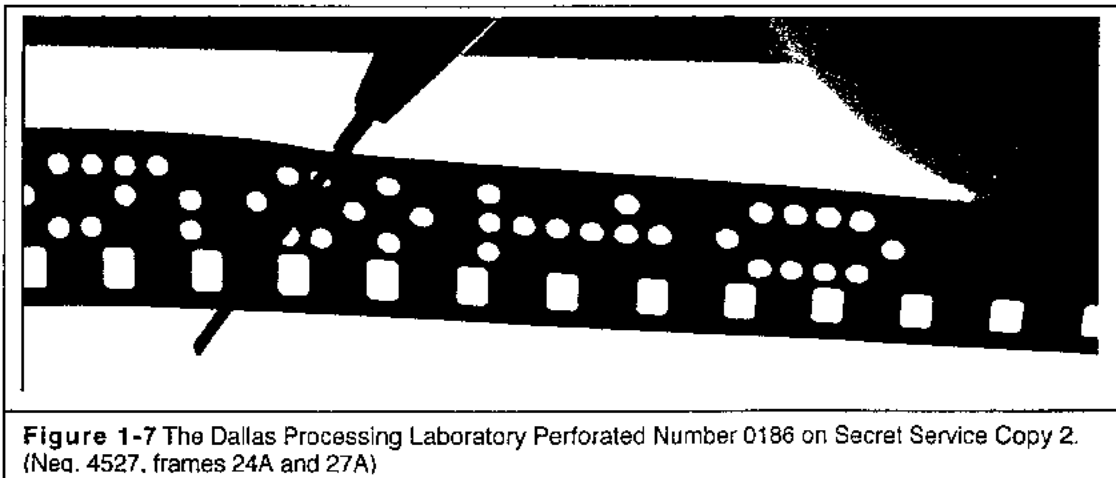


Figure 1-7 The Dallas Processing Laboratory Perforated Number 0186 on Secret Service Copy 2. (Neg. 4527, frames 24A and 27A)

PROCESSED BY KODAK Processed by: The processing edge print: "PROCESSED BY KODAK • D NOV 63 (month and year)" appeared on the family scenes - first half of the camera roll. This edge print was not on the motorcade second half of the roll. (See Figure 1-3 and Part 3 of this Study)

Print Through Edge Print:

Synopsis: There is no print-through of manufacturing edge print on the motorcade portion of Copy 2 because the edge print of side two of the original would have been located in the sound-track area of the 16mm printer aperture and this area was not selected by Jamieson's printer operator. For details, see: *Study 3 - Initial Motion Picture Printing of the Zapruder 8mm Original.*

Also, the laboratory identification number 0183 perforated in the Zapruder original was also printed-through onto this copy adjacent to the family scenes of side one. (See Figure 1-2 for reference)