

(536) 1. Two small areas of thermal damage resulting from a light source that was once held too close to the "anteroposterior" image. These were reported to be present on an observation report dated November 1, 1966, and validated by signature November 10, 1966. This report is in the National Archives.

(537) 2. In addition, the panel observed minor "staining" or discoloration of the images due to incomplete processing of the film in the developing process. This discoloration will continue to be more prominent with the passage of time. (199)

(538) Finally, the linear opacities associated with the postmortem X-rays have been said to be the result of manipulation. These opacities are normal grid lines from the grid used to eliminate "scatter fogging" of the images at the time of exposure of the films, and, therefore, represent normal images rather than evidence of manipulation.

3. FORENSIC ANTHROPOLOGICAL ISSUES

(a) *Introductory statement of approach*

(539) In the course of its investigation of the death of President Kennedy, the committee encountered several problems concerning the photographic identification of certain individuals either known or alleged to have been involved in the assassination. Upon the advice of other scientific consultants, it was determined that some of these problems fall within the purview of forensic anthropology, a relatively new discipline of the forensic sciences.

(540) Forensic anthropology is defined as the application of the physical anthropologist's knowledge of human variation to problems of legal medicine. As implied in this definition, forensic anthropologists, of whom there are fewer than 30 in the United States, are physical anthropologists who, by training and experience, are qualified experts in the medicolegal aspects of their science. The parent field, physical anthropology, is the study of man's biological variation in space and time. Any physical or physiological difference between human individuals and populations is of interest to physical anthropologists. Applications of their expertise range from the search and study of man's remotest fossil ancestors to helping design space suits for astronauts.

(541) For over a century physical anthropologists have measured the distances between specific anatomical landmarks of the human body in order to describe mathematically its variation in size and shape. To minimize error and insure repeatability, the measurements are made by trained anthropometrists with the subject positioned in a standardized pose. Size differences in body dimensions are reflected in the measurements themselves. Shape differences are defined by simple indices or by more complex multivariate methods. An index is ordinarily computed by dividing the smaller of two measurements by the larger and multiplying the result by 100 to eliminate the decimal. For example, the nasal index is computed as follows:

$$\text{Nasal Index} = \frac{\text{nose width}}{\text{nose length}} \times 100$$

From this, it can be seen that the nasal index provides some numerically expressed information about the shape of a given individual's nose. In a person with a short, broad nose, the index will be larger than in one whose nose is long and narrow.

(542) Although measurements are usually taken on living subjects; techniques to obtain accurate anthropometric measurements from photographs have also been developed. Nevertheless, such methods require elaborate equipment and extremely close control of the subject's pose, lighting, lens-subject distance, and other technical factors. Photogrammetric anthropometry generally also requires that the anatomical landmarks be marked on the subject in advance so that the distance between these points can be measured on the photograph.

(543) From time to time, forensic anthropologists are also asked to compare one or more photographs of crime suspects, disaster victims, or other unidentified persons to establish their identification. Usually, the photographs submitted for examination consist of casual snapshots, press photographs, studio portraits, passport pictures, or police "mug shots." Naturally, such photographs vary greatly in enlargement, camera angle, image clarity, lens-subject distance, lighting, and other factors that make direct comparison of measurements taken from such disparate photographs extremely difficult or totally impractical. For instance, an individual's nose width and length measured from a wallet-size identification photograph and a large studio portrait will be greatly different. Unless we know the exact degree of enlargement, type of camera, lens-subject distance, and many other technical features involved in making both photographs, meaningful comparison cannot be made between the nasal dimensions of the individual in terms of absolute size. Unfortunately, this kind of information is usually lacking on the types of photographs submitted for identification. In short, size differences cannot usually be studied in such analyses.

(544) Nevertheless, if two photographs are reasonably similar in camera angle—let us say, full-face—the ratio of nose width to length will be the same, or nearly so, in both photographs. Consequently, the nasal index, as defined above, can still be determined and meaningfully compared. This of course does not necessarily mean that the value of the index will be precisely the same from photograph to photograph of the same individual. Small variations in camera angle, lighting, facial expression of the subject, and measuring technique will introduce corresponding errors in the nose width and length measurements taken from the photograph, and these will be reflected as corresponding variations in the index values. Nonetheless, it is reasonable to expect the varying index values of the same individual to cluster within a reasonably narrow range.

(545) Of course, one does not rely upon a single index. Along with nasal width and length, a number of other facial measurements can be accurately taken from suitable photographs and pairs of these can be combined to produce other indices which describe other features of facial shape. Angles are also independent of enlargement factors and can be used for comparison. For example, from profile photographs one can measure the angle between the nasal bridge and the general facial plane and, in the same individual, it will be found to be fairly constant from one photograph to another. Thus, instead of only one or two indices or angles, several can be employed to add reliability to the com-

parisons. The term metric analysis is used to refer to comparisons based on numerically expressed variables such as angles and indices.

(546) The use of indices of this kind has not been refined to such an extent that a particular numerical result may automatically be considered indicative of a strong resemblance between two individuals, or that the same individual is, in fact, the subject involved in each case. Nevertheless, for general guideline purposes a mean deviation of five or less between the cumulative indices may be considered indicative of a strong physical resemblance.

(547) In addition to the analysis of metric traits by the use of such indices, there are certain other facial features which, although they cannot be conveniently measured or expressed numerically, are nevertheless very useful in photographic comparisons. This group of features vary considerably, but collectively can be called morphological (as opposed to metric) traits.

(548) An example of such a trait is the lowly ear lobe which, aside from providing a convenient place to hang earrings, seems to have no discernible purpose except to provide physical anthropologists with something to classify. Accordingly, a threefold classification of ear lobes as either free, attached, or soldered has been devised. Free lobes are those that are to some degree pendulous; in attached lobes the outside margins of the ears connect more or less directly to the side of the face. The soldered lobe is an extreme form of the attached type in which union of ear margin and cheek is so direct that there is no discernible lobe at all. Since ear lobe type can frequently be determined from photographs, the trait can be useful in identification.

(549) In addition to lobe type, there are numerous other structural features of the human ear that vary considerably from one person to the next. The total complex of these traits, while not as individually distinctive as fingerprints, are sufficiently unique to permit identification beyond reasonable doubt in many cases.

(550) Along with ears, the human face possesses an array of morphological features that, while difficult to measure, can be readily classified. The nasal tip can be elevated ("snub-nosed") or depressed, pointed or bulbous; the bridge of the nose, in profile, can be straight, convex or concave. Lips can be thick or thin; hair—straight, wavy, curly, or kinky, and so on. Also within this category are traits that are acquired by accident or age (or as Shakespeare put it ". . . through chance or nature's changing course untrimmed"). Among traits acquired during life may be included warts, moles, and other random blemishes, scars from accidents or surgery, broken noses, cauliflower ears, and other more or less permanent disfigurements. The inevitable loss of skin elasticity with age produces wrinkles and these networks of creases and furrows form patterns that uniquely characterize each human face. The comparison of traits that cannot be measured but only classified (as the ear lobe) or described as "present" or "absent" (such as a scar) constitutes the morphological analysis of the photographs in question.

(551) The forensic anthropologists serving as committee consultants were asked to deal with five specific problems of photographic identification:

(552) 1. *Authentication of JFK autopsy photographs and X-rays.*—Certain conspiracy theorists have claimed that the autopsy

photographs and X-rays are of a person other than the President. Is there scientific evidence that will support or refute this claim?

(553) 2. *The Milteer issue*.—Whether a certain man photographed in the line of motorcade spectators was actually one Joseph A. Milteer? Milteer (now dead) was a militant right wing activist who has been alleged to have had knowledge of a plot to assassinate President Kennedy.

(554) 3. *The three tramps issue*.—Shortly after the assassination, three men, described as derelicts, were apprehended by Dallas County Sheriff's officers in a boxcar on the triple overpass overlooking Dealey Plaza. These men were released without being formally identified. Could any of these men be certain individuals who some conspiracy theorists claim were involved in an assassination plot?

(555) 4. *The "Second Oswald" issue*.—Several assassination theories have been based on the speculation that Lee Harvey Oswald may, at one stage or another, have been impersonated by a double. Do the known photographs of Oswald support or refute this hypothesis?

(556) 5. *The Lovelady issue*.—Photographs taken during the assassination show a man standing in the doorway of the Texas Schoolbook Depository who bears a striking resemblance to Lee Harvey Oswald. Was this man actually Oswald or another Depository employee, Billy N. Lovelady?

(557) A review of the issues stated above shows that they were diverse in scope and therefore required an equally diverse approach in their resolution. Nevertheless, certain steps and procedures that were common to all may be briefly outlined here.

(558) 1. *Selection of materials*.—An initial step in all cases was a review of the available photographic materials and selection of those technically suitable for analysis. In some cases the selection was extremely limited. For example, because only one photograph of the spectator alleged to be Milteer was suitable for analysis, all comparisons with known photographs of Milteer had to be made against this single item. At the other extreme, dozens of photographs of Lee Harvey Oswald ranging in time from his Marine Corps enlistment to his arrest in Dallas were available for study.

(559) 2. *Measurements*.—Selected photographs were next processed for measurement. In some cases, measurements were taken from the unenlarged original photographs with a Bausch and Lomb measuring magnifier equipped with a calibrated metric scale. In others, measurements were taken from enlargements (made, when possible, from the original negatives) to the nearest 1.0 mm. All measurements were taken by one observer. Measurements reported here represent the mean of three trials.

(560) 3. *Computations*.—As noted previously, since enlargement factors were unknown, size differences—as represented by the raw measurements taken from the photographs—could not be meaningfully compared. Instead, indices were calculated between related measurement pairs. Wherever possible, landmarks, measurements and indices were selected that corresponded to those long standardized by physical anthropologists for facial anthropometry. Not all measurements could be taken from every photograph selected for study. For example, the various facial breadth measurements obviously could be obtained only from profile photographs. Even so, every effort was

made to obtain as many index measurements as possible for comparison. More detailed descriptions of data reduction and analysis will be provided in the sections dealing with the individual problems of photographic comparisons.

(b) Authentication of autopsy photographs

1. INTRODUCTION

(561) The anthropology consultants were asked by the committee to examine postmortem radiographs and photographs taken during the autopsy of President Kennedy at the U.S. Naval Hospital on Nov. 22, 1963, and, if scientifically possible, determine whether or not they were in fact those of the President. The approach to this problem was through the comparison of the postmortem X-rays and photographs with those known to have been taken prior to his death.*

(562) As noted previously in this appendix volume, the Kennedy assassination materials in the National Archives contain a series of negatives and prints of photographs allegedly taken during autopsy. The deficiencies of these photographs as scientific documentation of a forensic autopsy have been described elsewhere. (200) Here it is sufficient to note that:

(563) 1. They are generally of rather poor photographic quality.

(564) 2. Some, particularly close-up views, were taken in such a manner that it is nearly impossible to orient anatomically the direction of view.

(565) 3. In many, scalar references are entirely lacking, or when present, were positioned in such a manner to make it difficult or impossible to obtain accurate measurements of critical features (such as the wound in the upper back) from anatomical landmarks.

(566) 4. None of the photographs contain information identifying the victim; such as his name, the autopsy case number, and the date and place of the examination.

(567) In the main, these shortcomings bespeak of haste, inexperience and unfamiliarity with the understandably rigorous standards generally expected in photographs to be used as scientific evidence. In fact, in a criminal trial, the defense would probably raise many objections to an attempt to introduce such poorly made and documented photographs as evidence.

2. ISSUE

(568) Not all the critics of the Warren Commission have been content to point out the obvious deficiencies of the autopsy photographs as scientific evidence. Some have questioned their authenticity. These theorists suggest that the body shown in at least some of the photographs is not President Kennedy, but another decedent deliberately mutilated to simulate a pattern of wounds supportive of the Warren Commission's statements of their nature and significance. As macabre as this proposition might appear, the onus of establishing the authenticity of these photographs would have rested with the prosecution.

(569) With the above considerations in mind, the Committee requested the anthropology consultants to examine the questions sur-

*The discussion of postmortem X-rays is set forth in pars. 596-610 infra.

rounding the authenticity of the JFK autopsy photographs. Their inquiry was limited to determining the *identification* of the victim shown in the photographs. Other aspects of authentication concerning the possibility of technical alterations of the negatives and prints were undertaken by other photographic experts, as described elsewhere in this appendix. Questions concerning the description and location of the wounds and of their nature and significance, were considered exclusively by the forensic pathology consultants.

3. MATERIALS

Post mortem

(570) It has previously been recorded and the committee similarly found, that the autopsy materials in the National Archives, contain a total of 52 exposed transparencies and/or negatives. (201) These may be divided into two series: (1) 25 4 x 5 inch black-and-white and (2) 27 4 x 5 inch color negatives. The entire series is numbered sequentially beginning with the black-and-white series:

Black-and-white: No. 1-No. 25.

Color: No. 26-No. 52.

(571) Examination of prints of the total series revealed that most of the black-and-white negatives are virtually duplicates, in subject and view, to corresponding negatives in the color series. Consequently, our detailed analysis was limited to an examination of the color series. These items were in the form of high quality 8" x 10" prints specially prepared for the committee by a team of professors from RIT. Each print was identified by its original negative number. The entire series is described by subject in Table I.

Antemortem

(572) In order to compare the facial features of the autopsy subject with those of John F. Kennedy, a number of antemortem photographs of the President were examined. These were also furnished by the National Archives. Two of these (National Archives Accession Nos. 79-AR-6378G and 79-AR-8008K) were selected for a more detailed comparison since they show a full profile of the subject with his mouth slightly open, and in pose and camera angle correspond almost exactly with the full profile view of autopsy photograph No. 29.

4. CONCLUSIONS

(573) 1. The individual shown in the autopsy photographs is John F. Kennedy.

(574) 2. The brain shown in autopsy photographs No. 46-No. 52 cannot be positively identified as that of John F. Kennedy. Nevertheless, this brain displays trauma consistent with the known pattern of injury sustained by President Kennedy and, in the absence of any positive evidence to the contrary, there is no reason to believe that it is not the brain of the President.

5. ANALYSIS

(575) To examine the autopsy photographs from the standpoint of identification of the victim two hypotheses were considered:

(576) 1. That the subject shown in the photographs was not John F. Kennedy, but an unknown victim with a strong physical resemblance to the assassinated president.

(577) 2. That the victim in the photographs, in which the facial features are clearly visible, is in fact John F. Kennedy, but the body in which the face is not shown (particularly photographs No. 32 through No. 37 which document the location of the critical wounds of the back and head) is that of another, unknown, individual.

(578) In order to test the first hypothesis, it was necessary to compare the facial features of the victim in the autopsy photographs with antemortem photographs of President Kennedy. This comparison was made on the basis of both metric and morphological features.

(579) In making this comparison, it was first noted that there were no gross inconsistencies between the autopsy victim and general physical characteristics of President Kennedy. The victim is a well-nourished, dark-haired, middle-aged, white male who appears to be of northern European ethnic stock.

(580) The metric analysis was based on a comparison of autopsy photograph No. 29 with the two antemortem photographs (79-AR-6378G and 79-AR-8008K) selected from the National Archives series. The exact date of the antemortem photographs was not determined but both were made during the Kennedy presidency and therefore do not antedate the autopsy photograph by more than 3 years. All three photographs show the subject in nearly perfect facial profile; autopsy No. 29 and 79-AR-8008K are left profile and 79-AR-6378G is a right profile photograph.

(581) A series of 11 facial measurements were taken on each photograph. These measurements are defined in Table II and portrayed graphically in Figure IV-39. Measurements were recorded to the nearest 1.0 mm and made from 8" x 10" prints. Three sets of measurements were made on each photograph and the means were used to calculate the 10 indices given in Table III. The arrangement of President Kennedy's hair made it impossible to take physiognomic face height (mmt No. 1) in photographs 79-AR-6378G; otherwise, all the 11 measurements could be taken on each photograph.

(582) As shown in Table III, the index values of the autopsy photograph and the two antemortem photographs correspond very closely. For further comparison, the mean of the antemortem indices was compared with the postmortem values (represented by a single value in indices 1, 4, and 7 which are based on measurement No. 1 that could not be taken on 79-AR-6378G). The deviation between the antemortem and postmortem means range from 0.3 to 4.0 and the average deviation is 2.82 (Table III). This small deviation can be accounted for by a combination of several factors including that in the autopsy the subject is supine while he is standing erect in the antemortem photographs, and gravitational effects would cause some alteration of the facial features. The facial measurements would also be influenced by postmortem alterations and the effects of the massive cranial trauma. In short, the metric similarities, as expressed by facial indices are insignificant.

(583) In addition to the strong metric similarities between autopsy photograph No. 29 and the two antemortem photographs, a number of identical morphological features can be observed. The examination

of morphological similarities was not limited to the three photographs from which the measurements were taken but included comparisons between the other autopsy photographs that show the victim's face (No. 26, No. 27, No. 28, No. 29, No. 30, No. 31, No. 40, No. 41) and a series of 43 closeup photographs of President Kennedy selected from National Archives files to show his head and face from a variety of angles. In these comparisons, no inconsistencies in the morphological configuration of the eyes, nose, mouth, ears or other facial features were observed and, on the contrary, a number of identical features were apparent. These include rather distinctive traits such as the downward convexity of the nasal septum and an angular and elevated nasal tip (the latter, by the way, a trait observable in other members of the Kennedy family). Among similarities noted in the ears are a strong antihelix, small, "tucked" tragus, narrow intertragic notch and attached lobes. The lower margin of the helix is strongly concave at its junction with the lobe, giving the latter a rather attenuated appearance. Patterns of facial lines and wrinkles were similar where they could be discerned in the autopsy photographs.

(584) A partial list of morphological similarities between the autopsy subject and President Kennedy are shown in table IV. While they are simply listed in the table, each has a distinctiveness about it that impressed the examining anthropologists, both of whom have examined similar traits in a large number of human faces. Each of these traits, of course, can be separately observed in the general population. Nevertheless, the probability of their occurring together in a single individual is small. Their occurrence in two individuals with near-identical facial proportions, as expressed by the indices, is extremely remote.

(585) On the basis of the foregoing, it was concluded that the individual shown in the autopsy photographs that show the victim's face is beyond reasonable doubt, President John F. Kennedy.

(586) If it is accepted that the autopsy photographs showing the victim's face are those of John F. Kennedy, it then is necessary to examine the second hypothesis—namely that the remaining autopsy photographs are those of another person.

(587) Examination of table I shows that the entire series of 27 autopsy photographs can be grouped as follows:

<i>Groups</i>	<i>Negative Nos.</i>
1. Left lateral views-----	29, 30, 31.
2. Right lateral views-----	26, 27, 28, 40, 41.
3. Superior views-----	38, 39, 42, 43.
4. Posterior views-----	32, 33, 34, 35, 36, 37.
5. Cranial cavity-----	44, 45.
6. Brain-----	46, 47, 48, 49, 50, 51, 52.

(588) The photographs within each of the groups vary only slightly in camera angle, lens-subject distance, subject position, lighting and exposure. There is also sufficient commonality in morphological features and other details to leave no doubt but what they are of the same subject. Since we have concluded that photographs in groups 1 and 2 (showing the face) are those of President Kennedy, these features can be compared with features observed in the other photographs.

(589) From the standpoint of pathological interpretation, the least informative photographs are those of group 3, which provide a superior view of the head and shoulders. This is because the scalp has neither been shaved nor reflected from the cranium, procedures which would possibly have shown some of the crucial details of the cranial trauma. In these photographs, a portion of the victim's forehead and nose are shown from above. The configuration of these facial features are consistent with the nose and upper forehead contours of President Kennedy as surmised from the antemortem photographs taken from more conventional angles. Also, certain random features such as blood-stains and an apparent postmortem abrasion on the right shoulder (described in more detail below), which can be seen in the photographs of group 2, can be observed in this set of photographs. It was concluded therefore, that these photographs are of the same person as shown in groups 1 and 2 of the autopsy photographs; to wit, John F. Kennedy.

(590) The most critical set of photographs from the standpoint of identification are those of group 4 that show the head and upper back of the victim from behind. To take these photographs, the victim was apparently raised to a semi-upright position and held there while the pictures were taken from the head of the autopsy table. The purpose of these photographs was to document the scalp and upper back wounds, the exact location of which has been a matter of considerable controversy. In these photographs, the only facial features visible are the backs of the ears.

(591) In comparing these photographs with those taken in group 2, which show the right side of the head and face, several features common to both were noted. These include two dried blood stains on the upper right shoulder approximately 16 centimeters lateral to the midline of the back. Approximately 7 centimeters medial to these are a series of three narrow parallel marks approximately 3 centimeters in length, which appear to be slight skin abrasions. These marks and stains are situated several centimeters lateral to the back wound and do not appear to be directly associated with it. It is possible that they were made in the course of handling and lifting the body.

(592) There is also a 3- by 5-centimeter area of discoloration at the base of the neck in the right area that apparently represents either a slight contusion or some postmortem lividity. All of these features are very irregular in shape and would thus be very difficult if not impossible to duplicate. Such minor and random details are also the kind of characteristics that would likely be overlooked in any attempted hoax. Likewise, the hair, which is in disarray and matted with blood and body fluids, presents a complex of irregularly arranged strands and locks. Yet, allowing for the different angles of view, these features appear to be identical in size, location, and shape in both the posterior (group 4) photographs and those of the right lateral photographs of group 1, which can be identified as being of President Kennedy.

(593) In addition to the above rather transient features, others of a more permanent nature were noted. These were the network of transverse wrinkles extending across the back and side of the neck. Such lines develop in most individuals by middle age, but their exact arrangement forms a pattern that is virtually unique to the individual. Examination of these in the back photographs of group 4 shows that they are identical in pattern and development (again making allowance for view) as those seen on the lateral side of the neck in

the group 1 photographs. In short, the profusion of minute and common detail led the panel to conclude that the same individual is shown in both sets of photographs.

(594) The photographs of group 5, which show the cranial cavity with the brain removed, are somewhat more difficult to evaluate. One feature of interest is the outline of the fractured margin of the frontal bone that is partially visible in the foreground of these photographs. A deep V-shaped irregularity in this margin is also visible in photographs of group 1 in which the scalp is partially reflected to expose the underlying bone. The anterior margin of the cranial defects also corresponds in shape to the fractures observed in the cranial X-rays.

(595) From the standpoint of positive identification, the most problematical group of autopsy photographs are those of group 6 which show the isolated brain. Here the panel could find no anatomical features that would associate this brain with the remaining autopsy photographs. Nevertheless, the trauma to the brain, affecting primarily the superior aspect of the frontal lobes is certainly consistent with the pattern of cranial trauma observed in the X-rays and other autopsy photographs.

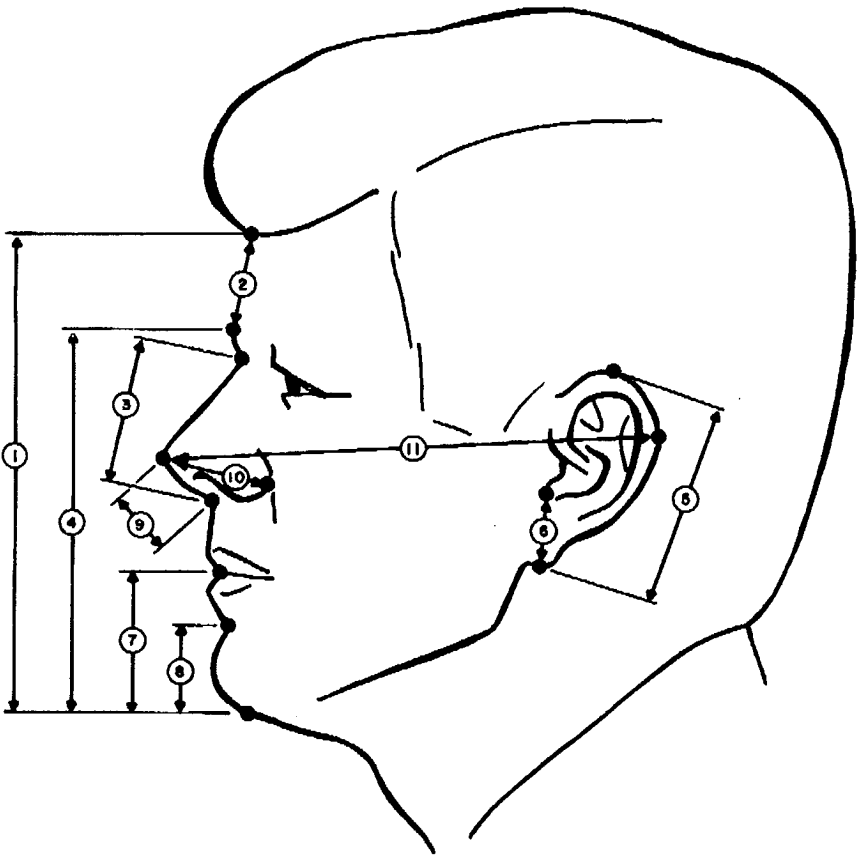


FIGURE IV-39.—Diagram of Measurements Set Forth in Table I.

TABLE 1.—*Description of autopsy photographs examined in authentication study*

Number		
26	Head, right lateral.....	} Superio-lateral view of head in quarter profile. Includes anterior neck wound, upper chest and shoulders.
27	Head, right lateral.....	
28	Head, right lateral.....	
29	Head, left lateral.....	} Profile view. Includes anterior neck wound. No. 30 overexposed.
30	Head, left lateral.....	
31	Head, left lateral.....	
32	Head, superior.....	} Superior view of head and shoulders.
33	Head, superior.....	
34	Head, superior.....	
35	Head, superior.....	
36	Head, superior.....	
37	Head, superior.....	
38	Upper torso, posterior.....	} Shows shoulder wound.
39	Upper torso, posterior.....	
40	Head, right lateral.....	} Inferio-lateral view of head in quarter profile. Includes anterior neck wound.
41	Head, right lateral.....	
42	Head, posterior.....	} Close-up of occipito-parietal area showing scalp wound.
43	Head, posterior.....	
44	Cranial cavity.....	} Anterio-superior views of cranial cavity. Brain removed.
45	Cranial cavity.....	
46	Brain, inferior.....	} Removed from cranial cavity.
47	Brain, inferior.....	
48	Brain, inferior.....	
49	Brain, inferior.....	
50	Brain, superior.....	
51	Brain, superior.....	
52	Brain, superior.....	

TABLE II.—*Measurements used to derive indices for comparison of JFK antemortem photographs with autopsy photographs No. 29*

1. Physiognomic face height.....Distance from the midpoint of the hairline to the lowest point on the chin (*trichion to menton*).
2. Forehead height.....Distance from the midpoint of the hairline to the most anterior point on the lower forehead just above the nasal root depression (*trichion to glabella*).
3. Nose length.....Distance from the deepest point of the nasal root depression to the junction point between the nasal septum and the upper lip (*subnasion to subnasale*).
4. Total face height.....Distance between the most anterior point on the lower forehead just above the nasal root depression and the lowest point on the chin (*glabella to menton*).
5. Ear length.....Distance between the uppermost point on the helix of the ear and the lowermost point on the earlobe (*superaurale to subaurale*).
6. Lobe length.....Distance between the lowest point in the intertragic notch and the lowest point of the earlobe (*intertragon to subaurale*).
7. Mouth height.....Distance from the point of contact between the upper and lower lip and the lowest point on the chin (*stomion to menton*).
8. Chin eminence height.....Distance from the point of deepest depression between the lower lip and chin and the lowest point on the chin (*supramentale to menton*).

9. Nasal projection-----Distance from the most anterior point on the nasal tip to the junction point between the nasal septum and the upper lip (*pronasale* to *subnasale*).
10. Nasal elevation-----Distance from the most anterior point on the tip of the nose to the posterior most point on the junction line between the nasal alae and the cheek (*pronasale* to *postalare*).
11. Total facial depth-----Distance between the most anterior point on the nasal tip and the posterior most point on the posterior margin of the helix of the ear (*pronasale* to *postaurale*).

TABLE III.—COMPARISON OF FACIAL INDEX VALUES OF ANTEMORTEM PHOTOGRAPHS OF PRESIDENT JOHN F. KENNEDY (79-AR-6378G, 79-AR-8008K) WITH LEFT PROFILE PHOTOGRAPH (NO. 29) OF AUTOPSY SUBJECT

Index (M/M×100) ¹	Antemortem			Postmortem (No. 29)	Δ ²
	79-AR-6378G	79-AR-8008K	Mean		
1. 2/1×100.....		27.0	27.0	30.7	3.7
2. 3/4×100.....	26.4	35.1	35.8	33.1	2.7
3. 8/4×100.....	21.4	21.1	21.2	18.1	3.1
4. 7/1×100.....		28.4	28.4	21.6	2.8
5. 7/4×100.....	37.1	36.8	37.0	33.8	3.2
6. 6/5×100.....	29.4	33.9	31.6	33.9	2.3
7. 5/1×100.....		41.2	41.2	37.5	3.7
8. 9/3×100.....	47.1	45.0	46.0	50.0	4.0
9. 10/3×100.....	60.8	61.5	61.2	63.6	2.4
10. 5/11×100.....	49.7	45.9	47.8	47.5	.3

¹ Numbers refer to measurements defined in table II.

² Absolute differences between mean of antemortem index and postmortem index.

Note: Mean deviation equals 2.82.

TABLE IV.—*Morphological similarities in both the ante mortem and post mortem Kennedy photographs*

Convex angle of nasal septum.	"Tucked" ear tragus.
Lower third of nose convexity.	Distinctive lip profile.
Nasal tip area elevated.	Identical facial crease lines.
Attached ear lobe.	Similar neck crease lines.
Strong ear antihelix.	

(c) Authentication of Autopsy X-rays

1. INTRODUCTION

(596) Human bone structure varies uniquely from one individual to another. The bones not only differ in their overall size and shape but also in their minute structural details so that the total pattern of skeletal architecture of a given person is as unique as his or her fingerprints. Forensic anthropologists have long made use of this fact in establishing the positive identification of persons killed in combat, aircraft accidents, or other disasters, by comparing X-rays taken before death with those of the unidentified body taken after death.

(597) Of course, just as no two individuals are alike, no two X-rays of the same bones of the same person are ever exactly alike because there is always some variation in the positioning of the subject, the X-ray technique, and the processing of the film. The skeleton also undergoes some remodeling throughout life so that a certain amount of variation in detail is to be expected in films of the same individual taken a few years apart. Nevertheless, with experience, these technical and age variations can be taken into account so that, given a pair of reasonably good films of the same person, posed in the same way, a

positive identification can nearly always be made even if the X-rays were made many years apart by different technicians using different equipment.

(598) In the following analysis the committee applied this method in comparing the post mortem X-rays said to be those of President Kennedy with clinical films known to have been taken prior to his death.

2. ISSUE

(599) Just as they have questioned the autopsy photographs, critics of the Warren Commission have suggested that the autopsy X-rays are not those of President Kennedy. The committee asked the anthropology consultants to examine the X-rays to determine if they are of the President.

3. MATERIALS

(600) Both ante mortem and post mortem X-rays examined were from the JFK assassination materials curated by the National Archives.

(601) The autopsy X-rays bear the case number "21296" of the U.S. Naval Hospital in Bethesda, Md. They include front and side views of the skull as well as a series of overlapping views of the torso and upper legs. There are also several X-rays of three skull fragments reportedly found in the Presidential automobile after the assassination.*

(602) In addition to the autopsy X-rays, the Archives collection includes three sets of clinical X-rays of President Kennedy taken at various times prior to his death. Two of these sets were made by personal physicians who treated the then-Senator Kennedy for an upper respiratory illness in August 1960. The earliest, dated August 14, bears the case number "202617" of Dr. Stephen White, 521 Park Avenue, New York. The second set was made 3 days later at the clinic of Drs. Groover, Christie, and Merritt of 1835 I Street NW., Washington, D.C., and bears the case number "336042." Dr. White's series consists of a side view of the head and a routine chest plate. Those from the Groover, Christie, and Merritt Clinic include side and front views of the skull. The third set of ante mortem X-rays were taken at the U.S. Naval Hospital in Bethesda on March 14, 1962, while President Kennedy was undergoing treatment for a back complaint. These X-rays consist of front and side views of the lower spine and pelvis. Hereafter, these three sets of ante mortem X-rays will be referred to as the "White," "Groover," and "Navy" films, respectively.

4. CONCLUSION

(603) Both the skull and torso autopsy radiographs, now in the possession of the National Archives, are X-rays of President John F. Kennedy.

5. ANALYSIS

(604) First the "Groover" and "White" ante mortem X-rays of the skull were compared with the autopsy films. In the front views, it was found that the outlines of the frontal sinuses of the autopsy X-rays

*A list of these materials is set forth at pars. 516-522 *supra*.

were virtually superimposable on those shown in the clinical X-rays. The sinuses, which are lobular air pockets inside the bone that forms the forehead, vary uniquely in size and shape from one person to another. This variability is seen particularly in the outlines of their upper margin which typically cast a set of scalloplike shadows on the X-ray. This scallop pattern is so individually distinctive that forensic anthropologists have termed them "sinus prints." For many years, courts of law throughout the world have accepted the matching on ante mortem and post mortem X-rays of the sinuses as evidence for the positive identification of unknown bodies. In the present case, the similarity in shape of the sinus print patterns in the ante mortem and post mortem films is sufficient to establish that they are of the same person on the basis of this trait alone.

(605) In addition to the sinus prints, several other strikingly similar anatomical features were observed in the front view X-rays. For example, the nasal septum—the thin wall of cartilage and bone that separates the nostrils—was deviated to the same side and to an identical degree in ante mortem and post mortem films. Also, the outlines of the bony rims of the orbits of the eyes were nearly identical. The very slight variations observed in these three features—sinus pattern, nasal septum, and orbital margins—are the results of minor differences in the way the X-rays were taken.

(606) The profile views of the skull in the White and Groover films were next compared to the autopsy X-rays. Again, a number of almost identical anatomical features were observed in the ante mortem and post mortem films. For example, the outlines of the *sella turcica* (the saddle-shaped depression in the base of the skull), the complex patterns of the cranial sutures (the joints uniting the bones of the skull), and location and arrangement of the vascular grooves (the shallow depressions on the inner surface of the skull which mark the course of blood vessels) were the same. There was also nearly exact duplication of the honeycomblike air cells of the mastoid bone.

(607) The chest X-ray taken by Dr. White in 1960, was next compared to those of the upper torso taken at autopsy. Again, a number of identical features were noted in both sets of films. Among these were the outlines of the dorsal spines of the thoracic vertebrae. (These spines are the bony projections that are visible just under the skin along the center of the back.) In X-rays these spines project a vertical series of small shadows of varying sizes and shape that, like the architectural features of the skull discussed above, are virtually unique in each individual. In shape these shadows may range from almost perfect circles to irregular trapezoids. They vary not only from one individual to the next but from one vertebra to another in the same individual so that the series of a dozen or so of these spines, usually visible in a standard chest film, form a combination of shapes distinctive for each individual. Allowing for slight distortions due to position and technique, this series of spines can be considered identical in the antemortem and postmortem films.

(608) In addition to the similar pattern of dorsal vertebrae spines, a number of other features common to both sets of film were observed. For example, the size and shape of the medial ends of the clavícula (collar bones) were identical, as was the pattern of ossification of the costochondral junctions of the first ribs. Numerous details in the form

and trabecular structure of the ribs could also be matched from one set of films to the other, particularly in the left eighth and ninth ribs which were especially well-defined in both films.

(609) The autopsy radiographs of the lower torso, including the pelvis and upper legs, could be compared to the antemortem Navy films taken in 1962. These also show an impressive number of osseous details in common. Of particular interest was the right transverse process of the fifth lumbar vertebra. In both sets of films it was displaced upwards in a manner suggestive of a congenital malformation or an old, ununited fracture.

(610) To summarize, the skull and torso radiographs taken at autopsy match the available ante mortem films of the President in such a wealth of intricate morphological detail that there can be no reasonable doubt that they are in fact X-rays of John F. Kennedy, and no other person.

(d) Comparison of photographs of Joseph Milteer with that of an unidentified Dallas motorcade spectator

1. INTRODUCTION

(611) An unidentified motorcade spectator who bears a strong resemblance to Joseph Adams Milteer, a militant right-wing organizer who is alleged to have been a possible coconspirator in the assassination, appears in the background of a photograph that was taken by Associated Press photographer James W. Altgens less than a minute before the assassination occurred. (202) The presidential limousine can be seen passing the Dal-Tex building on Houston Street just before the vehicle turned south onto Elm Street in front of the Texas School Book Depository Building. The spectator in question is seen standing on the east side of Houston Street, just beyond the limousine. He is a white male appearing to be about 60 ± 10 years of age. Immediately to his right is a taller man wearing a dark hat, coat and necktie. (See figure IV-40, JFK Exhibit F-124).

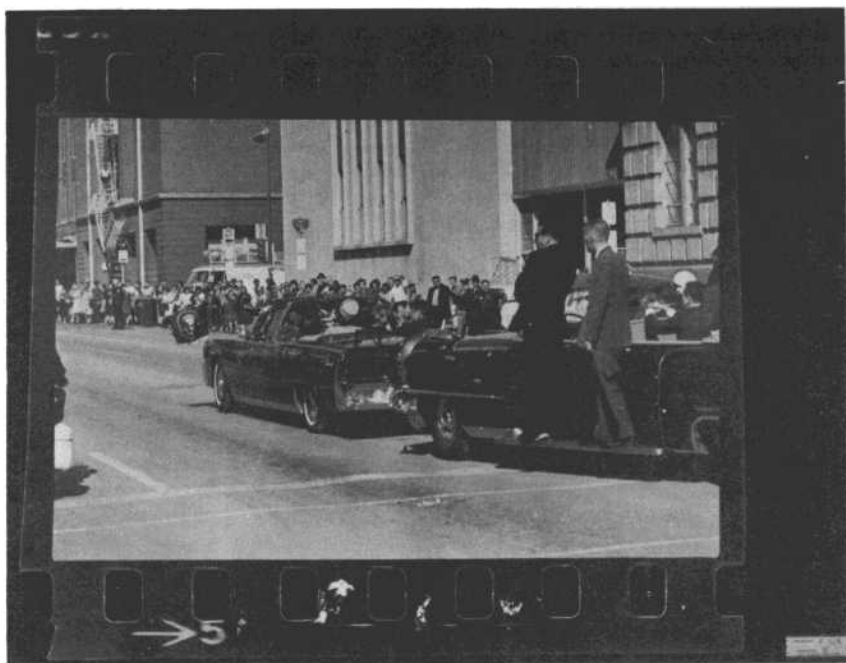


FIGURE IV-40.—Altgens 1-5 photograph taken on Houston Street.

(612) Milteer's possible involvement in the assassination was first brought to public attention by Harold Weisberg, the author, who described a taped conversation that allegedly took place in Miami, Fla. 13 days before the assassination between Milteer and a Miami police informant, Willie A. Somerset (both now deceased).⁽²⁰³⁾ During the taped discussion, a voice identified as that of Joseph Milteer says that a plan to kill the President is "in the working" and describes how the President could be shot "(f)rom an office building with a high-powered rifle."⁽²⁰⁴⁾ FBI documents describe subsequent interviews, both with a "reliable informant,"⁽²⁰⁵⁾ relating further incriminating comments by Milteer regarding the events of the assassination,⁽²⁰⁶⁾ and with Milteer, who denied any involvement.⁽²⁰⁷⁾ These FBI documents were retained in the Warren Commission files, but the Commission is said not to have investigated this matter further.⁽²⁰⁸⁾

(613) Assassination critics raise the possibility that Milteer was an active participant in a conspiracy and present in Dealey Plaza at the time of the assassination as evidenced by the Altgens photograph.⁽²⁰⁹⁾ The man the critics claim is Milteer also appears in a few frames of the Bell, Nix and Muchmore motion picture films.

2. ISSUE

(614) By comparing known photographs of Milteer with photographs of the motorcade spectator in Dealey Plaza, is it possible to determine whether the spectator, in fact, is Milteer?

3. MATERIALS

(615) (a) The photographs of Joseph Milteer consist of the following items:

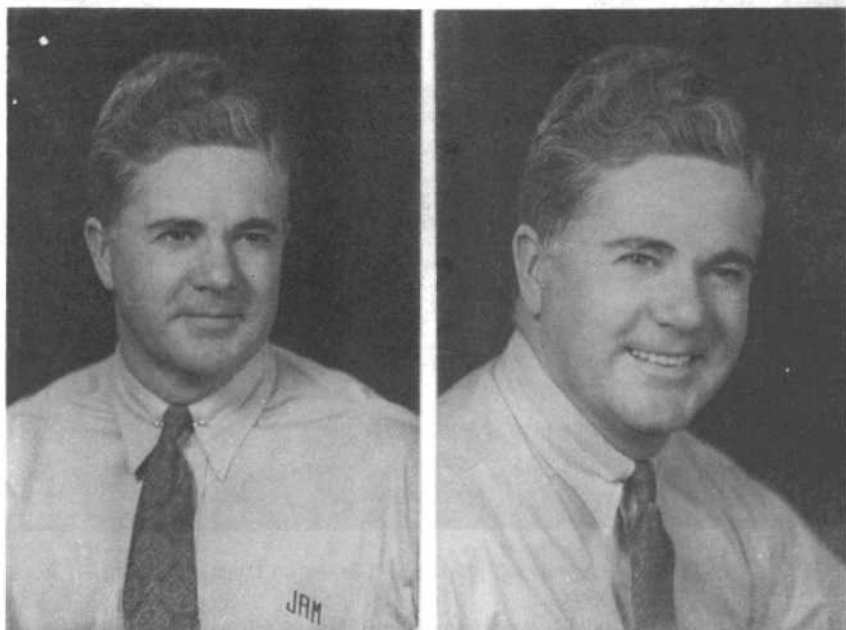


FIGURE IV-41.—Undated studio photographs of Joseph Milteer.

Figure IV-41.—Two undated 5 x 7-inch black-and-white studio portraits stamped "Modern Studio, 219 W. Adams Street, Jacksonville, Florida." In these, the subject appears to be about 40 ± 5 years old. As Milteer was born in 1902, these photographs probably date from the 1940's or early 1950's.

Figure IV-42.—A 3 x 3-inch snapshot of Milteer seated in a chair. A 1957 calendar appears in the background.

Figure IV-43.—A 3 x 4-inch black-and-white photograph. This photograph is undated, but judging from the subject's apparent age is obviously later than Figure IV-41 photographs and probably also later than figure IV-42.

Figure IV-44.—A 3.5 x 5.5-inch black-and-white photograph of Milteer standing beside an unidentified elderly woman. It is undated, but is said to have been taken in the early 1970's when Milteer was about 70 years old.

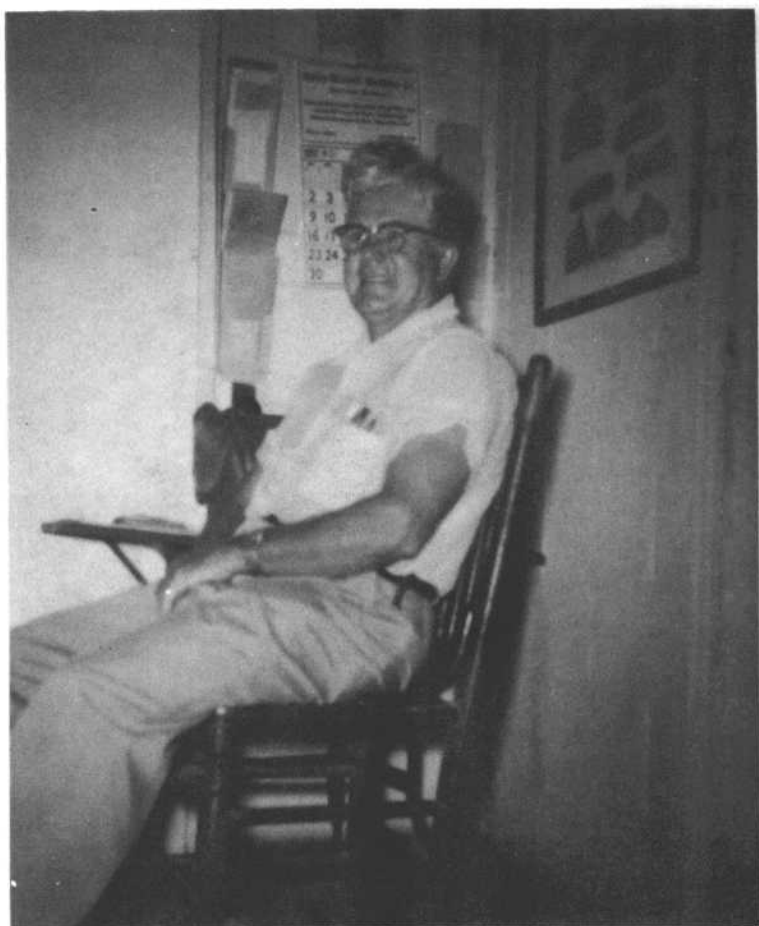


FIGURE IV-42.—Color snapshot of Joseph Milteer. Note 1957 calendar in background.

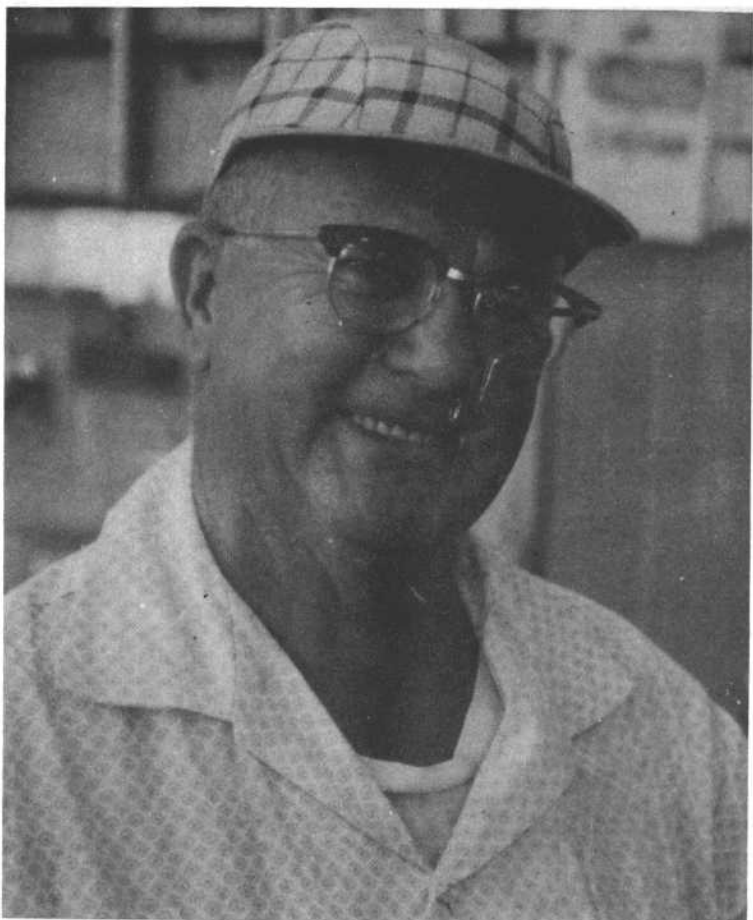


FIGURE IV-43.—Undated photograph of Joseph Milteer.



FIGURE IV-44.—Photograph of Joseph Milteer taken in early 1970's.

(616) (b) Prints of the spectators were made from the original Altgens negative. (See fig. IV-45, JFK Exhibit F-563). In addition both the Altgens negative and relevant frames of the Bell film were subjected to digital image processing. (210)* (See fig. IV-46).

4. CONCLUSIONS

(617) Milteer resembles the Kennedy motorcade spectator in age and general facial configuration. The spectator appears to have worn eyeglasses similar in general style to those favored by Milteer. The spectator, however, does not resemble Milteer in upper lip thickness; he is also partially bald, whereas Milteer apparently had a full head of hair in the photograph that was taken several years after the assassination. (See fig. IV-44). Most significantly, Milteer's reported stature of

* Computer enhancement of the spectator as seen in the Bell film did not produce usable results.

64 inches places him about 6 inches under the spectator's estimated stature.*

(618) In the absence of evidence that (1) Milteer had become extensively bald by 1963 or was wearing a hairpiece in the postassassination photograph, or that (2) Milteer's statural estimate of 64 inches is incorrect, the motorcade spectator could not have been Joseph Milteer.

5. ANALYSIS

First. Metric analysis

(619) Although several enlargements and an enhanced photograph of the spectator have been furnished for examination, they are not sufficiently sharp to permit any meaningful comparison based on facial measurements and indices. (See fig. IV-46).

Second. Age

(620) The age of the motorcade spectator is estimated at 60 ± 10 years. Milteer was approximately 61 years old in 1963.(211)

Third. Eyeglasses

(621) In all three photographs of Milteer taken during his later years he is wearing eyeglasses with composite frames (plastic upper rims, wire lower) and a broad metal nosepiece. (See figs. IV-42 and IV-44). The spectator is also wearing spectacles which appear to be of the same general style favored by Milteer. (See fig. IV-46.)

Fourth. Lip thickness

(622) All of the available Milteer photographs show that the membranous position of Milteer's upper lip was very thin. The enhanced photographs of the spectator suggest a rather full and thick upper lip. (See fig. IV-46). This is not a trait apt to be influenced by normal variation in facial expression.

Fifth. Hair

(623) In the earliest photographs Milteer has a full, regular hairline with no central or lateral retreat suggestive of incipient baldness. (See figure IV-41). In the photograph that was apparently taken when Milteer was about 55 years old, his hairline is virtually identical to that of the earlier photographs. (See figure IV-42). The latest photograph, taken about a decade after the assassination, shows Milteer with a full head of hair. (See figure IV-44). The spectator, however, appears to have little, if any, hair. The extent of his balding, though, could not be ascertained; no hairline is visible, and in fact, the entire frontal crown of his head appears bare. (See figure IV-46).

Stature

(624) The only available height record on Milteer gives his stature as 64 inches.(212) This corresponds to about the seventh statural percentile of American males. That is, about 93 out of 100 adult American men would be taller than Milteer. Also, about 35 percent of adult American females would exceed Milteer's reported height.(213) In contrast, the spectator alleged to be Milteer is taller than 4 of the 7 other males and all of the 16 females in the line of spectators shown in the motorcade photograph. Based upon Milteer's reported height, the

*See *infra*, pars. 625-659.

probability of randomly selecting a group of Americans where so many are shorter than Milteer's reported height is .0000007. Moreover, an analysis based upon actual measurements of certain physical features shown in the photograph yields a height estimate for the spectator of about 70 inches—6 inches taller than Milteer's reported stature.*

ADDENDUM

HEIGHT ANALYSIS OF ALLEGED JOSEPH MILTEER

(625) According to the only known physical description of Milteer, he was 64 inches (162.6 cm) in height. (214) As errors of as much as ± 2 inches are not uncommon in police and medical records, (215) we will assume that his true stature was somewhere between 62 and 66 inches (157.5–167.6 cm). The key question, then, is whether or not the stature of the motorcade spectator falls within the estimated stature range of Milteer. If so, the finding would not, of course, prove that the spectator was indeed Milteer but would at least be consistent with this theory. If, however, the spectator's stature falls outside the range, it would substantially decrease the likelihood that he is Milteer.

Materials and methods

(626) The photograph on which the following analysis was based was taken from the intersection of Main and Houston shortly after the presidential limousine had turned right onto Houston Street from Main. (See figure IV-40). The view takes in the entire front of the Dallas County Records Building and a portion of the Dal-Tex Building. Direction of view is toward the northeast.

(627) In this photograph, the spectator in question is a balding white male in a light-colored short-sleeve shirt who appears to be about 60 ± 10 years of age. He is standing in the line of spectators arrayed along the sidewalk in front of the records building. Immediately to his right is a tall white male in a dark suit and hat.

(628) For the analysis, the committee furnished the original 35 millimeter black-and-white negative taken by James Altgens. Our photographic measurements were made from an 8 x 10 inch enlargement of the negative. See figure IV-45. Angular measurements were recorded to the nearest 0.10 and taken with a Lutz-10 inch protractor. Linear measurements were taken with a needlepoint Helios dial caliper to the nearest 0.1 millimeter. Each angular and linear measurement reported here represents the mean of three trials.

The site

(629) A map of the site (Warren Commission exhibit 882, 17:901) shows the sidewalk fronting the records building to be of uniform width (10 feet) from the Houston-Elm corner southward to where it curves into the driveway between the records building and the Criminal Courts Building. From measurements by the committee (216) the elevation of the sidewalk in relation to the records building was found to be uniform. The street, however, slopes slightly upward so that the curb is higher near the driveway entrance than at the Houston-Elm corner.

*A detailed analysis of the available statural data is given *infra*, pars. 625–659.

Signposts

(630) Physical features of particular importance in the following analysis are the two tall street signposts located a short distance north of the spectator alleged to be Milteer. (See fig. IV-45). Each post holds three vertically arranged signs, the lowest of which bears the notice "no parking except police officers." According to information supplied by the committee, the standard dimensions for such signs in Dallas are 12 x 18 inches and, in 1963, city regulations specified that the bottom edge of the lowest sign be set 80 inches above the sidewalk. (217)

Vertical and horizontal reference lines of motorcade photograph*

(631) The vertical reference line (VRL) of the motorcade photograph is taken as coincident with the northwest corner of the Dallas County Records Building.

The horizontal reference line (HRL) which represents the elevation of the center of the camera lens, can be calculated from the perspective angles of two transverse masonry seams that run across the west face of the records building. (See fig. IV-45). The upper of these seams passes along the bottom edge of a large window. The lower line is partially obscured by the heads of the spectators. The upper line slopes upward, and the lower line slopes slightly downward from left to right; therefore, the HRL must pass between them and also perpendicular to the VRL.

(632) The law of perspective dictates that the two masonry lines, if extended indefinitely, would meet at the vanishing point of the photograph.** Consequently, their extensions may be visualized as forming the sides of a triangle, ABC, the apex of which is the vanishing point and the base of which is that segment of the VRL subtended by the angle of convergence of the masonry lines. Since, as noted above, the HRL must pass between the masonry lines and is also perpendicular to VRL, it can be visualized as subdividing the triangle ABC into two smaller right triangles AHC and HBC (See figure IV-47).

(633) The angles α and α' , measured from the photograph are 89.0° and 87.5° , respectively, and

$$\begin{aligned}\beta &= 90.0 - 89.0 = 1.0^\circ \\ \beta' &= 90.0 - 87.5 = 2.5^\circ\end{aligned}$$

and since

$$\frac{AH}{AB} = \frac{AH}{AH+AB} = \frac{\tan \beta}{\tan \beta + \tan \beta'} = \frac{\tan 1.0^\circ}{\tan 1.0^\circ + \tan 2.5^\circ} = .286$$

the distance of HRL above the intersection of the lowest masonry line with VRL is about 28.6% ($= .286 \times 100$) of the total distance between the masonry lines. When projected onto the photograph, the HRL is seen to pass slightly above the head of the alleged Milteer. (See Figure IV-47).

*Measurements are made above and below a hypothetical plane known as the datum plane or horizontal reference line, analogous to measurements that a geographer reports relative to sea level. Vertical distances are measured along or parallel to a vertical reference line that runs perpendicular to the horizontal reference line.

**For a discussion of the "vanishing point" concept see pars. 414-417 *supra*.



FIGURE IV-45.—Enlargement of original Altgens photograph used in stature analysis of spectator alleged to be Joseph Milteer.



Enhancement by digital image processing



FIGURE IV-46.—Enlarged enhancements of spectator from Altgens photograph.

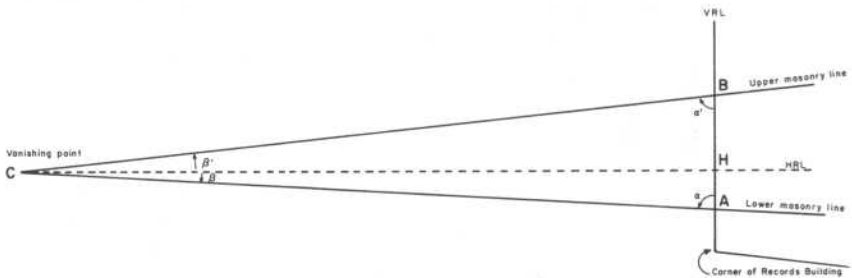


FIGURE IV-47.—Derivation of the vanishing point (C) and the horizontal reference line (HRL) from the Altgens photograph, using masonry lines and the northwest corner of the Dallas County Records Building as the vertical reference line (VRL).

The spectators

(634) Approximately 60 spectators are shown in the motorcade photograph. (See figure IV-40). They are standing in an irregular line stretching from the south end of the Records Building northwards to the vicinity of the southwest corner of the Dal-Tex Building. At the south end of this line are five males, four of whom are standing in the street in front of an automobile parked near the driveway entrance. The fifth man of this group is sitting on the fender of the automobile. At the north end of the line, extending from the southeast corner of the sidewalk of the Houston-Elm intersection, most of the spectators are also standing in the street.

(635) Between these two groups, is an intermediate segment of the spectator line consisting of 28 individuals, including the alleged Milteer. (See figure IV-45). In the motorcade photograph, the lower bodies of these spectators are obscured by the presidential limousine so that it is impossible to determine whether they are standing in the street or on the curb. Nevertheless, other motorcade films show that the individuals in the north portion of this line, including the spectator under investigation, are standing along the edge of the sidewalk. (218) Judging from their relative height and position, it seems reasonable to assume that the persons in the south end of this line are also on the sidewalk. At the south end of this line is a white female shading her eyes with a parcel held in her left hand; the line ends with a Black man wearing a dark hat who is standing just to the left of the utility pole at the northwest corner of the Records Building.

(636) Besides the alleged Milteer, this group of sidewalk spectators consists of 27 individuals. The sex of two cannot be determined as they are nearly totally obscured by other spectators. Among the remaining 25 are 17 women and 8 men. Two of these spectators, a male in a non-military uniform, and a very short female standing immediately on the left of the man alleged to be Milteer, appear to be rather young individuals who may not have attained adult stature. The remaining 7 males and 16 females are adults ranging from about 20 to 60 years of age. Two of the males and six of the females are Black. Judging from their short stature and rather dark complexions, it is possible that as many as 4 of the 10 Caucasoid females may be of Mexican-American ethnic extraction.

(637) Thus, in terms of age and ethnic composition, the group seems fairly representative of the urban population of Dallas during the 1960's. (219) The preponderance of females might be accounted for by the relatively large number of women employees in the many retail stores, business offices and local government agencies in this area of downtown Dallas. Barring undue sampling errors, the average stature of both sexes in the group might be expected to approximate the mean stature of the general U.S. adult population.

Methods of analysis

(638) The hypothesis that the spectator's stature falls within Milteer's stature range of 64 ± 2 inches can be tested by two methods:

(639) 1. Estimation of the spectator's height in relation to the street signs; and

(640) 2. Relating his height to the heights of the other sidewalk spectators.

(641) Although possibly redundant, using both methods is advantageous as they are independent; that is, neither relies on information used in the other. More specifically, the first method could be used even if the alleged Milteer were standing alone on the sidewalk and, conversely, the second method does not depend on the presence of the street signs in the photograph. As each method is based upon different assumptions and subject to different errors, they provide a valuable check upon one another.

(642) Both methods share the assumption that the elevation of the sidewalk, from north to south, is uniform. Beyond this, each method has a unique assumption:

(643) *Method 1.*—The signpost dimensions provided the Committee by Dallas Street Department officials are correct. This must be assumed because the actual signs seen in the 1963 photograph have been removed and, thus, can no longer be measured directly.

(644) *Method 2.*—In using this method it is assumed that, as a group, the stature of the adult men and women standing along the sidewalk approximate the statural norms of the general U.S. population of the 1960's.

Test 1: Estimation of height from street signs

(645) If the spectator happened to have been standing against one of the signposts, it could be used as a simple measuring rod to obtain a measurement of his stature. Unfortunately, this is not so; therefore this would violate the geometric rules of perspective by simply passing a horizontal line across the top of the spectator's head and using its intersection with one of the signposts as the measuring point.

(646) Imagine, however, that there was a third sign, identical to the other two, positioned immediately behind the spectator. Such a sign would provide an ideal measuring rod as the spectator is standing by the edge of the sidewalk.

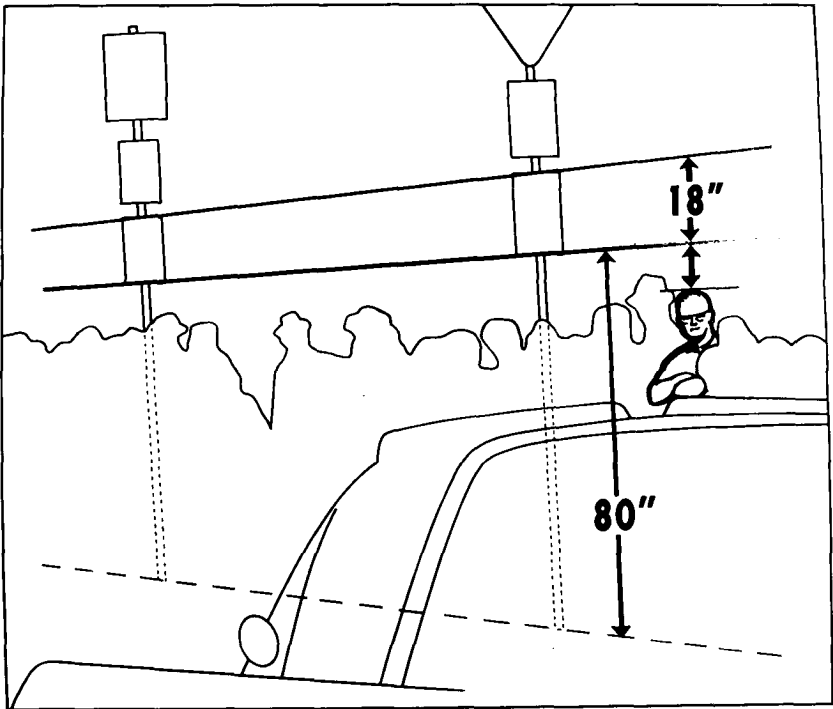


FIGURE IV-48.—Estimation of spectator's height from street signs.

(647) Taking the laws of perspective into account, this imaginary sign can be constructed by passing two lines connecting the tops and bottoms of the real signs to a point immediately above the top of the spectator's head. A vertical line, perpendicular to HRL, passing upward from the top of the spectator's head represents the post of the imaginary sign. (See figure IV-48, JFK exhibit F-562.) This sign will have the same actual dimensions of the other two: its length is 18 inches and its lower border is 80 inches above the sidewalk. From these relationships the spectator's stature can be calculated from the

formula: Stature, inches = $H - \frac{sd}{s'}$ where

H = height of lower border of sign above sidewalk in inches

s = actual length of sign in inches

s' = length of sign measured on photograph in millimeters

d = distance from top of spectator's head to lower border of sign measured on photograph in millimeters

(648) In the present case, $H=80$ inches, $s=18$ inches, $s'=16.1$ mm and $d=9.1$ mm, so

$$\begin{aligned}\text{spectator's stature} &= 80 - \frac{(18 \times 9.1)}{16.1} \text{ inches} \\ &= 80 - 10.2 \text{ inches} \\ &= 69.8 \text{ inches}\end{aligned}$$

(649) In round figures, the stature of the alleged Milteer would have been about 70 inches (177.8 cm) or 5 foot, 10 inches. Thus, he would have been about 2.5 inches taller than the average 55-64 year old U.S. male of the early 1960s. (220) More importantly, he exceeds Joseph Milteer's reported stature of 64 inches by 6 inches.

Test 2: Stature relative to other spectators

(650) Just as an imaginary sign has been created, it may be imagined that the two real signs have vanished. Now there is no convenient measuring rod against which the spectator's stature may be measured. Nevertheless, inspection of the photograph shows that, among the adult spectators lining the sidewalk, only one, the man in the Black hat standing next to him, is clearly taller than the alleged Milteer. (See figure IV-49, JFK exhibit F-563). Allowing for perspective, it is possible that the two Black males toward the end of the line are also taller; if it is assumed they are, then four of the seven males can be counted as shorter than the spectator. He is also definitely taller than all of the 16 adult females among the sidewalk spectators.

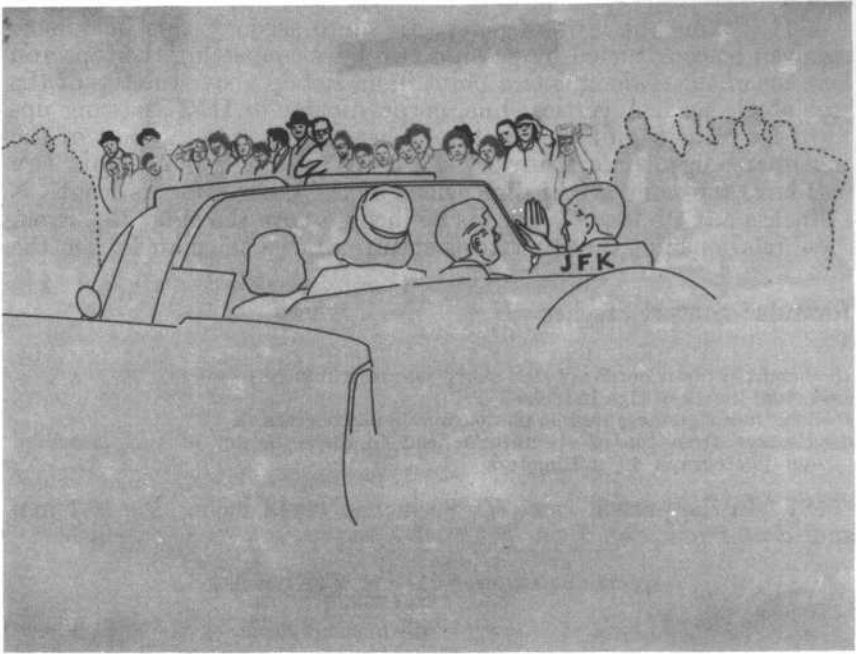


FIGURE IV-49.—Spectator's stature relative to other bystanders.

(651) Consider then the null hypothesis that the spectator is actually only 64 inches in height. If so, he has managed to insert himself among an apparently random group of 23 adults of whom 7 men and 16 women are shorter than he. Such an elfin array would be unlikely to congregate through chance alone in downtown Dallas, Tex.

(652) According to a nationwide anthropometric survey of adult Americans conducted in 1960-62, the median height of males was 68.3 inches (173.5 cm) and of females 62.9 inches (159.8 cm). Furthermore, only about 7 percent of men were under 64 inches in height. Approximately 65 percent of adult females were shorter than 64 inches. (221) Stated differently, if the spectator's stature was only 64 inches, he would be shorter than about 93 percent of adult men and 35 percent of adult women.

(653) As adult stature is normally distributed, the probability of randomly selecting a group of 16 adult women shorter than 64 inches from the general population is as follows:

$$P \text{ } \bar{X}_{16} \leq 64'' = C_{16, 16} (.65)^{16} \\ = .00102 \text{ or about 1 in 1000.}$$

(654) The probability of randomly selecting a group of seven American men, four of whom are less than 64 inches in height is as follows:

$$P \text{ } \bar{X}_7 \leq 64'' \leq 7 = C_{7, 4} (.07)^4 (.93)^3 + C_{7, 5} (.07)^5 (.93)^2 + C_{7, 6} (.07)^6 (.93) + C_{7, 7} (.07)^7 \\ = .00075, \text{ or about 75 in 100,000.}$$

(655) Since $P\sigma$ and $P\varphi$ are independent, the probability of randomly selecting a group of sixteen females and seven males with the above-defined statural characteristics is even smaller:

$$\begin{aligned} P\sigma\varphi &= (P\sigma)(P\varphi) \\ P\sigma\varphi &= (.00102)(.000075) \\ P\sigma\varphi &= .0000007 \end{aligned}$$

In other words, the odds are less than a million to one that the spectator is as short as 64 inches—Joseph Milteer's reported stature.

(656) For the sake of argument, it may be assumed that the 64-inch stature record of Milteer understates his true height by two inches, making him 66 inches tall. According to the survey cited above, about 85 percent of women and 20 percent of men are less than 66 inches in stature. Using the same approach detailed above, the probability is as follows:

$$\begin{aligned} P\sigma\varphi &= (P\varphi_{16 \leq 66''})(P\sigma_{4 \leq 66'' \leq 7}) \\ P\sigma\varphi &= (.0743)(.0334) \\ P\sigma\varphi &= .0025 \end{aligned}$$

Stated as odds, the chances are about 25 out of 100,000 that the spectator was as short as 66 inches.

(657) By the same method it can be shown that the probability the spectator was at least 70 inches in height is 0.87. That is, the odds are about 9 to 1 that he was as tall as estimated from the street signs.

Conclusions

(658) By two independent tests, it can be shown that the spectator alleged to be Milteer was substantially taller than the Milteer's reported height of 64 ± 2 inches. The first method provides a height estimate of about 70 inches through comparison with the reported dimensions of two street signs shown in the motorcade. The second demonstrates that the probability of the spectator's height falling within the range given for Milteer is statistically remote.

(659) The findings of both tests support the conclusion that the spectator was not Joseph Milteer.

(e) The three tramps

1. INTRODUCTION

(660) Immediately after the assassination, law enforcement officers conducted a search of the area behind the grassy knoll in which several railroad boxcars were situated. As a result of this search, approximately six to eight persons who appeared to be derelicts were taken either to the nearby Dallas County Sheriff's office, or to the Dallas Police Department for questioning. All were released without being booked, fingerprinted or photographed. (222) Among these "derelicts" were three men who, according to the arresting officers, had been found in a boxcar approximately one-half mile south of the assassination scene. (223) As the police led the three derelicts through Dealey Plaza to the sheriff's office, they were photographed by several press photographers. (224)

(661) When allegations of a CIA connection with President Kennedy's death emerged in the years following the assassination, these photographs received wide publicity in newspapers, television and in

the April 28, 1975 issue of Newsweek magazine. (225) It was claimed that two of the derelicts or "tramps," as they had come to be called, bore striking resemblances to Watergate burglars E. Howard Hunt and Frank Sturgis respectively. (226) Allegations have been made that Hunt, who had been a CIA employee in 1963, Sturgis, who, while not an employee, had been involved in CIA-related activities, had been together in Dallas on November 22, 1963 and had participated in the assassination as part of a CIA conspiracy. (227)

(662) In 1975 the Rockefeller Commission, investigating CIA activities within the United States and allegations concerning CIA complicity in the Kennedy assassination, requested the FBI to compare known photographs of Hunt and Sturgis, taken near the time of the assassination, with photographs of the tramps each was said to resemble. (228) After a photographic analysis of facial and statural characteristics of the men in question, the FBI concluded that "neither E. Howard Hunt nor Frank Sturgis appear as any of the three 'derelicts' arrested in Dallas, Tex., as shown in the photographs submitted."

(229) In response to the 1975 Newsweek story, the CIA also conducted a physiological comparison of the Hunt and Sturgis photographs with the tramp photographs, and reached the same conclusion as the FBI. (230)

(663) Nevertheless, Warren Commission critics still view this issue as unresolved and the identity of the three tramps is still regarded as an important part of the conspiracy theories. (231) In addition to the Hunt and Sturgis connection, three other individuals, Thomas Vallee, Fred Lee Chrisman, and Daniel Carswell, who have been named as possible co-conspirators, have been suggested as likely tramp candidates.

(664) In an attempt to identify or exclude Hunt, Sturgis and these other individuals as one of the derelicts arrested by the Dallas Police Department, forensic anthropologists were asked to examine and compare photographs of the tramps and the suspected individuals.

2. ISSUES

(665) Can any of these individuals be positively identified or excluded as one of the three tramps?

3. MATERIALS

(666) *Three tramps.*—A series of 8 by 10 black and white copy prints depicting one or more of the tramps were examined. (See figs. IV-50—IV-56.) These were taken by press photographers as the detainees were being escorted through Dealey Plaza by Dallas police officers. A number of enlargements of the heads of the three individuals were also provided.

(667) Photographs of the following individuals were examined and compared with those of the tramps:

(668) *Daniel Carswell.*—Two photographs, one an 8 by 10 black and white lateral view (1963) and the other a 3 by 3 color frontal view (1969), were reviewed.

(669) *Fred Lee Chrisman.*—The only available photograph was a single undated black and white 8 by 10 print.

(670) *E. Howard Hunt*.—Twenty-six black and white photographs that span the assassination period and vary widely in type, pose, and quality were examined.

(671) *Frank Sturgis*.—A series of 38 black and white photographs, ranging widely in quality and varying from casual snapshots to studio photographs, were studied. They are undated but, based upon the subject's age and clothing styles, they appear to span the period of the assassination.

(672) *Thomas Vallee*.—One 8 by 10 black and white frontal view was analyzed.

4. CONCLUSIONS

(673) Daniel Carswell, E. Howard Hunt, Frank Sturgis, and Thomas Vallee were not the tramp(s) with whom they were being compared. Fred Chrisman strongly resembles one of the tramps, but, without analysis of additional photographic materials, no positive identification can be made.

5. ANALYSIS

(674) The three tramps have been arbitrarily identified "A," "B," and "C" according to their position, from left to right, in figure IV-50. All three are white males of medium stature and physique. Tramp A appears to be approximately 35 ± 5 years old, tramp B about 30 ± 5 years, tramp C, the eldest, about 50 ± 10 years. Tramp B is the tallest, exceeding A and C (who are of approximately equal height) by about 3 to 5 inches. None of the men have any striking facial abnormalities or disfigurements. Their hands, shown in several photographs, display no abnormalities or amputations that might serve as clues to identification. Judging from his apparent gait, tramp A may have been slightly bow-legged. Tramp C appears to have been somewhat splay-footed.

(675) All three men are shabbily dressed, befitting their apparent status as vagrants. Tramp A, however, is the better attired, wearing well-fitting jeans and a tweed-like sports jacket, although this, judged by 1963 styles, was several years out of date. Tramp B is wearing ill-fitting slacks and a double-breasted suit coat. Tramp C, from his battered fedora to his worn-out shoes, has managed to achieve a sartorial effect similar to what one would expect had he been fired from a cannon through a Salvation Army thrift shop.

(676) While such clothing might be a disguise, their footwear seems consistent with their classification as vagrants. All three men are shod in worn, low-cut oxfords that appear to be leather-soled. Tramp C's shoes seem to be several sizes too large for him.

Tramp A

(677) Enlarged photos of this tramp were compared with those of Thomas Vallee who, a few weeks before the assassination, had been arrested in Chicago after making threats on the life of President Kennedy, Frank Sturgis, the anti-Castro soldier of fortune who participated in some of the illegal activities associated with the Watergate scandals, and Daniel Carswell. (See fig. IV-57, JFK exhibit F-172.)*

* Originally Sturgis was compared only with tramp B (see HSCA JFK hearings, vol. IV, pp. 374-77); the anthropologists were later asked to extend their comparison to include tramp A.

(678) Table I compares the facial indices of tramp A with those of Vallee, Sturgis, and Carswell. The figures enclosed in parenthesis along with indices of Vallee and Sturgis represent the difference between their indices and that of tramp A. Thus for the nasal index (No. 4), that of Vallee is 68, 3 points less than that of tramp A. This would suggest that Vallee had a slightly narrower nose (relative to its length) than that of the tramp. Nevertheless, when consideration is given to the possibility of variation in the index caused by the inevitable errors involved in taking measurements from the rather poor quality tramp photographs, such a difference is not too impressive. In contrast, the same index for Sturgis exceeds that of tramp A by 15 points, indicating that, compared to the tramp's his nose was much broader in relation to its length. This difference is considerable, and far outweighs any variation caused by technical error.

(679) When the differences in the other indexes of the series were similarly examined, it was determined that generally the values of Vallee's indices more closely approximated those of the tramp than the indices of either Sturgis or Carswell. Four of Vallee's indices differ by less than 5 points from tramp A's and the largest difference is 7 points. These results were indicative of a fair resemblance between Vallee and tramp A. Sturgis' indices vary between 2 and 15 points from those of the tramp. The average deviation of all seven indices is 4 for Vallee, 7 for Carswell, and 8.6 for Sturgis. Therefore, on the basis of metric analysis, Vallee's resemblance to the tramp is more impressive than that of either Sturgis or Carswell. An average deviation of 5 or less may be considered as evidence of a strong resemblance between the subjects of analysis.

(680) In addition to this facial index analysis, the subjects' morphological features were also closely examined. Strong differences in their features were discerned between those of tramp A and Vallee, Sturgis, and Carswell.

Sturgis

(681) 1. *Hair*.—Both Sturgis and Tramp A have dark hair with a strong transverse wave. Tramp A's bilateral recession of the hairline, however, is more advanced than is observed on any of the Sturgis photographs. Sturgis also has a short, low part line extending from the apex of lateral hairline recession on the right side of the head—a feature not present in tramp A.

(682) 2. *Forehead*.—Tramp A's forehead is characterized by a strong vertical interciiliary sulcus (frown line) that extends upward to a point about three-quarters of the distance between the level of his eyebrows and hairline. This sulcus is a little to the left of the midline of his forehead so that its lower end is located very close to the medial (inner) end of his left eyebrow. This wrinkle, of course, is probably somewhat accentuated by the tramp's deep frown. In several photographs of Sturgis shown in a similar facial expression, however, this deep furrow is not observed. Instead, Sturgis has a short, almost dimple-like, vertical interciiliary line situated slightly to the right of the midline of the forehead.

(683) 3. *Eyebrows*.—The eyebrows of both men are similar in form (low, weakly arched). In the tramp, however, they are more narrowly separated than in Sturgis. In the former, they are heavy throughout

their length; in the latter, the lateral (outer) half of the eyebrows is scantily haired.

(684) 4. *Nasal form*.—Tramp A's nasal profile is straight, ending in a sharp and angular nasal tip. His nasal tip is horizontal or perhaps slightly depressed. Sturgis has a slightly convex nasal profile with a full, fleshy, and slightly elevated tip.

(685) 5. *Mouth*.—The Tramp has a relatively wide mouth with thin membranous lips. Each end of the mouth terminates in an oblique furrow (angulus oris sulcus). Sturgis' mouth is narrower with full lips; the angular furrows at the ends of the mouth are not as prominent as those of the Tramp.

(686) 6. *Chin*.—The chin of the Tramp is low, moderately projecting and has a relatively narrow, slightly squared lower border. Sturgis' chin is very deep, strongly projecting with an extremely wide, square, lower border. It is also distinguished by a well-marked median cleft—a feature not observed in the Tramp.

(687) 7. *Ears*.—The Tramp's ears are more projecting than those of Sturgis. The ear lobes of the Tramp are attached; Sturgis has free lobes. In the Tramp, the intertragal notch is extremely narrow, whereas in Sturgis, it is wide.

(688) 8. *Physique*.—Throughout the numerous series of photographs, Sturgis is characterized by a massive, muscular body build with some suggestions of a tendency toward corpulence. The Tramp, while well-muscled, is thin and wiry. In somatotypic terms, Sturgis would be classified as an endomorphic mesomorph; the Tramp as a mesomorphic ectomorph. Stated more plainly, Sturgis is built like a defensive guard, the tramp like an offensive quarterback. No statural data on either man was available but if it were assumed that they were of equal height, Sturgis would probably outweigh Tramp A by at least 20 to 40 pounds.

(689) To summarize, Frank Sturgis differs strongly from Tramp A in numerous metric and morphological features as well as in overall physique. Most of these features relate more to the underlying skeletal framework than to superficial soft tissues and, therefore, could not be effectively altered by disguise. For example, the massively squared, deep chin of Sturgis could not be altered into the low, more gracile chin of Tramp A. In conclusion, Frank Sturgis can be excluded as a candidate for the identification of Tramp A.

(690) *Vallee*.—As noted previously, Thomas Vallee resembles Tramp A more strongly in facial indices than Sturgis. There are also some similarities between the Tramp and Vallee in morphological traits. Thus, the contour of the hairline, the projection and general shape of the ears (except for the lobes) and the height and contour of the chin are much alike. Offsetting these resemblances, however, are the following features:

(691) 1. *Forehead*.—The strong vertical interciliary furrow of the Tramp is not present in Vallee.

(692) 2. *Eye brows*.—These are laterally sparse in Vallee, but are heavy throughout in the Tramp.

(693) 3. *Mouth*.—Vallee has a small mouth, whereas the Tramp's is relatively wide. The upper lip is longer in Vallee. The angular furrows marking the corners of the mouth in the Tramp are not present in Vallee.

(694) 4. *Ears*.—The Tramp has attached lobes, Vallee's lobes are free.

(695) 5. *Nose*.—The strongest morphological differences between Vallee and the Tramp are in nasal structure:

(a) Nasal root—Very broad in Vallee, narrow in Tramp A.

(b) Nasal bridge—Wide, low, and concave in Vallee; narrow, salient and straight in Tramp A.

(c) Nasal tip—Rounded and extremely elevated in Vallee; angular and slightly depressed in Tramp A.

(d) Nostrils—In Vallee, the margins of the nostrils recede upward to such an extent that their interiors are fully exposed. This condition is sufficiently extreme to be classified as a disfiguring trait. The nostril margins are of normal configuration in Tramp A.

(e) In Vallee, two wart-like growths are present in the nasal region. The smaller is located just above the lower margin of the left nostril; the larger growth is on the cheek immediately adjacent to the margin of the left nostril. Neither feature is observed in the photographs of Tramp A, although the larger of these two structures is sufficiently sharp to allow visualization if it were present in the photograph.

(696) In conclusion, despite some strong metric resemblance between these two individuals, they are sufficiently dissimilar in morphological features to exclude Vallee as being Tramp A.

Carswell

(697) Of the three men who have been proposed as Tramp A, the resemblance between the latter and Carswell is the least impressive. As noted previously, they diverge in facial index values by an average of 7.0 points. Carswell's face is relatively long and narrow; Tramp A's is short and broad. This length difference is especially expressed in the lower face with Carswell's chin and upper lip being very long when compared to the Tramp's. Carswell's nose is also much longer, relative to its breadth. Differences in ear structure are also striking. In the Tramp, the lobes are attached whereas in Carswell the lobes are "welded"—that is, they attach to the sides of cheek with no discernible lobe at all. The antihelix of the ear (the elevated ridge just in front of and parallel to the outer margin of the ear) is well developed in Tramp A, but very poorly developed in Carswell.

Tramp B

(698) Photos of Frank Sturgis and Daniel Carswell* were compared with those of Tramp B. (See Figure IV-58.) Table II compares the facial indices of Tramp B with those of Sturgis and Carswell.

Sturgis

(699) In terms of these indices, Sturgis most closely resembles Tramp B in mouth height relative to lower face height (No. 5), the length of his ear lobe relative to the total ear length (No. 6), and the total ear length relative to face height (No. 7). He is more divergent in the remaining indices. The average deviation between the six facial indices analyzed here is 4.0 points. This is low enough to

*Originally, Carswell was compared only with Tramp A (see HSCA-JFK Hearings vol. IV, pp. 374-77); the anthropologists were later asked to extend their comparison to Tramp B.

make it impossible to rule out Sturgis on the basis of metric traits alone.

(700) The following morphological differences, however, between Sturgis and Tramp B indicate that they are not the same person:

(701) 1. *Hair*.—Sturgis is a very dark brunette with strongly waved hair; Tramp B has medium-dark hair with a slight wave.

(702) 2. *Hairline*.—The hairline of Tramp B shows more bilateral recession than is observed in Sturgis.

(703) 3. *Nose*.—Tramp B has a concave nasal profile with a rounded, slightly bulbous, nasal tip. Sturgis' nasal profile is slightly convex and the nasal tip is less bulbous than that of the Tramp.

(704) 4. *Chin*.—The most striking difference between the two men is the form of the chin. Sturgis' is massive and square; Tramp B has a small and rounded chin.

(705) 5. *Ears*.—Tramp B's ears are considerably more projecting than those of Sturgis which are rather close set.

(706) 6. *Physique*.—Tramp B appears to be considerably more linear in body build than Sturgis, who is broad and stocky in physique.

Carswell

(707) Carswell's resemblance to the Tramp based upon the facial indices was not nearly as impressive. Two of his facial indices, forehead height relative to total face height (No. 1) and lobe length relative to ear length (No. 6) differ from those of the Tramp by 12 and 13 points, respectively. These differences strongly exceed any divergence that might be introduced by technical error. The average deviation between the values of all six indices is 5.8 points. This deviation is sufficiently high to exclude Carswell as Tramp B on metric features alone.

(708) Strong differences in morphological features are also observed between Carswell and Tramp B. Carswell has a longer face relative to its breadth than the Tramp. Carswell's nose is thin with a sharply defined tip whereas the Tramp has a short, relatively broad nose with a rather bulbous tip. Carswell has a longer chin than the Tramp. The most striking difference between the two men is in the shape of their ears. Carswell's are essentially lobeless, that is, the lower margins of the ear attach directly to the cheek; Tramp B has well-developed lobes. In Carswell, the antihelix (the elevated ridge just in front of and parallel to the outer margin of the ear) is very weakly developed; in the Tramp, this structure is strongly developed and prominent.

(709) In conclusion, both Carswell and Sturgis can be excluded as being Tramp B.

Tramp C

(710) Photographs of Fred Lee Chrisman, a right-wing activist implicated in the Garrison investigation, and E. Howard Hunt, a principal figure in the Watergate burglaries and an employee of the U.S. Central Intelligence Agency at the time of the Kennedy assassination, were compared with Tramp C. (See fig. IV-59.) The indices of Hunt, Chrisman, and Tramp C are compared in table III.

(711) In comparing Hunt with Tramp C, the average difference in the six indices of the two men is 9.0, a value sufficiently high to suggest no particularly strong resemblance in facial proportions. In addition, in comparing the photographs of the Tramp to those of Hunt taken in

the late 1950's and early 1960's, the following morphological differences were noted:

(712) 1. *Forehead*.—Tramp C has several well-developed transverse frontal sulci and a strong vertical interciliary sulcus. These are not observed in Hunt who, even in photographs taken in later years, has only slightly developed transverse frontal and interciliary furrows.

(713) 2. *Nose*.—The Tramp has a relatively broad nose with a bulbous, fleshy nasal tip. The nasal tip is not depressed. Hunt has a narrow nose with a salient nasal bridge and an angular, moderately depressed nasal tip.

(714) 3. *Mouth*.—Tramp C has thick, full membranous lips; Hunt is thin-lipped.

(715) 4. *Cheek*.—Tramp C has well-developed nose-labial folds whereas in Hunt these are only incipiently developed in his photographs taken at about the time of the assassination.

(716) 5. *Ear*.—From his photographs, it is apparent that Hunt underwent surgery to correct his rather projecting ears. The date of this operation was not determined but from the photographs, it would appear to have been within a few years before or after the assassination. In degree of projection, the Tramp's ears appear to more closely match Hunt's pre-surgical condition.

(717) Two features not influenced by the surgery are strongly different in the two men. One of these is the helix, the fold of flesh that forms the outer rim of the ear. In the Tramp, this fold is wide and prominent whereas it is narrower and more weakly developed in Hunt. The second difference is in the antihelix, the secondary fold that roughly parallels the helix inside the ear. This structure is strongly developed in the Tramp and, in fact, its lower portion appears to extend beyond the helix. In Hunt, the antihelix is weakly developed¹.

(718) 6. *Scars*.—In the Tramp there is a pit-like, ovoid scar about 1 centimeter in diameter located immediately above the lateral end of his right eyebrow. This feature is not observed in any of the Hunt photographs provided for examination.

(719) 7. *Age*.—In general facial tone, age lines and other features, Tramp C appears to be at least a decade older than Hunt.

(720) From the observed differences in metric and morphological features, E. Howard Hunt can be confidently excluded as being Tramp C.

(721) *Chrisman*.—A comparison of a single undated full-face photograph of an individual identified as Fred Lee Chrisman was also made with those of Tramp C. His mouth is slightly open and he appears to have been speaking at the time the photograph was made. The subject is a white male who appears to be about 60 ± 5 years of age. In general, the index difference between Chrisman and Tramp C is low, ranging between two and six points with a mean difference of four index points. This is less than one-half the average index difference (nine) observed between E. Howard Hunt and Tramp C. Such a low value suggests a strong resemblance between Tramp C and Chrisman in general facial configuration.

(722) Tramp C appears to be approximately a decade younger than Chrisman.* The similarities in morphological traits between Tramp C and Chrisman are nevertheless impressive.

*Therefore, to obtain a more definitive interpretation, it would be helpful to establish the date of the Chrisman photograph.

(723) 1. *Hairline*.—Although Tramp C is wearing a hat, it is positioned far enough back on his head to reveal his hairline. It appears to be continuous and uninterrupted by a part or any strong recession due to balding. It is thus of the same general configuration observed in Chrisman.

(724) 2. *Forehead*.—Both Chrisman and Tramp C are characterized by several strongly developed transverse frontal sulci "worry lines". These are more accentuated in Chrisman as would be consistent with his apparent greater age. Unfortunately, these wrinkles are not shown with sufficient clarity in the Tramp to allow a detailed comparison of their pattern. Differences observed in this region include the circular, pit-like scar located immediately lateral to the outer end of the left eyebrow of Tramp C and the strong vertical inter-ciliary sulcus of the Tramp, neither of which are discernible in the Chrisman photograph.

(725) 3. *Eyebrows*.—In both men, the eyebrows are low and weakly arched. In the Tramp, however, they appear to be more widely separated than they are in Chrisman.

(726) 4. *Eyes*.—Both men have heavy medial eyefolds which tend to obscure the upper lids, lending their eyes a "hooded" aspect. Also both display well-developed oblique palpebral sulci that gives them a somewhat "baggy-eyed" appearance.

(727) 5. *Nose*.—In Tramp C, the nasal root appears to be somewhat broader than in Chrisman. In both men, the lower nasal region is characterized by a full, fleshy tip.

(728) 6. *Mouth*.—Both men have relatively small mouths. The membranous portion of Chrisman's upper lip appears to be extremely thin whereas that of the Tramp is moderately full. The nasolabial fold is strongly developed in Tramp C but not present in Chrisman.

(729) 7. *Chin*.—Both men have prominent chins with squared lower margins. In both, platysmal folds have developed to give them a rather "jowly" appearance.

(730) 8. *Ears*.—No morphological inconsistencies in the ears of the two men are observed.

(731) In brief, Chrisman resembles Tramp C rather strongly in both metric and morphological features. These similarities, derived from the analysis of a single undated photograph of Chrisman, are in no way sufficient to establish a positive identification. Nevertheless, they are strong enough to suggest that further analysis, based on more fully documented Chrisman photographs, should be considered, unless independent evidence excludes Chrisman's presence in Dallas on November 22, 1963.

TABLE I.—COMPARISON OF FACIAL INDICES OF TRAMP A WITH THOSE OF VALLEE, STURGIS, AND CARSWELL

No. and index (Times 100)	Tramp A	Vallee	Sturgis	Carswell
1. Forehead height: Total face height.....	31	37 (6)	33 (2)	28 (3)
2. Nose length: Lower face height.....	47	46 (1)	33 (14)	42 (5)
3. Chin eminence height: Lower face height.....	20	23 (3)	31 (11)	27 (7)
4. Nose breadth: Nose length.....	71	68 (3)	86 (15)	76 (5)
5. Mouth height: Lower face height.....	33	34 (1)	40 (7)	36 (3)
6. Lobe length: Ear length.....	22	29 (7)	30 (8)	42 (20)
7. Ear length: Total face height.....	36	29 (7)	33 (3)	30 (6)
Mean deviation.....		4.0	8.6	7.0

TABLE II.—COMPARISON OF FACIAL INDICES OF TRAMP B WITH THOSE OF FRANK STURGIS AND DANIEL CARSWELL

No. and index (times 100)	Tramp B	Sturgis	Carswell
1. Forehead height: total face height.....	41	33 (8)	28 (13)
2. Nose length: Lower face height.....	40	33 (7)	42 (2)
3. Chin eminence height: Lower face height.....	27	31 (4)	27 (0)
4. Nose breadth: Nose length.....			
5. Mouth height: Lower face height.....	38	40 (2)	36 (2)
6. Lobe length: Ear length.....	30	30 (0)	42 (i...)
7. Ear length: Total face height.....	36	33 (3)	30 (6)
Mean deviation.....		4.0	5.8

TABLE III.—COMPARISON OF FACIAL INDICES OF TRAMP C WITH THOSE OF E. HOWARD HUNT AND FRED LEE CHRISMAN

No. and index (times 100)	Tramp C	Hunt	Chrisman
1. Forehead height: Total face height.....	29	42 (13)	33 (4)
2. Nose length: Lower face height.....	35	46 (11)	41 (6)
3. Chin eminence height: Lower face height.....	20	30 (10)	18 (2)
4. Mouth height: Lower face height.....	40	50 (10)	34 (6)
5. Lobe length: Ear length.....	30	32 (2)	27 (3)
6. Ear length: Face height.....	36	28 (8)	33 (3)
Mean deviation.....		9.0	4.0

PHOTOGRAPHS TAKEN OF THE THREE TRAMPS
ARRESTED IN DEALEY PLAZA, NOVEMBER 22, 1963



FIGURE IV-50.



FIGURE IV-51.

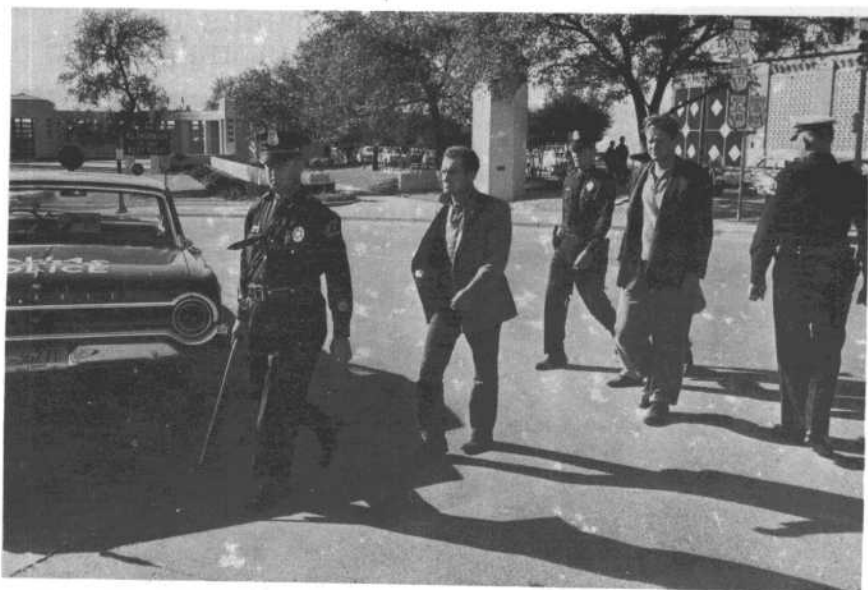


FIGURE IV-52.

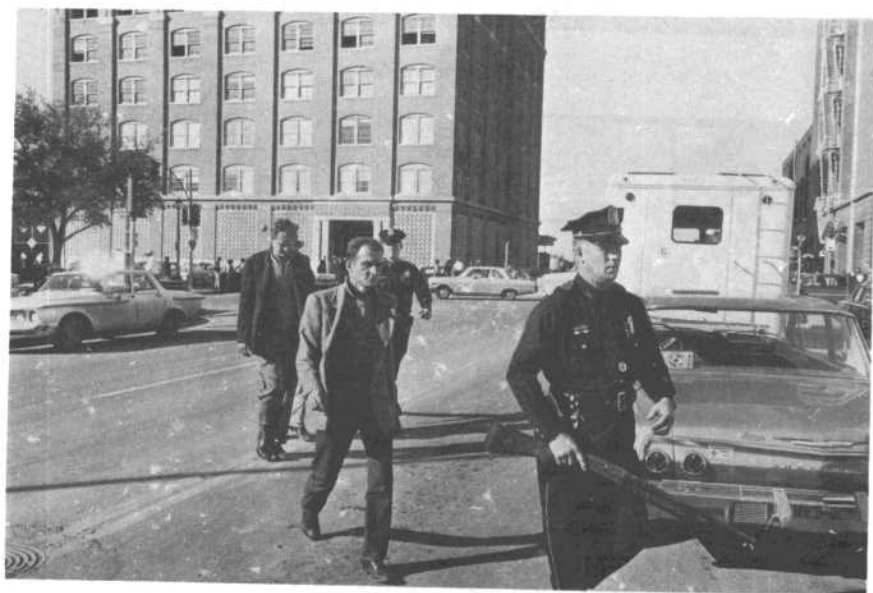


FIGURE IV-53.



FIGURE IV-54.



FIGURE IV-55.



FIGURE IV-56.

FIGURE IV-57.



FIGURE IV-58.



FIGURE IV-59.

(f) *The "Second Oswald" Theory—Comparison of Oswald Facial Photographs*

1. INTRODUCTION

(732) Various conspiracy theories have centered around the hypothesis that a double of Lee Harvey Oswald played a part in the assassination of President Kennedy. The theorists themselves appear to disagree on the origin and role of this "Second Oswald." Nevertheless, all agree that in at least one stage of his career between the

time Oswald defected to the Soviet Union and the assassination, he was impersonated by a double. (232) To investigate this possibility, the anthropology consultants examined a series of Oswald photographs ranging in time from his Marine Corps enlistment to his arrest in Dallas after the assassination.

2. ISSUE

(733) Is there any photographic evidence of an Oswald imposter?

3. MATERIALS

(734) The collection of photographs pertaining to the Kennedy assassination and Warren Commission investigation includes several dozen of Oswald (or, possibly, his double). As one might expect, they vary widely in pose, facial expression, lens-subject distance, and image quality. From these, it was possible to select nine in which (1) the facial features were fairly well defined, (2) the pose was either nearly full-face or true profile, and (3) represented the subject during various key episodes of his life from the time he was a Marine until the assassination. (See figs. IV-60, IV-61, JFK exhibits 556-557.)



FIGURE IV-60.



FIGURE IV-61.

In addition, two photographs of definitely poorer quality were selected for analysis. These were two of the controversial "backyard photographs;" they differ from the others in that the direction of lighting was from almost directly overhead and the facial image was somewhat more poorly defined. (See figs. IV-18 and IV-20.)

(735) In addition to the Oswald photographs, data were included from three photographs of Billy Lovelady, taken in the early 1960's. Lovelady was a fellow employee of Oswald's at the Texas School Book Depository and his strong physical resemblance to Oswald was a source of controversy and confusion regarding the "man in the doorway" photograph.* The inclusion of Lovelady's facial indices in our analysis provides a convenient control or yardstick to measure the variation observed in the facial indices derived from the Oswald photographs.

4. METHODS

(736) This analysis is based on 15 indices derived from 16 measurements of the head and face.** The measurements were taken to the nearest 1 millimeter from 8-by-10-inch, black-and-white enlargements of the subject's face. The indices for both Oswald and Lovelady are given in table I. There are some missing values for the three profile views of Oswald. This is because certain measurements necessary for calculating these indices cannot be obtained from a profile photograph. Also, a few indices could not be calculated for the full-face photographs because lighting, image clarity, or other factors would not permit the necessary measurements to be made with sufficient accuracy.

*See par. 759 *infra*.

**See addendum A, pars. 746-748 *infra*.

(737) In order to reduce this complex set of individual values to more meaningful statistics, one of the methods long employed by anthropologists was used to compare both living and fossil populations. The method selected was Penrose's distance statistic, which has an advantage over more sophisticated multivariate methods in that it is fairly simple to compute, but still gives an acceptable approximation of the morphological differences between the groups. (233) The use of more elaborate methods did not seem justified in view of the small sample sizes involved.

(738) This method reduces a set of complex variables that characterize two or more groups to a pair of coefficients that reflect the groups' overall difference in size and shape.

(739) To apply this method to the present problem, the index data was grouped chronologically to represent Oswald at various significant periods of his life:

1. Marine Corps.
2. Russia.
3. Backyard (Dallas).
4. New Orleans.
5. Arrest (Dallas).

(740) The data were then studied to determine whether the face of the individual shown in the Oswald photographs, taken during any one of the first four of these periods (Marine Corps, Russia, backyard, New Orleans), differed morphologically from the face of the man who was arrested in Dallas after the assassination. If such a difference was found, it might suggest that a double was involved.

5. CONCLUSIONS

(741) There are no biological inconsistencies in the Oswald photographs examined that would support the theory that a second person, or double, was involved. The variation observed is that expected in an array of photographs taken by different cameras with varying lens, camera angles, lighting, and other technical differences.

(742) It is not, however, possible totally to dismiss the "second Oswald" hypothesis on the basis of this negative finding. For example, it is possible that a double—if one existed—may not have been included in the series of photographs examined. There is also a possibility, however remote, that such a double was such a perfect twin of Oswald that no detectable metric or morphological differences are discernible in the photographic record.

6. ANALYSIS

(743) The results of the analysis are shown in the accompanying graph. (See fig. IV-62.) The origin of the graph represents the facial indices of the Dallas arrestee. The various points on the graph represent the other Oswald photographic sets as well as that of Billy Lovelady. The points were determined by plotting the Penrose size coefficient against the shape coefficient. The closer a point falls to the origin, the greater the similarity in facial morphology between the individual represented in a particular set of photographs and the person arrested in Dallas. As might be expected, the point representing Billy Lovelady lies much farther from the origin than those represent-

ing Oswald. Of the latter, the backyard photographs are the most divergent.

(744) Compared to Lovelady, who strongly resembles Oswald, the Marine, Russia, backyard, and New Orleans photographs cluster rather closely to the origin. It seems highly probable that the relatively small deviation observed in the Oswald data can be attributed to inevitable error involved in locating landmarks and making measurements from the photographs rather than to the existence of an Oswald double.

(745) In addition to the analysis of facial indices described above, other facial features were compared. For example, in the three profile views, the angle of the nasal bridge in relation to the face was 37° in all three cases and the angle between the nasal septum and the facial plane varied by less than 1° . The ears are relatively distinctive in shape and are strikingly similar in all photographs where they can be examined. The hairline, if one makes allowance for the passage of time, is quite compatible in all photographs examined. Also, there was no evidence of any incompatible anomalies, scars or other characteristic features suggesting different individuals in the various photographs.

TABLE I.—FACIAL INDICES OF LEE HARVEY OSWALD AND BILLY N. LOVELADY

Index No.	MMT	Marine	Russia			Backyard		New Orleans		Dallas arrest			Lovelady		
			1	2	3 ¹	1	2	1	2 ¹	1	2	3 ¹	1	2	3
1.....	9/1	65.3	68.1	69.7	-----	70.1	74.7	68.5	-----	63.5	68.7	-----	65.8	-----	65.4
2.....	9/2	85.2	83.9	86.8	-----	83.7	85.0	83.5	-----	86.4	84.8	-----	75.8	-----	68.0
3.....	3/2	36.5	33.9	29.7	-----	32.6	30.0	33.0	30.4	36.0	34.1	30.7	36.4	32.4	32.0
4.....	4/5	43.7	41.3	42.0	42.0	-----	-----	36.1	37.8	45.7	42.0	39.1	38.1	32.6	26.2
5.....	14/5	20.0	22.6	22.1	20.2	26.1	22.2	22.9	20.3	23.4	21.6	21.9	26.5	28.3	29.4
6.....	11/9	90.8	87.2	86.1	-----	86.6	86.8	90.8	-----	86.1	85.7	-----	86.0	-----	100.0
7.....	15/4	75.0	82.7	74.0	-----	-----	-----	79.2	-----	73.5	-----	-----	79.3	84.0	-----
8.....	8/2	23.5	24.1	24.2	25.3	26.5	25.0	24.2	23.5	23.2	23.4	25.0	24.2	28.5	28.0
9.....	8/5	33.7	36.0	33.6	34.9	40.0	37.0	36.1	32.4	35.8	35.2	34.4	37.2	42.2	41.2
10.....	12/11	87.6	90.2	-----	-----	77.5	-----	89.8	-----	87.1	87.5	-----	-----	-----	85.3
11.....	16/6	32.4	34.2	39.3	-----	31.2	30.8	32.1	-----	30.0	-----	-----	40.2	47.8	46.1
12.....	7/6	33.8	34.2	33.3	-----	40.6	-----	33.9	-----	30.0	34.1	-----	37.0	41.1	46.1
13.....	10/11	24.7	24.4	24.9	-----	-----	-----	21.7	-----	23.1	23.9	-----	27.9	29.1	26.5
14.....	13/12	30.8	32.4	-----	6.0	40.0	-----	32.2	-----	34.6	32.1	-----	-----	-----	48.3
15.....	6/2	32.2	31.2	30.8	--- 3	32.6	32.5	30.8	34.3	32.0	31.1	35.2	27.7	26.5	26.0

¹ Profile.

TABLE II.—MEAN INDEX VALUES OF LEE HARVEY OSWALD AND BILLY N. LOVELADY

Index No.	Oswald					Lovelady	Mean	Standard deviation
	Marine	Russia	Backyard	New Orleans	Dallas arrest			
1.....	65.3	68.9	72.4	68.5	66.1	65.6	67.8	2.71
2.....	85.2	85.4	84.4	83.5	85.6	71.9	82.7	5.33
3.....	36.5	31.8	31.3	31.7	33.6	33.6	33.1	1.95
4.....	43.7	41.8	-----	36.9	42.3	32.2	39.4	4.76
5.....	20.0	21.6	24.2	21.6	22.3	28.1	23.0	2.86
6.....	90.8	86.6	86.7	90.8	85.9	93.0	89.0	2.94
7.....	75.0	78.4	-----	79.2	73.5	81.6	77.5	1.46
8.....	23.5	24.5	25.8	23.8	23.9	26.9	24.7	1.34
9.....	33.5	34.8	38.5	34.2	35.1	40.2	36.1	2.63
10.....	87.6	90.2	77.5	89.8	87.3	85.3	86.3	4.66
11.....	32.4	36.8	31.0	32.1	30.0	44.7	34.5	5.51
12.....	33.8	34.0	40.6	33.9	32.0	41.4	36.0	3.99
13.....	24.7	24.4	-----	21.7	23.5	27.8	24.4	2.22
14.....	30.8	32.4	40.0	32.2	33.4	48.3	36.2	6.76
15.....	32.2	32.7	32.6	32.6	32.8	26.8	31.6	2.37

TABLE III.—Measurements used to derive indices for comparison of Oswald photographs

1. Total head height-----Vertical distance from the top of the head to the bottom of the chin (*vertex to menton*.) N.B.: some allowance for hair must be made in taking this measurement from a photograph.
2. Physiognomic face height---Distance from the midpoint of the hairline to the most anterior point on the lower forehead just above the nasal root depression (*trichion to glabella*).
3. Forehead height-----Distance from the midpoint of the hairline to the most anterior point on the lower forehead just above the nasal root depression (*trichion to glabella*).
4. Nose length-----Distance from the deepest point of the nasal root depression to the junction point between the nasal septum and the upper lip (*subnasion to subnasale*).
5. Total face height-----Distance between the most anterior point on the lower forehead just above the nasal root depression and the lowest point on the chin (*glabella to menton*).
6. Ear length-----Distance between the uppermost point on the helix of ear and the lowermost point on the earlobe (*superaurale to subaurale*).
7. Lobe length-----Distance between the lowest point in the intertragic notch and lowest point of the earlobe (*inter-tragion to subaurale*).
8. Mouth height-----Distance from the point of contact between the upper and lower lip and lowest point on the chin (*stomion to menton*).
9. Maximum head breadth----Horizontal distance across the broadest portion of the head. N.B.: Some allowance for hair must be made in taking this measurement from a photograph.
10. Interpalpebral breadth----Horizontal distance between the inner corners of the eyes (*biendocanthion breadth*).
11. Facial breadth-----Maximum horizontal distance across the face (*bizygomatic breadth*).
12. Mandibular breadth-----Horizontal distance between the angles of the jaws (*bigonal breadth*).
13. Chin width-----Horizontal distance across the eminence of the chin.
14. Chin eminence height-----Distance from the point of deepest depression between the lower lip and chin and the lowest point on the chin (*supramentale to menton*).

TABLE III.—Measurements used to derive indices for comparison of Oswald photographs—Continued

15. Nasal breadth-----Maximum horizontal breadth across the nasal wings (*bialar breadth*).
16. Lateral ear projection-----Horizontal distance from the lateral-most point on the outside margin of the ear to the junction of the ear with the face.

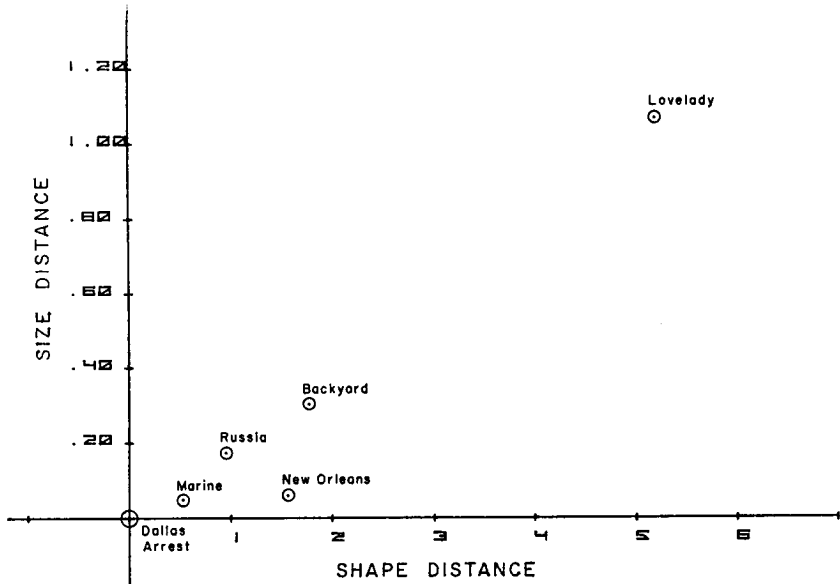


FIGURE IV-62.—Penrose Size and Shape Coefficients Calculated From Facial Indices of Lee Harvey Oswald and Lovelady Photographs. Origin of the Graph Represents Dallas Arrest Photographs.

ADDENDUM A

CALCULATION OF PENROSE SIZE AND SHAPE COEFFICIENTS

(746) Table I gives the individual indices calculated from the measurements taken from the photographs of the series under examination. These were averaged for each photographic set to give the mean indices shown in Table II. In some instances these are, of necessity, based on a single value. The mean and standard deviation of the index values of the photographic sets (including Lovelady's) were then computed. These statistics are also given in Table II.

(747) The index values were then converted to standard deviation units (*d*-values). The Penrose coefficients were calculated from the *d*-values, using the following formulae:

Distance coefficient:

Formula

Size

$$C_G^2 = \left\{ \sum_1^n (d) \right\}^2 / n^2$$

Shape

$$C_s x \frac{n-1}{n} = \sum_1^n (d^2) / n - \left\{ \sum_1^n (d) \right\}^2 / n^2$$

(748) The size and shape coefficients calculated for the various photographic sets and plotted in Table I are as follows:

	Marine	Russia	Backyard	New Orleans	Lovelady
Size equals C^2_{α}	0.049	0.172	0.303	0.060	1.07
Shape equals $C^2_{\alpha} \times \frac{14}{15}$	.480	.888	1.647	1.460	4.83

ADDENDUM B

OSWALD HEIGHT AND PROPORTION STUDIES*

INTRODUCTION

(749) Several Warren Commission critics have alleged that substantial differences exist in the reported heights and facial characteristics among different photos and other measurements purported to represent Lee Harvey Oswald. (234) For example, differences of as much as 2 inches in height exist between an early Marine Corps induction photo of Oswald in front of a height chart (see fig. IV-63, JFK exhibit F-166), reported height measurements of Oswald, (235) measurements of the Oswald corpse in Dallas, and another height chart photograph of Oswald (see fig. IV-64). The Marine photograph, which allegedly depicts Oswald with a 13-inch head (measuring from the bottom of his chin to the top of his head), is also said to be inconsistent with his true facial measurements. (236) (See fig. IV-63). On this basis, it has been alleged that these differences are evidence of different individuals purporting to be Lee Harvey Oswald. (237)

1. ISSUE

(750) Are the differences in Oswald's body measurements, as detected from photographs of him standing against a height chart, probative in any way of an Oswald imposter theory?

2. ANALYTICAL APPROACH

(751) Two members of the photographic evidence panel were directed to take an independent series of photographs involving an individual of known height standing against a height chart. For each series of pictures, each person was to be photographed at different distances in relation to the height chart. The vertical orientation of the camera and its distance to the height chart was also subject to change at the photographer's discretion, but the camera was kept essentially horizontal at all times so that optical axis was level, that is, parallel to the ground.

(752) In addition, the forensic anthropologists on the photographic evidence panel were asked to provide information concerning discrepancies between measured and reported heights.

* This section was prepared under the direction of W. K. Hartmann and C. W. Kirk. For related testimony of Kirk, see HSCA-JFK Hearings, vol. IV, pp. 362-65.

3. CONCLUSION

(753) No probative weight should be given to an Oswald imposter theory based upon differences in Oswald's body measurements that have been detected from photographs of him standing against a height chart.

4. ANALYSIS

(754) First, panel member Dr. William K. Hartmann made a series of photographs of a subject standing with a height chart in the background, but with the subject standing at two different distances from the chart (shoulder-to-chart distance, 1 inch and 10 inches) and the camera at two distances typical of identification camera working distances (45 inches and 58 inches, respectively, from the height chart). To simulate the typical practice of adjusting the camera to the subject's approximate facial height (sometimes to eye level, sometimes to nose level, et cetera), the camera was elevated and lowered through a series of different vertical positions from chin level to the top of the hair. It was found that the subject's height, read from the height chart, ranged from 0 to $1\frac{3}{4}$ inches higher than the actual measured hair-top position during these photos. (238)*

(755) A second test involving similar procedures was conducted by Sergeant Cecil W. Kirk, of the District of Columbia Metropolitan Police Department's mobile crime lab, using departmental identification camera and height chart equipment. The subject's height in this experiment, as read from the height chart, increased one-half inch as the subject moved from a position with heels against the wall to a position with heels 8 inches out from the wall. In addition, while the height of the subject's head actually measured 8 inches from chin to head top, the readings on the height chart were approximately $12\frac{1}{2}$ and 14 inches, thereby resulting in errors of $4\frac{1}{2}$ and 6 inches, respectively. (239) (See fig. IV-65, JFK exhibit F-564.)

(756) The types of discrepancies obtained in the Hartmann and Kirk studies are attributable to parallax errors which, in this case, present a difference in scale between the images of the subject and the chart. Parallax errors occur because the plane of the subject's face or body is not in the same plane as the height chart to which it is being compared; since these two planes were photographed from a finite distance, nonparallel lines from camera to subject were introduced. The nonparallel lines diverge from the camera lens to the subject. Consequently, from a camera centered in front of the subject's face, the line of sight from the camera lens slopes upward past the top of the subject's head, yielding a higher reading on the background wall chart than the actual head-top height.

(757) Moreover, unless the subject photographed is standing with his back against the height chart at a correct distance from a properly

*In addition, because this particular subject's driver's license reported his height as $1\frac{3}{4}$ inches smaller than his actual measured hair-top position during the photography, the total discrepancy between the height chart readings and the driver's license ranged from $1\frac{3}{4}$ to $3\frac{1}{2}$ inches. The reported height in the subject's driver's license was not checked until after the photography had been completed.

positioned camera equipped with an appropriate lens,* it is unreasonable to assume that the resulting picture is ever a precisely accurate indicator of both his height and head size. (240) For this reason, height charts are no longer commonly used in law enforcement and industrial security work. (241)

(758) Finally, the photographic evidence panel's board of forensic anthropologists advised that a diurnal variation in height of half an inch or more is common during the course of a day, with the subject generally being taller in the morning when the spine has been less compressed. (242) The board also cited to the panel an anthropological study by Robert M. White and Edmund Churchill ("The Body Size of Soldiers," U.S. Army Natic Laboratories, technical report 72-51-CE, 1971), which measured heights of 6,682 army personnel versus the heights these individuals reported for themselves. Typical discrepancies in height were 1.1 inches. Generally, men of average height (5 feet 9 inches) reported themselves 1.1 inches taller than their measured stature; relatively short men reported themselves about 0.8 inch taller; and relatively tall men reported themselves 1.2 inches taller.

* To get an accurate height measurement, the camera must be level and its optical axis must be level with the top of the head.

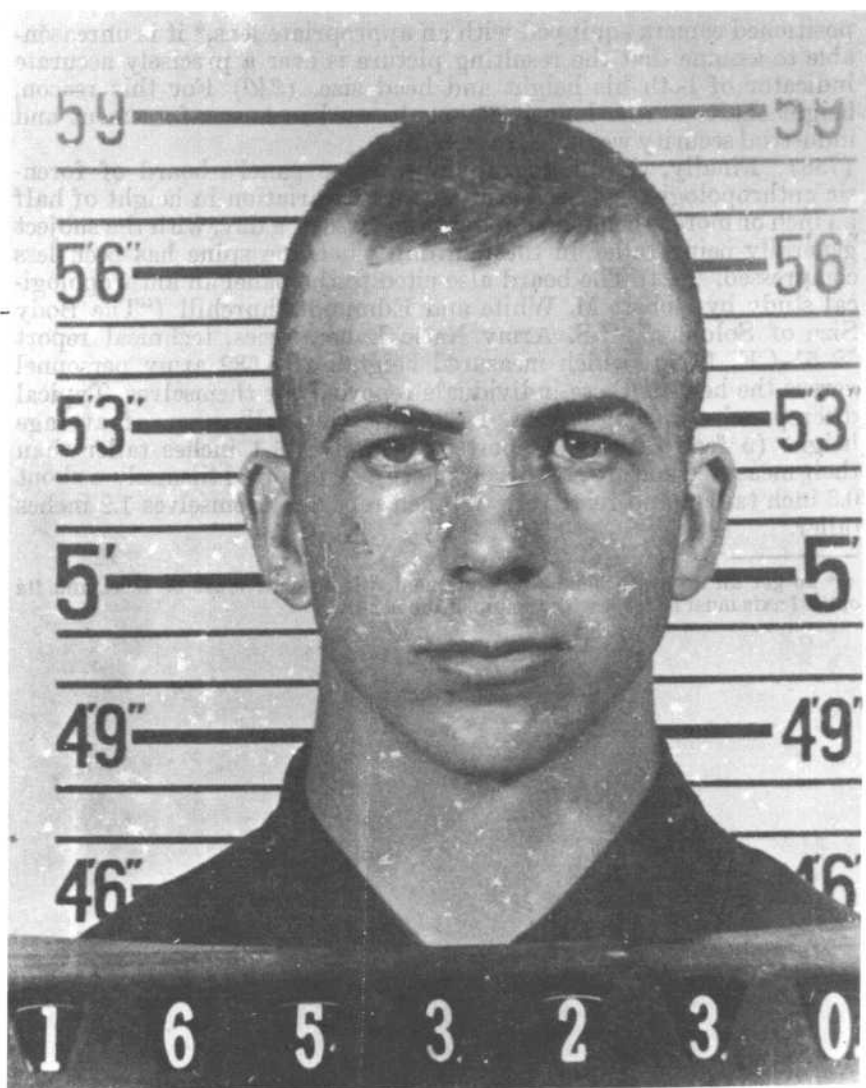


FIGURE IV-63.

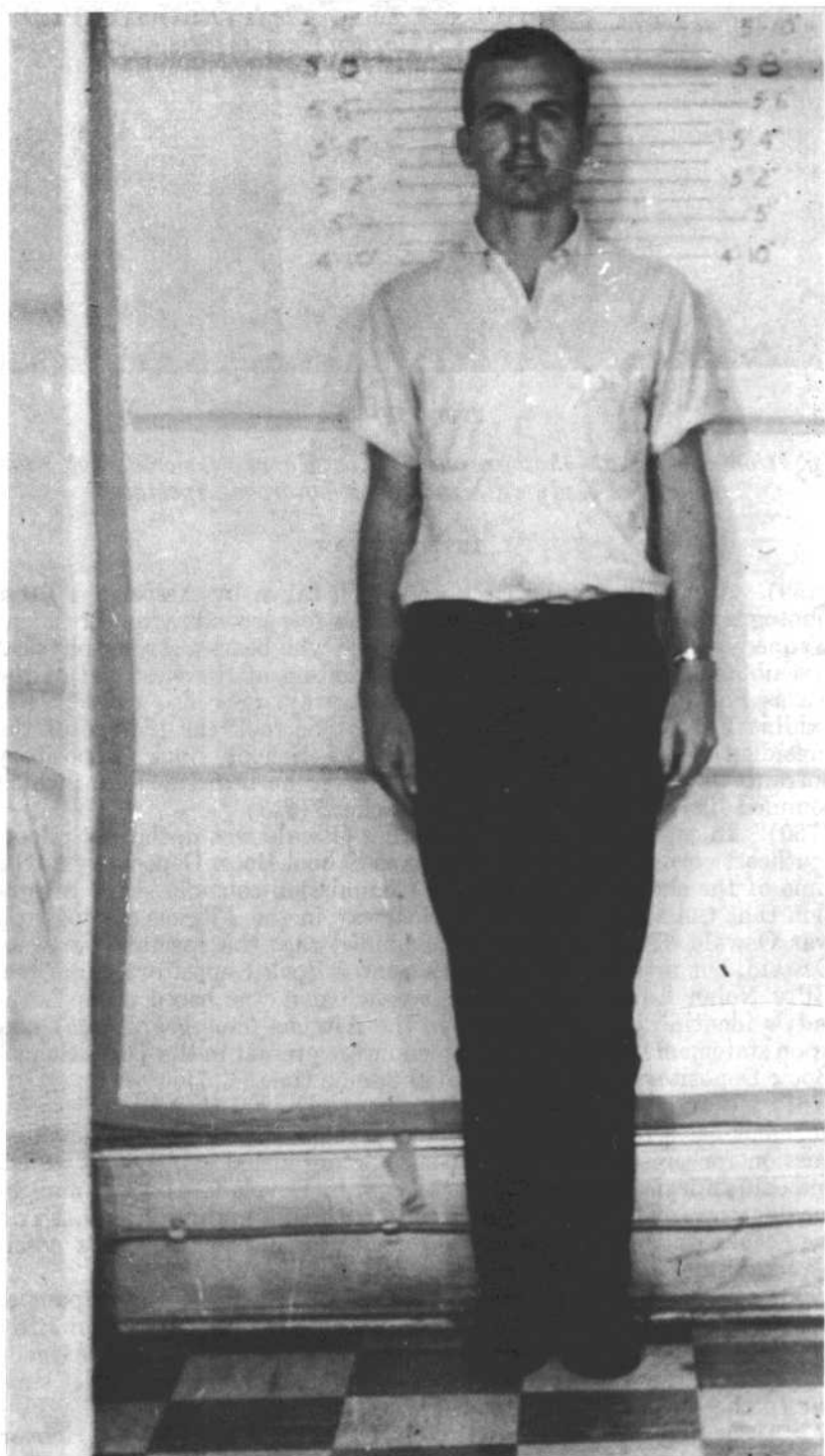


FIGURE IV-64.—New Orleans arrest picture of Oswald in front of height chart.

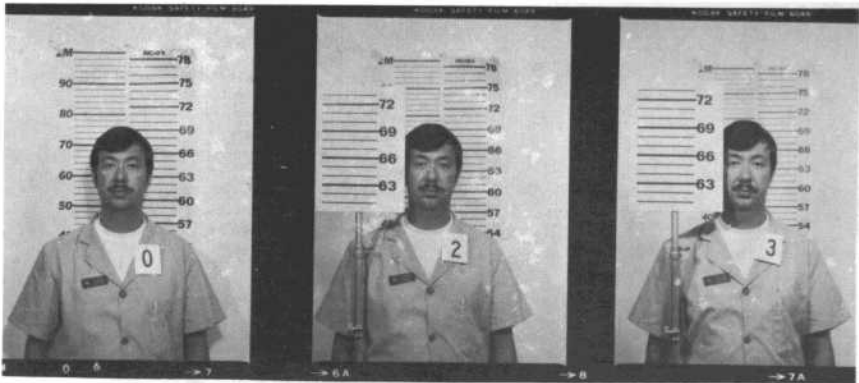


FIGURE IV-65.

(g) *Comparison of photographs of Lee Harvey Oswald and Billy Nolan Lovelady with that of a motorcade spectator*

1. INTRODUCTION

(759) A widely publicized photograph taken by Associated Press photographer James W. Altgens within a few seconds after President Kennedy was first shot shows a spectator who bears a strong physical resemblance to Lee Harvey Oswald standing at the west end of the Texas School Book Depository entranceway. (See fig. IV-66, JFK exhibit F-559.) Altgens has stated that he took the picture of the presidential limousine, with the Texas School Book Depository entranceway in the background, just after he heard a noise "which sounded like the popping of a firecracker." (243)

(760) In evaluating the evidence that Oswald was in the sixth floor, southeast corner window of the Texas School Book Depository at the time of the shooting, the Warren Commission considered the allegation that the man shown in the doorway in the Altgens photograph was Oswald. The Commission concluded that the spectator was not Oswald, but rather another Texas School Book Depository employee, Billy Nolan Lovelady. (244) This conclusion was based upon Lovelady's identification of himself in the Altgens photograph (245) and upon statements of other persons who were present in the Texas School Book Depository entranceway at the same time. (246)

(761) Warren Commission critics have charged that there was insufficient basis for this conclusion (247), and have faulted the Commission for presenting " * * * no supporting visual evidence by which one can appraise the resemblance between Lovelady and the man in the doorway, or Lovelady and Oswald, although nothing less hangs on the accurate identification of the doorway man than Oswald's possible total innocence of the assassination" (248).

(762) This issue has also persisted because of reported discrepancies in connection with the clothing worn by the Altgens figure and Billy Lovelady on November 22, 1963. (249) In media prints of the Altgens photograph, the man appears to be wearing a long-sleeved shirt similar to the one in which Oswald was arrested. (250) (See fig. IV-67.) According to a memo written by FBI Director J. Edgar Hoover

to the Warren Commission after Lovelady had been interviewed and photographed in 1964 by FBI agents, (251) Lovelady was reported to have been wearing a short-sleeved red and white, vertically striped shirt. (See fig. IV-67.) Lovelady later explained that when he was interviewed and photographed by the FBI, he had not been told to wear the same shirt he had worn on the day of the assassination and that, in fact, he had been wearing a long-sleeved, plaid shirt when he was standing in the Texas School Book Depository doorway. (252) (See fig. IV-67.)

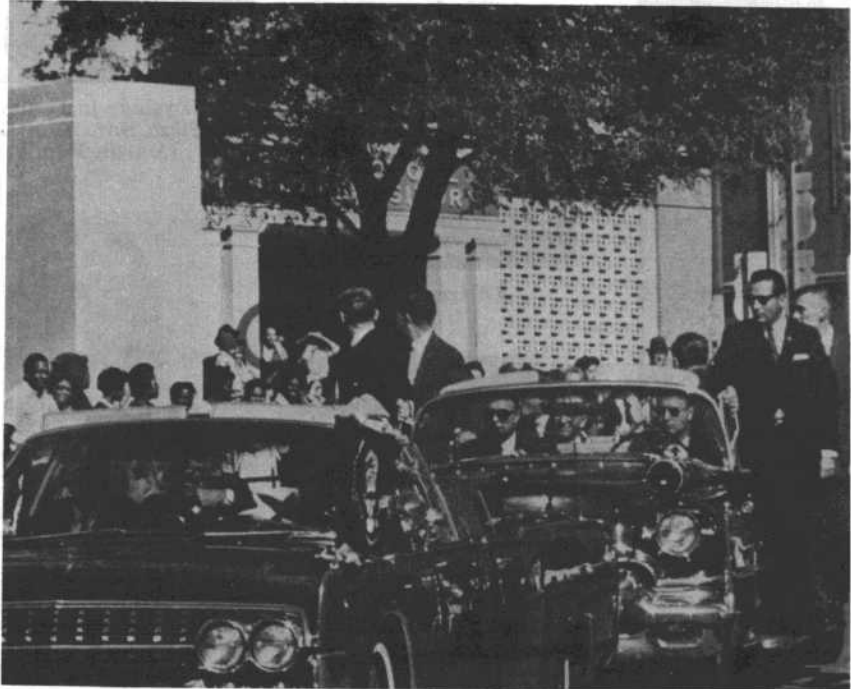


FIGURE IV-66.—TSBD doorway spectator seen in Altgens 1-6 photograph taken on Elm Street.

SPECTATOR IN TSBD DOORWAY:



Oswald Arrest Shirt



(Hughes Film)



Lovelady in Dealey Plaza Nov. 22, 1967
(Martin Film)



(Altgens Photo)



Lovelady in 1963
shirt (1976)



(Bell Film)



Lovelady photo-
graphed by FBI
in 1964

FIGURE IV-67.—Photographic evidence evaluated in Robert Groden's shirt analysis.

(763) This contradiction was partially resolved by photo-optical work performed by Robert Groden, a Warren Commission critic and photographic consultant to the committee.* During his work with the committee Groden made photographically enhanced enlargements of the original 35 millimeter black and white Altgens negative and frames of the Bell, Martin, and Hughes color motion picture films, which also showed the spectator in the doorway, and detected a pattern of lines that correspond in pattern and color more closely to Lovelady's plaid shirt than to Oswald's tweed-patterned shirt. (253) (See figure IV-67.)

(764) Even so, in an effort to resolve the issue even more definitively, the photographic evidence panel's board of forensic anthropologists were requested to study the photograph of the spectator shown standing in the doorway.

2. ISSUE

(765) Is it possible to identify positively as either Lee Harvey Oswald or Billy Lovelady, the man, shown in the Altgens photograph standing by the doorway entrance to the Texas School Book Depository at the time of the President's assassination.

* Groden initially was among those who claimed the Altgens photograph could not be of Lovelady. See note 249 *supra*.



FIGURE IV-68.—Enlargement of spectator's face.
Altgens A.P.—World Wide Photos



FIGURE IV-69.—Oswald arrest in Dallas.

3. MATERIALS

Spectator

(766) In order to produce the clearest possible photographic images of the spectator in question, the Photographic Evidence Panel had black and white prints made from the original Altgens 35 millimeter negative at various contrasts, density levels and enlargements.* (254) They included various enlargements of the spectator's face such as that shown in figure IV-68. The anthropologists were furnished with a number of these prints.

Oswald

(767) A series of photographs of Lee Harvey Oswald, ranging from the time of his U.S. Marine Corps enlistment in 1956 to his arrest in Dallas in 1963, were provided to the anthropologists. While all were examined, those taken on the day of Oswald's arrest in Dallas received the closest scrutiny. (See, for example, Figure IV-69).

* The Altgens negative was not subjected to digital image processing because the image was blurred to the resolution limitations of the camera system, and, consequently, the Photographic Evidence Panel believed that computer assisted enhancement techniques would not aid in identifying the man in the doorway.

Lovelady

(768) Photographs of Lovelady were furnished which varied in date from 1959 to 1977. Of most interest were those taken near the time of the assassination. (See, for example, figure IV-70.)



FIGURE IV-70.—Billy Nolan Lovelady circa 1959-63.

4. CONCLUSION

(769) Due to the blurred quality of the enlargements of the spectator's image in the Altgens photograph, it was not possible either to identify or exclude positively Lovelady or Oswald. Based on a subjective assessment of the facial features of the spectator, however, it was determined that the man in the doorway bears a much stronger resemblance to Lovelady than to Oswald. Thus, assuming it is either Oswald or Lovelady, and not a third party, it appears highly improbable that the spectator is Oswald and highly probable that he is Lovelady.

5. ANALYSIS

(770) In comparing the photographs of Oswald and Lovelady, the general similarities in facial configuration between the two men were initially noted. Closer examination of the photographs revealed significant differences in the two men's facial proportions:*

(771) (a) *Facial length*.—Relative to facial breadth across the cheekbones, Lovelady's face is longer than Oswald's.

(772) (b) *Lower jaw breadth*.—Relative to facial breadth, measured across the cheekbones, Lovelady's lower jaw is narrower than Oswald's.

(773) (c) *Chin length*.—Relative to facial length, Lovelady has a somewhat longer chin than Oswald.

(774) (d) *Forehead breadth*.—Relative to the breadth of the face measured across the cheekbones, Lovelady's is broader than Oswald's.

(775) (e) *Nasal breadth*.—Relative to nose length, Lovelady's nose is broader than Oswald's.

(776) (f) *Nasal tip*.—Oswald's nasal tip is somewhat small and sharply contoured, whereas that of Lovelady is rounder and more bulbous.

(777) (g) *Forehead height*.—Due to hairline recession, Lovelady has a relatively higher forehead than Oswald.

(778) (h) *Hairline contour*.—Photographs of Lovelady and Oswald taken at a time close to the assassination indicate that overall Lovelady's central hairline had receded more than Oswald's, resulting in Lovelady's higher forehead, as noted above; in addition, the recession on both sides of Lovelady's temple is more sharply advanced than Oswald's. Lovelady's recession was not uniform, and he has a downward projection in the hairline about one inch to the right of the center of his forehead. This eccentrically placed "widow's peak" was not observed in any of Oswald's photographs.

(779) In summary, Lovelady's face is relatively longer than Oswald's, its length accentuated, in part, by more advanced balding and also by his narrower lower jaw and deeper chin. The asymmetry in his hairline is also a distinctive trait.

(780) The enlargements of the spectator's face are not of sufficient quality to permit accurate measurements. However, several features corresponding to Lovelady's traits can be discerned and subjectively assessed:

(781) (a) A relatively broad, high forehead;

(782) (b) Advanced recession of the hairline on each side of his head;

(783) (c) Interruption of the central hairline by a downward extension located slightly to the right of the center of the forehead;

(784) (d) A relatively long face with narrow jaws and a deep chin; and

(785) (e) A rather bulbous nasal tip.

*All measurements relative to these facial proportions are provided in the tables accompanying the text to pars. 732-748 supra.