

## PRELIMINARY REPORT ON BALLISTICS EVIDENCE

### TESTING LOCATIONS/PARTICIPANTS

Firearms Identification Examinations performed by and under the auspices of the FBI Laboratory were conducted by Special Agents Robert A. Frazier, Courtland Cunningham and Charles L. Killion. These agents actually fired the Manlicher-Carcano rifle in the firearms performance tests conducted at Edgewood Arsenal, Edgewood Maryland.

Spectrographic analysis was performed at FBI Laboratory, FBI Headquarters, Washington, DC, by Special Agents John F. Gallagher, Henry B. Heiberger, and William R. Heilman.

The neutron activation analysis tests for the Warren Commission were conducted by J.F. Emery and Frank F. Dyer while both men were chemists employed by Union Carbide Corporation, Oak Ridge National Laboratory, Oak Ridge, Tennessee. The evidence items were irradiated on May 15, 1964 and counted on May 15, 1964 and May 26, 1964. (First Response to Interrogatories, Weisberg v. United States, p. 6)

The neutron activation analysis tests for the House Select Committee on Assassinations were conducted by Dr. Vincent Guinn of the University of California, Irvine. The tests were conducted at the University of California, Irvine campus on September 12, 13, and 14, 1977. The items were accompanied by James Gear, National Archives, and two Federal guards. The specimens were secured during testing at the Laguna Niguel, California branch of the National Archives.

The ballistics examination conducted by the House Select Committee on Assassination was performed by John S. Bates, Jr., Donald E. Champagne, Monty C. Lutz and Andrew M. Newquists, independent firearms experts. The tests took place at the Washington Metropolitan Police Department Firearms Laboratory on November 12, 1977, January 30-February 3, 1978, March 13-17, 1978, May 22-26, 1978, June 2, 1978 and June 12-15, 1978. The items were returned to the National Archives after the Panel completed its tests.

### DEFINITIONS

Micrometer--measurements of the interior of the weapons and of the lands and grooves on the ammunition.

Microscopic--comparison of bullets and fragments under a microscope in an attempt to

match them with missiles or fragments known to have been fired from a particular weapon. Used also to compare bullet characteristics to ascertain the caliber.

Spectrographic--measurements of the spectrum of elements present when a solid object is transformed into a gas. This test consumes the specimen tested.

Neutron Activation Analysis--measurements of the radioactive half-lives of elements present in a specimen that is bombarded by neutrons in a nuclear reactor.

## ARTIFACTS

### Three Empty Shell Casings, --TSBD--(CEs 543, Q48; CE 544,Q6; CE 545, Q7 )

#### Tests

FBI Laboratory

Micrometer--CE 544, 545--11/23/63; CE 543--11/28/63

Microscopic -CE 544, 545--11/23/63; CE 543--11/28/63

Examination of markings to determine if previously loaded--5/12/64--requested by the Warren Commission in a letter from Rankin to the FBI.

Note: The WC concluded that the cartridges had been loaded and ejected prior to being fired during the assassination. See chart to follow.

HSCA Firearms Panel

CE 543, 544, 545

The cartridges were compared to CE 577, 2 cartridges test fired from CE 139, the 6.5 mm Manlicher-Carcano rifle found in the TSBD, by the FBI during the initial investigation. The were also compared with four shell casings, T-1 through T-4, test fired by the HSCA firearms panel.

Chain of Custody--Three empty shell casings were photographed on the sixth floor at the TSBD on 11/22/63, after being discovered by Lt. Day and R. L. Studebaker of the DPD. CE 544 and CE 545 were removed from the TSBD by Lt. Day and Detective Richard H. Sims 11/22/63 and given to Capt. Fritz of the DPD. CE 544, CE 545 marked by Lt. Day were received by FBI lab from SA Vincent Drain, 11/23/63--180-10090-10415. CE 543 was not turned over to the FBI until 11/28/63 after the FBI demanded the cartridge from Capt. Fritz. There are questions concerning the chain of custody of CE 543 because it was not turned over at the same time as the other cartridges and it was not marked by Lt. Day.

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The empty shell casings were retained by the FBI until transferred to the National Archives on 9/14/66. These items were included on a 90 page list of items prepared by the FBI. The cartridges were subsequently requested by the Firearms panel of the HSCA and were retained in their custody at the Washington Metropolitan Police Department during the Panel's examination. I found no records of transfers between the FBI and the Warren Commission, however, the items were given commission exhibit numbers and photographed for the Warren Commission. On April 23, 1996, I observed the items labeled CE 543, 544 and 545. CE 543 was dented on the lip as reported in the WC documents. The empty shell casings appeared to be the same as described in the various WC and HSCA documents.

**One Complete rifle cartridge, (unfired), removed from the chamber of CE 139  
(CE 141, Q8)**

Tests

FBI

Microscopic--FBI lab 11/23/63

HSCA

microscopic--CE 141 was compared to the Panel's test cartridge No. 4 which was loaded in CE 139 but was not fired. The bullet portion of CE 141 was compared to several of the fragments examined by the Panel.

Chain of Custody--This unfired cartridge was discovered during the initial investigation of the sixth floor of the TSBD. Captain Will Fritz noticed the unfired cartridge in the rifle. The rifle was received from Lt. J. C. Day by SA Vincent Drain who transferred it to the FBI laboratory on 11/23/63--180-10090-10415. The cartridge was retained by the FBI until transferred to the National Archives on 9/14/66. This item was included on a 90 page list of items prepared by the FBI. The cartridges were subsequently requested by the Firearms panel of the HSCA and were retained in their custody at the Washington Metropolitan Police Department during the Panel's examinations. The cartridge was returned to the National Archives at the end of the HSCA firearms panel tests. On April 23, 1996, I observed item CE 141. It was as described, an unfired cartridge loaded with a 6.5 mm caliber bullet.

**Two bullet fragments (front seat of limousine)**

CE 567,Q2, C2--nose portion of 6.5mm caliber full-metal jacketed lead core bullet;

CE 569,Q3, C3--base portion of 6.5 mm caliber full-metal jacketed lead core bullet CE

**572--two bullets test fired by the FBI. Individually labeled KIA and KIB.**

Tests

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FBI

spectrographic--11/23/63

microscopic--11/23/63

neutron activation analysis--

CE 567 was tested during the WC neutron activation analysis  
(62-109060-3452)

HSCA

microscopic--CE 567 was compared with 2 test bullets from the FBI tests (CE 572,

KIA and KIB). The worksheets of 2 members of the panel

referenced a "white (fibrous)[sic] substance" adhering to the fragment.

Further chemical analysis of the fiber was suggested in the unpublished report  
of the panel. There is no evidence that any additional investigation of this material  
was conducted and no reference was made in the published report of the HSCA  
Firearms panel, nor in any previous FBI laboratory tests.

CE 569 was compared with both the bullet portion of CE 141 and the  
individual bullets test fired by the FBI, CE 572 (KIA and KIB).

Note: CE 567 and CE 569 were found to have markings consistent with  
CE 141 but could not be matched with CE 399. (HSCA Firearms Panel  
Report, p. 22, unpublished.)

neutron activation analysis

CE 567 (C2) was the only "layer bullet fragment" tested, meaning that it  
was the only one with the lead inner core and copper jacket. CE 569 was found  
to be unsuitable for NAA. (180-10106-10429) (Dr. Guinn NAA report, p. 9)

Chain of Custody--Recovered from presidential limo front seat 11/22/63 (11:25pm) by Floyd Boring,  
USSS. The fragment was turned over to the FBI lab from S.A. Orrin Bartlett, 11/22/63. These  
fragments were included on the 90 page list of evidence items transferred by the FBI to the National  
Archives on 9/14/66. The fragments were transferred from the National Archives to Dr. Guinn at the  
University of California, Irvine on 9/12, 1977 until 9/14/ 1977. The fragments were flown by  
commercial airline, in the custody of Mr. James Gear of the National Archives and two Federal  
guards. At the end of each day of testing, the samples were secured at the Laguna Niguel, California  
branch of the National Archives. After the neutron activation analysis was complete, the fragments  
were transferred back to the National Archives in Washington, DC. The fragments were transferred  
to the Washington Metropolitan Police department for the HSCA Firearms panel tests. They were

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returned to the National Archives after the Panel's tests. On April 23, 1996, I observed items CE 567 and CE 569. CE 567 was separated into one large nose portion consisting of a mutilated piece of copper jacketing twisted and flattened around the lead core. As observed under 10X magnification, a tan, fibrous substance was imbedded in the fragment. This fibrous substance was also visible to the naked eye. Additionally, the two smaller lead pieces of the fragment were covered with particles from the cotton batting they had originally been packed in. One of the smaller particles also contained a piece of fibrous, resembling the substance embedded in the larger piece. CE 569 was clearly identifiable without magnification. It appeared as previously described, the bottom portion of a copper jacketed bullet. The copper jacket appeared to be empty of any lead from the interior of the bullet.

### **Three\*\* bullet fragments (limousine backseat; CE 840, Q14)**

\*\*In 1970 an independent researcher discovered that one of the fragments was missing from the National Archives. There are now only two fragments in the National Archives. The original three were received from SA Cunningham by Marion Johnson, Archivist, in 1966.

Tests

FBI

spectrographic--11/23/63

microscopic--11/23/63

HSCA

micrometer--the particles were measured and considered too minute for any further testing.  
neutron activation analysis--tested by Dr. Guinn

Chain of Custody--These particles were found under the rug of the left jump seat in the rear of the limousine. FBI laboratory personnel examined the limousine, recovered the fragments and transmitted them to the FBI lab on 11/23/63--180-10090-10415. A researcher discovered and brought to the attention of the National Archives that one of the fragments was missing in 1970. The remaining two fragments were transferred to Dr. Guinn at the University of California, Irvine by Mr. James Gear of the National Archives and two Federal guards. At the end of each day of testing, the samples were secured at the Laguna Niguel, California branch of the National Archives. After the tests, the fragments were returned to the National Archives in Washington DC. The fragments were subsequently transferred to the Washington Metropolitan Police Department for testing by the HSCA firearms panel in 1978. The Panel determined that the fragments were too minute for any procedure other than weighing. The fragments were returned to the National Archives at the end of the HSCA examination. On April 23, 1996, I observed the items recovered from the rear of the limousine, labeled CE 840. This exhibit consisted of two small fragments that were clearly visible without magnification.

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**Two\*\*\* bullet fragments (Kennedy's head CE 843; C4, Q4; C5, Q5)**

Tests

FBI

spectrographic--11/23/63

microscopic--11/23/63

neutron activation analysis--

tested during the WC neutron activation analysis

( 62-109060-3452)

HSCA

microscopic--\*\*\*the published report of the HSCA Firearms panel lists three fragments which were too small to test.

neutron activation analysis--tested Dr. Guinn for the HSCA

Chain of Custody--rec'd from SAs Siebert and O'Neill in the autopsy room at Bethesda Naval Hospital, 11/23/63, --180-10090-10415, these fragments remained in the custody of the FBI laboratory until transferred to the National Archives on 9/14/66. These items were included on a 90 page list of items prepared by the FBI. The cartridges were subsequently requested by the Firearms panel of the HSCA and were retained in their custody at the Washington Metropolitan Police Department during the Firearms Panel's tests. I found no records of transfers of these items between the FBI and the Warren Commission, however, the items were given commission exhibit numbers and photographed for the Warren Commission. The fragments were brought by commercial airline, in the custody of Mr. James Gear of the National Archives and two Federal guards to the University of California, Irvine for neutron activation analysis on 9/12, 1977. At the end of each day of testing, the samples were secured at the Laguna Niguel, California branch of the National Archives. They were returned to the National Archives in Washington, DC after the tests were completed on 9/14/77. They were later transferred to the Washington Metropolitan Police department for examination by the HSCA Firearms Panel. They were subsequently returned to the National Archives. On April 23, 1996, I observed the items labeled CE 843. They consisted of two small fragments, one fragment was approximately one and one half to two times the size of the other fragment. The smaller fragment appears to have a tan colored, dried flake of unknown origin attached to it.

**One 6.5 mm bullet (CE 399, Q1, "Magic Bullet", "Pristine Bullet")**

Tests

FBI

spectrographic--11/23/63

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microscopic--11/23/63

neutron activation analysis

lead from the base was tested during the WC neutron activation analysis  
(62-109060-3452)

HSCA

microscopic-- compared with two bullets test fired by the FBI (CE 572).

neutron activation analysis

lead from the base was tested by Dr. Guinn for the HSCA

Chain of Custody--According to document 180-10089-10187, Nathan Pool, an employee of Otis Elevator Company was sent to Parkland by Otis Co. to ensure that the elevators worked. He was with Darrell C. Tomlinson and actually discovered the bullet on the stretcher in the hall, outside the elevator. He claims to have heard the bullet fall, it was not visible on top of the stretcher and he gave it to Tomlinson. Pool stated that he did not know who Tomlinson gave the bullet to because he went around the corner to give it to a Secret Service Agent. Tomlinson gave the bullet to O.P. Wright, hospital security at Parkland Hospital. Wright gave the bullet to SA Richard E. Johnson, USSS. SA Johnson gave the bullet to James Rowley, Chief, USSS, on 11/22/63 upon his return to Washington, DC. Chief Rowley gave the bullet to SA Elmer Todd (Todd marked it with his initials), 11/22/63--180-10090-10415. SA Todd gave the bullet to SA Frazier at the FBI lab. received from FBI Lab by Melvin Eisenberg, assistant counsel, WC on 3/24/64. The bullet was given to Joseph Nicol, Bureau of Criminal Identification, State of Illinois for ballistic comparison. On 6/12/64, SA Bardwell D. Odum, FBI asked Tomlinson and Wright to identify bullet CE399 as the one they recovered in Parkland Hospital. They could not positively identify it as the same bullet. On 6/24/64, SA Johnson (USSS) and Chief Rowley were asked to identify the bullet as the one they received from Dallas. They could not positively identify it. SA Todd identified it as the one he put his initials on when he received it from Chief Rowley. This item was included on the 90 page list of evidence items transferred from the FBI to the National Archives on 9/14/66. On 9/12/78, the whole bullet was brought by Commercial Airline, in the custody of Mr. James Gear of the National Archives and two Federal guards to Dr. Guinn at the University of California, Irvine campus. At the end of each day of testing, the samples were secured at the Laguna Niguel, California branch of the National Archives. The bullet was returned to the National Archives after the tests ended on 9/14/78. I can personally verify that I have seen the item identified as CE 399 in the National Archives, JFK Collection, at College Park, Maryland. On April 23, 1996, I observed the item labeled CE 399. The bullet looked the same as depicted in the pictures published in the WC documents. I was able to discern the initials representing the chain of custody of item CE 399. **Note: SA Drain advised FBI HQ that he was bringing in a bullet removed from the President's body. The lack of any other explanation indicates that this is the CE399 bullet recovered from Parkland Hospital.** (1241002710261) On 6/24/64, SA Richard Johnson was shown FBI exhibit Q1 (CE 399) but was

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unable to identify it as the bullet he received at Parkland Hospital and gave to Chief Rowley. (WH XXIV 411-428, CE 2011)

**One 6.5 full metal-jacketed bullet (Walker house, CE 573, C 148, Q188)**

Tests

FBI

spectrographic--12/6/63

microscopic--12/6/63

HSCA

microscopic--compared with CE 141, CE 572 and Panel test bullets, T-1 through T-4. Determined to be too damaged to be identified or eliminated as a bullet fired from CE 139.

neutron activation analysis--tested by Dr. Guinn

Chain of custody--On April 23, 1996, I observed item CE 573. It was a flattened, full metal-jacketed 6.5 mm caliber bullet. It appeared to be an entire bullet that was mutilated from the impact with the window and wall of the Walker home. The lead core was exposed along the length of the bullet.

**First bullet from Tippet body (CE 602, C13, Q13)**

Tests microscopic--compared with test bullets fired from the S&W revolver by the FBI.  
spectrographic--11/23/63

**Remaining three bullets from Tippet body (CE 594)**

1 Remington-Peters .38 caliber-C252, C48

2 Western Cartridge Co. .38 caliber-C251, C47; C253, C49

Tests spectrographic--FBI lab 11/23/63 180-10089-10073

*Worksheets--62-109060-1719, folder 11*

microscopic--FBI lab 11/23/63 180-10059-10061

**6.5 mm ammunition from Western Cartridge Co.--lots 6000, 6003**

Tests

Velocity--12/2/64--Naval Research Laboratory-- Using CE 139, three shots from each lot (six shots total) were fired to measure the time it takes bullet to travel 2.01 feet.

**Bullet fragment from Connally's Arm (CE 842, Q9)**

There is a clear discrepancy involving the number and size of fragments recovered from

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Governor Connally's arm during the surgery at Parkland Hospital. Nurse Audrey Bell recalled seeing five fragments of rather large size. The National Archives and Records Administration has four fragments which are much smaller than the size of the fragments Audrey Bell indicated in a drawing published in 1992. The FBI Laboratory records indicate receiving and testing only one fragment from Governor Connally's arm.

#### Tests

##### FBI

microscopic--11/23/63

spectrographic--11/23/63

neutron activation analysis

tested by the WC, (62-109060-3452)

**Note: According to the FBI, only one fragment was removed from Governor Connally's body. ( First Response to Interrogatories, Weisberg v. United States, p. 14)**

##### HSCA

microscopic--the HSCA Firearms panel published report lists four lead-like fragments, "the smallest was identified as having come from Governor Connally's arm." (HSCA Vol. 7, p. 367)

neutron activation analysis--tested by Dr. Guinn

Chain of custody--The HSCA interviewed Nurse Audrey Bell who was present in the operating room during Governor Connally's surgery on 11/22/63. She recalled seeing the Dr. Gregory remove the fragments from the Governor's wrist and place them in a glass vial. Nurse Bell recalls seeing four or five large fragments which she placed in an evidence envelope and sealed the envelope. She claimed to have written a description of the evidence and a chain of custody on the envelope. Dr. Gregory remembered removing only three fragments during the operation. CE 843, three to four fragments, were transferred from the FBI on 9/14/66 to the National Archives. In 1977, the fragments were transferred to Dr. Guinn at the University of California, Irvine, for neutron activation analysis in the custody of Mr. James Gear of the National Archives and two Federal guards. At the end of each day of testing, the samples were secured at the Laguna Niguel, California branch of the National Archives. The fragments were returned to the National Archives in Washington, DC when the tests ended on 9/14/77. The fragments were also examined by the HSCA Firearms Panel at the Washington Metropolitan Police Department in 1978. The fragments were returned to the custody of the National Archives after May 27, 1978. On April 23, 1996, I observed the items labeled CE 842. The exhibit consisted of a small sliver of lead and three very minute specks of what appears to be lead.

**One mutilated bullet--found in 1975 by Richard Lester ( C332\*, Q632)**

\*The Lester bullet was never issued a Commission Exhibit number

Tests

FBI

microscopic --comparison to two bullets fired from M-C rifle (C2766)

Chain of custody--found by Richard Lester using metal detector in Dealey Plaza. Transferred to the FBI lab by agents of the Dallas office. The Lester bullet was received by FBI lab on 12/1/76. On July 28, 1977, the bullet was compared to CE139 test bullets from NARA. It was determined that the test bullets and the Lester bullet were different types bullets but of the same caliber. The bullet was returned to Mr. Lester after the tests were completed. The bullet was severely mutilated when received by the FBI lab. After the bullet was returned to Mr. Lester, he stated that he was not sure he had received the same bullet that he turned over to the FBI.

**Manlicher-Carcano Rifle C2766 (CE 139, K1, C14)**

Tests latent prints--DPD 11/22/63

sulphur casts--FBI lab 11/23/63, 62-10906, Box 109D

microscopic--FBI lab 11/23/63

Test fired--FBI lab 11/23/63

**Note: The scope on the rifle was mounted for a left-hand shooter. It was switched to the right side and shims were added to facilitate testing by the FBI special agents, who like Oswald, were right-handed.**

*Aberdeen Firearms tests worksheets--62-109060-8307X, box 109B, folder 15*

Ejection Pattern test--2/26/64--19 cartridges ejected in two tests--1)Muzzle horizontal, 2)Muzzle depressed 45°

Velocity Tests--5/13/64--57 shots in two tests. 1)Edgewood Arsenal, 2)H.P.

White Laboratory--Original targets, original worksheets 62-109060, box 111A, folder 51.

Trajectory Tests--3/27/64--4 shots to determine distance of projectile above or below line of sight when rifle "sighted-in" for various distances.

Accuracy Tests--11/27/63--3 rounds each of WCC lot 6000 ammunition--Killion-- 3 rounds, 8 seconds, 3/8" from target, Cunningham-- 3 rounds, 8 seconds, 7/16" from target, Frazier--3 rounds, 5.9 seconds, 3/4".

**CE 551--300ft target showing 3 holes**

--11/29/63--Frazier--3 rounds, 4.8 seconds, 1<sup>15/16"</sup>

--11/29/63--Frazier--3 rounds, 4.6 seconds, 5<sup>3/16"</sup>

Wound Ballistics Tests--

neck (Kennedy)

gelatin block

180 ft

	horse meat	
	goat meat	
chest (Connally)	goat (13 shots)	210 ft
wrist (Connally)	cadaver (10 shots)	210 ft
head (Kennedy)	skull/20% gelatin (10 shots)	270 ft

Test fired--HSCA Firearms Panel--03/13-17/63, 180-10076-10362

fired by John S. Bates, Jr., Donald E. Champagne, Monty C. Lutz, Andrew M. Newquist. Trigger pull was determined to be three pounds.  
Bullets were fired into a horizontal water recovery chamber.

Chain of Custody--taken from TSBD by Lt. J. C. Day and SA Odum. The rifle was initially identified as a 7.65 mm German Mauser by Deputy Constable Seymour Weitzman and in his affidavit of 11/23/63, and by Eugene Boone, who so indicated in 2 written statements on 11/22/63. Dallas District Attorney Henry Wade announced at a midnight news conference on 11/22/63 that the rifle was a German Mauser rifle. rec'd by SAC Forrest Sorrels, USSS, rec'd by FBI-Dallas 11/23/63, rec'd from SA Vincent Drain to FBI laboratory, 11/23/63, 180-10090-10415, received by DPD as evidence in the LHO murder investigation. The rifle was returned to the FBI SA Drain on 11/26/63, after LHO's death. The rifle was requested and received by the Warren Commission on 2/5/64. It was returned to the FBI lab on 2/6/64. The rifle was received by the Warren Commission on 2/17/64 and returned to the FBI lab on 2/17/64. It was again requested and received by the Warren Commission on 3/11/64 and returned to the FBI Lab 3/11/64. The rifle was transferred back into the custody of the Warren Commission on 3/17/64 and returned to the FBI lab on 3/30/64. The rifle was returned to the Warren Commission on 3/31/64 where it remained until it was received by the FBI lab on 5/8/64. The rifle was again transferred to the Warren Commission and back to the FBI lab on 7/2/64. The gun was transferred back to Dallas into the custody of the FBI- Dallas office on 8/13/65. The rifle, pistol and holster were evidence in the civil suit brought by Marina Oswald against the United States government. The evidence remained in Dallas in the custody of the DPD until it was returned to the FBI on 11/05/66. It was shipped by air express to Washington. The rifle was transmitted to the National Archives after its return to the FBI.

**Smith and Wesson .38 caliber revolver suspected in Officer Tippet shooting (CE 143, C 15, K3)**

Tests

FBI

microscopic--11/23/63

micrometer--11/23/63

sulphur cast--3/23/64--62-109060, Box 109D--

In the National Archives Collection

Original worksheets, drawings, 62-109060, Box 111A, folder 51

Chain of custody--Received from DPD by FBI- Dallas 11/23/63. The revolver was transmitted to the FBI lab on 11/23/63. It was returned to FBI- Dallas on 11/23/64, in anticipation of a murder trial. It was returned to the FBI lab on 11/27/63 after LHO's death. It was received by the Warren Commission on 2/5/64. It was returned to the FBI lab on 2/6/64. It was subsequently transferred to Mr. Howard P. Willens of the Warren Commission on 3/25/64. It was returned to the FBI lab on 3/30/64. It was received by the Warren Commission on 4/1/64 and returned to the FBI lab on 5/1/64. The revolver was transferred back to Dallas on 8/13/65 FBI Dallas for the civil suit brought by Marina Oswald against the United States. The DPD returned it to the FBI on 11/05/66 (after it was determined to be government property in the lawsuit), shipped by air express. The FBI transferred it to the National Archives where it has remained.