

## BALLISTICS

September 8, 1978

Narration by G. Robert Blakey

So far this week, the Committee has taken testimony relating to President Kennedy's trip to Texas, the nature and extent of his wounds as well as those inflicted on Governor Connally, the number of bullets that struck President Kennedy and the direction from which they were fired. Today, testimony will be taken from experts in the general field of ballistics, specifically including:

- an expert in wound ballistics, or the science of bullet effects on the human body;

- a panel of experts in firearms analysis; and

- an expert in neutron activation analysis, which is a method of analyzing bullet samples for their trace-element characteristics, which makes possible conclusions about the probability of common origin.

It may be helpful before hearing from these experts, however, to review or to set out several of the issues that the Committee will be examining today.

First, what is the validity of the single bullet theory? That is, did the slightly damaged bullet that was recovered and marked by the Warren Commission as exhibit 399 traverse the President's neck and cause all of Governor Connally's wounds?

Second, what is the best explanation for the apparent rearward movement of the President's head at the time of the fatal shot, as it is portrayed by the Zapruder film.

Third, what are we able to determine about the rifle found on the sixth floor of the Texas School Book Depository and identified as the one used to assassinate President Kennedy, as well as the revolver found at the scene of the murder of Dallas Police Officer J. D. Tippit?

Finally, what can our firearms experts tell us about the bullets fired in the Kennedy assassination and the Tippit murder in terms of type, number of bullets fired and so on?

Since the turn of the century, when it first became possible to photograph bullets in flight, scientists have been collecting data on the trajectory and stability of bullets. A highly specialized area of this general field of "ballistics" has been developing in recent years. It is the science of what occurs to a bullet when it strikes, enters and traverses a human body. It is called "wound ballistics", and there are two important aspects of it here.

1. the determination of the factors involved in the potential of a projectile to cause injury, namely its velocity, shape, momentum, energy and power; and
2. the determination of the nature of the damage to tissues as a result of a projectile striking a human body.

The Warren Commission ordered wound ballistics experiments in an effort to determine if the wounds to President Kennedy and Governor Connally could have been caused by the Mannlicher-Carcano rifle found in the Book Depository. The tests were conducted by the Wound Ballistics Branch of the U. S. Army Chemical Research and Development Laboratories at Edgewood Arsenal, Maryland.

The Army measured the penetrating power and flight stability of the bullets fired by the Mannlicher-Carcano, and it simulated the wounds to President Kennedy and Governor Connally by shooting anesthetized goats and materials that replicate the human body. In part, as a result of the tests, the Commission concluded:

1. That Governor Connally's wounds were caused by one bullet and that the bullet that traversed the President's neck probably then proceeded to inflict all the wounds to Governor Connally.
2. That a bullet fired from the Mannlicher-Carcano rifle at a distance of 270 feet would cause a wound similar to the wound discovered in the President's head.

The Committee analyzed the reports of the tests at Edgewood. It also considered having a series of its own conducted. Rather than ask the Army to do additional experiments, it solicited a proposal from a private contractor, H. P. White Laboratory of Bel Air, Maryland. The company expressed its view that efforts to replicate the assassination would always be subject to question, since no material reacts in the exact manner of human

tissue when fired into. Moreover, it is impractical to expect to be able to recreate C.E. 399 by shooting bullets through a series of various substitute materials, such as gelatin blocks and bone fragments.

 The main reason was the extreme unpredictability of the yaw motion of a bullet in flight as it traversed, exited and reentered a series of targets. The company did propose shooting through smoothbore barrels in a series of tests costing \$20,000, but it was not at all optimistic about exactly reproducing what occurred in Dallas.

WHO The Committee discussed the proposal with Mr. Larry Sturdivan, a wound ballistics expert employed by the Army, and it got advice from a specialist in scientific methodology, Dr. Gerald Gordon. The decision made was not to undertake further testing for these reasons:

1. Results of tests with materials other than human bodies could be theoretically questioned.
2. The number of shots to obtain a statistical sample could not be reasonably determined.

PERHAPS SUBTLE, BUT IMPORTANT... MISUNDERSTOOD BY LAYMEN

3. Under the best possible circumstances, the experiment would only yield a statement about probabilities. There is, in fact, no way to prove scientifically that C.E. 399 could not have inflicted the damage attributed to it by the Warren Commission.
4. The most such tests could establish is that such a series of events, that is, the wounding of both

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President Kennedy and Governor Connally, could have occurred, not that they actually did occur.

LET'S  
SEE WHAT  
NAA  
SAYS.

Mr. Sturdivan, who will be our next witness, received an M.S. degree in statistics from the University of Delaware in 1971 and a B.S. degree in physics from Oklahoma State University in 1961. He has studied mathematics and computer science at the Ballistic Institute of the Ballistic Research Laboratories, Aberdeen Proving Ground, Maryland, and he has been a physical scientist with the Wound Ballistics Branch of Aberdeen Proving Ground's Vulnerability Laboratory since 1964. In that capacity, he has worked on projects for the Columbia University College of Physicians and Surgeons and the Engineering Department of the University of South Carolina.

Mr. Sturdivan is the author of numerous professional articles. He has presented papers before the U. S. Army Science Conference at West Point, the 14th Army Conference on Design of Experiments at Edgewood Arsenal and at the First Stabilized Fragment Review Conference at Picatinny Arsenal.

Mr. Sturdivan frequently serves as a consultant in wound ballistics for such agencies as the Law Enforcement Assistance Administration, the Department of Justice and NATO.

Mr. Chairman, it would be appropriate now, to call Mr. Sturdivan.

Mr. Chairman, the testimony now to be taken concerns forensic firearms identification - the science of identifying fired bullets and cartridge cases with firearms. But first, some background information would be helpful. Soon after the assassination, Dallas police suspected the shots originated at the Texas School Book Depository. At 1:13 p.m. central standard time Deputy Sheriff Luke Mooney discovered three used cartridge cases lying on the floor near the southeast corner window of the sixth story. The cartridge cases were later turned over to the FBI.

At 1:22 p.m. Deputy Sheriff Eugene Boone and Deputy Constable Seymour Weitzman discovered a bolt-action rifle equipped with a telescopic sight. It was also on the floor of the sixth story of the Book Depository, near the northwest corner. Weitzman - though neither he nor Boone handled the rifle - described it as a 7.65 German Mauser, although it was subsequently determined to be a 6.5 millimeter Mannlicher-Carcano Italian military rifle. It contained one round, a full copper-jacketed military-type bullet manufactured by Western Cartridge Company.

As the officers were collecting assassination evidence in the Book Depository, Officer J. D. Tippit was shot and killed in the Oak Cliff section of Dallas, several miles from the Book Depository. Four spent .38 caliber cartridges were found at the scene of the Tippit murder.

Shortly before 2 p.m., Lee Harvey Oswald was arrested as a suspect<sup>NOT IN THE PRESS'S 935M 805</sup> in the Tippit shooting. He was apprehended after

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a scuffle in the Texas Theater, and he was carrying <sup>ALLEGEDLY</sup> a .38 S&W special designed to fire .38 S&W ammunition. Although the revolver had been rechambered to fire .38 special ammunition, it had not been rebarreled.

At approximately 1:55 p.m., a bullet was found on a stretcher in the emergency area of Parkland Hospital. O. P. Wright, Director of Security, was notified, and he turned the bullet over to a Secret Service agent. It was the one the Commission would label exhibit 399.

Other evidence that was recovered in the aftermath of the assassination included missile fragments from the presidential limousine, fragments from Governor Connally's wrist and fragments from the President's body. In addition, a bullet that had been recovered in an attempted assault on General Edwin A. Walker in Dallas on April 10, 1963, would become the subject of evidentiary interest in the assassination.

The Warren Commission relied on FBI facilities for firearms identification of the missiles and fragments. (Firearms identification is the process in which missiles and fragments are examined for characteristics that precisely identify the weapon from which they were fired.) The Commission concluded from the FBI tests that C.E. 399, and the two fragments found in the limousine that were large enough to test reliably, had been fired by the Mannlicher-Carcano retrieved from the Texas School Book Depository. It also determined that the three

cartridge cases found in the Book Depository had been ejected from the chamber of the Mannlicher-Carcano. The FBI was unable, however, to link the bullet fired at General Walker with the rifle, though it said the badly mutilated bullet showed the characteristics of a round that had been fired by a Mannlicher-Carcano.

As for the evidence in the Tippit shooting, the bullets removed from the officer's body could not be linked to Oswald's revolver. This was attributed to erratic bullet behavior caused by rechambering. The empty cartridge cases found near Tippit's body were, however, connected to Oswald's revolver.

The critics have used the ballistics evidence to cast doubt on the Warren Commission conclusions. Edward Jay Epstein, in Inquest, contends there remained in Governor Connally's body more bullet fragments than could have been left by C.E. 399. Many critics, for that matter, have maintained that C.E. 399 could not have been recovered virtually intact after causing the many severe wounds the governor received.

To conduct a comprehensive scientific examination of the firearms evidence, the Committee chose a panel of experts who had no prior affiliation with the case. The panel was charged with resolving the following issues:

1. The character and characteristics of the evidence - the Mannlicher-Carcano retrieved from the Book Depository, the .38 revolver found in Oswald's possession, and missiles and fragments that have been associated with the assassination.
2. The possibility that a 6.5 millimeter Mannlicher-

Carcano could be easily mistaken for a 7.65 German Mauser.

3. Whether the cartridge cases found on the floor of the sixth story of the Texas School Book Depository, the bullet found at Parkland Hospital and the fragments removed from Governor Connally, the limousine and from the President's body can be connected to the Mannlicher-Carcano.

4. A number of related issues raised by critics, for example, was the scope mounted for a left-handed marksman?

Members of the ballistics panel on hand today are:

Mr. Monty C. Lutz,

Mr. Donald E. Champagne

Mr. John S. Bates, Jr., and

Mr. Andrew M. Newquist.

Mr. Lutz holds a B.S. degree in Criminal Justice from the University of Nebraska. He presently is a firearms and tool mark analyst with the Wisconsin Regional Crime Laboratory, New Berlin, Wisconsin. Mr. Lutz has lectured at colleges, universities and law enforcement schools across the country.

Mr. Lutz is a past president of the Association of Firearm and Tool Mark Examiners, is presently the chairman of the executive committee and has been named a distinguished member of that association. He is also a member of the National Automatic Pistol Collectors Association and the International Cartridge Collectors Association.

Mr. Lutz has authored numerous professional papers in the area of firearms identification.

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Mr. Champagne is presently a firearms and tool mark examiner with the Florida Department of Criminal Law Enforcement in Tallahassee. He previously served for 15 years as a firearms and tool mark examiner in the Crime Detection Laboratory in Ottawa, Ontario. He has lectured extensively at the Canadian Police College and at other law enforcement agencies in Canada and the United States

Mr. Champagne presently serves as President of the Association of Firearm and Tool Mark Examiners. He also is a member of the Southern Association of Forensic Scientists and the Canadian Society of Forensic Science.

Mr. Champagne has trained several firearms examiners for the Royal Canadian Mounted Police and for the Florida Department of Criminal Law Enforcement. He serves on the editorial board of the Journal of the Canadian Society of Forensic Science.

Mr. Bates is the senior firearms examiner in the New York State Police Laboratory at Albany. He has been a lecturer at the State University of New York at Albany and Cobleskill, the New York Police Academy and the New York State Municipal Police Training Council.

Mr. Bates has studied firearms identification and examination procedures at the U. S. Army Criminal Investigation Laboratory, the Regional Center for Criminal Justice and the Federal Bureau of Investigation in Washington, D. C. He is a member of the Association of Firearm and Tool Mark Examiners,

serving as its Secretary since 1973. In 1973, he was the recipient of the AFTE Distinguished Service Award.

Mr. Bates is a historian for the New York State Police, and he has written numerous articles on the subject of firearms identification for the Journal of the Association of Firearm and Tool Mark Examiners.

Mr. Newquist is a special agent and firearm, tool mark and latent fingerprint examiner for the Iowa Bureau of Criminal Investigation. He has studied firearms identification at the Cook Institute of Applied Science and the FBI Academy.

Mr. Newquist is a member and a past president of the Association of Firearm and Tool Mark Examiners, and he currently is on its executive committee. He is a member of the International Association of Identification.

Mr. Newquist is a lecturer at the Iowa Institute of Public Safety, and he has been accepted as a qualified expert witness in all Iowa courts.

Serving as technical assistant to the firearms panel is Mr. George R. Wilson. Through his assistance, the facilities at the Metropolitan Police Department Firearms Laboratory were secured. His expertise in the area of firearms identification greatly assisted the Panel's conduct of its inquiry.

Mr. Wilson is presently the section chief and senior firearms examiner of the Metropolitan Police Department Firearms Identification Section in Washington, D. C. He developed and implemented the first firearms identification laboratory in the police department's history. He has been its chief for the past 9 years.

Mr. Wilson currently serves as the second vice president of the Association of Firearm and Tool Mark Examiners. In 1974 he received that association's distinguished service award, and during his twenty-five-year tenure with the Metropolitan Police Department he has received over thirty commendations for outstanding and meritorious performance.

It would be appropriate at this time, Mr. Chairman, to call the panel members.

Mr. Chairman, there have been several prior attempts to analyze missiles and fragments recovered after the assassination from the standpoint of their metallic makeup - to determine, for one possibility, if they have a common origin.

In November and December 1963, the FBI applied to the evidence samples a technique called emission spectography. It is a process in which the samples are subjected to intense heat, and their metallic composition is determined by the color of the gas that is emitted. Emission spectography is not highly sensitive, however, and the tests were deemed "inconclusive".

In May 1964, the FBI also performed neutron activation analyses on some of the samples. It is a nuclear method to determine the elements present. An analysis of trace elements found in samples of similar materials - for example, bullet lead - enables a scientist to come to a conclusion as to the probability of the samples having a common origin.

"Inconclusive" was also the term used to describe the FBI neutron activation analysis. The FBI report to the Warren Commission stated the tests would not "...permit positively differentiating among the larger bullet fragments and thus positively determining from which of the larger bullet fragments any given small lead fragment may have come."

(NOT READ??) [ The Warren Commission did not divulge that the neutron activation analysis had taken place. In fact, it was not made public until the early 1970's.

Hopeful that new tests might succeed where old efforts had failed, the Committee engaged, as a consultant, Dr. Vincent P. Guinn, professor of chemistry at the University of California at Irvine. Dr. Guinn analyzed the assassination evidence samples, as well as the bullet allegedly fired at General Walker.

In his experiments, Dr. Guinn used a high resolution lithium-drifted germanium detector, a device that is far more sensitive - and accurate - than the one used for the FBI tests in 1964.

Dr. Guinn received an M.S. in chemistry from the University of California in 1941 and a Ph.D. in physical chemistry from Harvard University in 1949. He has been head of radiochemistry for the Shell Development Corporation and technical director of activation analysis for the General Development Company.

Dr. Guinn studied radioisotopes at the Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee, in 1952. He is a fellow of the American Nuclear Society, the American Academy of Forensic Scientists, and he is a member of the American Chemical Society.

Dr. Guinn has published numerous scientific articles in the area of activation analysis. He has served as advisor to such agencies as the Atomic Energy Commission and he has made a training film on neutron activation analysis which is in wide use today.

It would be appropriate at this time, Mr. Chairman, to call Dr. Guinn.