

# The Kennedy-Connally Single Bullet Theory

## A Feasibility Study

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One of the specific findings of the Warren Commission Report on the Assassination of President Kennedy, which has been a prime target for critics, has been their conclusion that a single bullet from Oswald's rifle traversed President Kennedy's neck, turned slightly, then pierced Governor Connally's chest below the right scapula. The Commission Report postulated that this same bullet then shattered the Governor's fifth rib, turned completely sideways, emerged below his right nipple, went sideways through his right wrist, turned still further to turn completely around and ended up sticking backwards into the skin of his left thigh. From this

position the long narrow bullet was dislodged and was found on a stretcher upon which it was deduced that Governor Connally had lain.<sup>1</sup>

This bullet (Warren Commission Exhibit 399)<sup>2</sup> (Fig. 1, left), if seen only in the side view, which has been widely republished by critics of the Warren Report,<sup>3</sup> appears to be deformed very little. In fact, its apparent lack of deformity has led critics to describe it inaccurately as a "pristine" bullet.<sup>3,4</sup>

Critics have also contended that the four fragments of bullet seen in the preoperative roentgenograms of the wrist and thigh of Governor Connally (Figs. 2A and B) would weigh more than the weight which was estimated to be missing from bullet 399, i.e., 2.2 grains.

Furthermore, they state that the ammunition used by Oswald was "unreliable,"<sup>5</sup> likely to fail to fire and that it did not have

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the capability required by the "single bullet" theory.

Ballistics tests done by governmental agencies<sup>6,7</sup> to investigate these points have been challenged on various grounds. The critics, however, seem to have done no ballistics experiments of their own.

It seemed appropriate, therefore, that some of these points which are still susceptible to experimentation should be investigated by "uninvolved" research workers to see if these particular allegations of the Warren Commission Report are indeed feasible, or whether discrepancies actually do exist which would make them untenable.

First, an investigation of the ammunition, bullets and bullet fragments involved was undertaken to determine whether their condition, number, weight and reliability made it impossible or even unlikely that the bullets involved could have done what the Warren Commission contends they did.

Various laboratory technics were employed with the help of pathologist Dr. Myron Tannenbaum and roentgenologist Dr. Joshua Becker of the Columbia-Presbyterian Medical Center.

Answers to the following questions were sought:

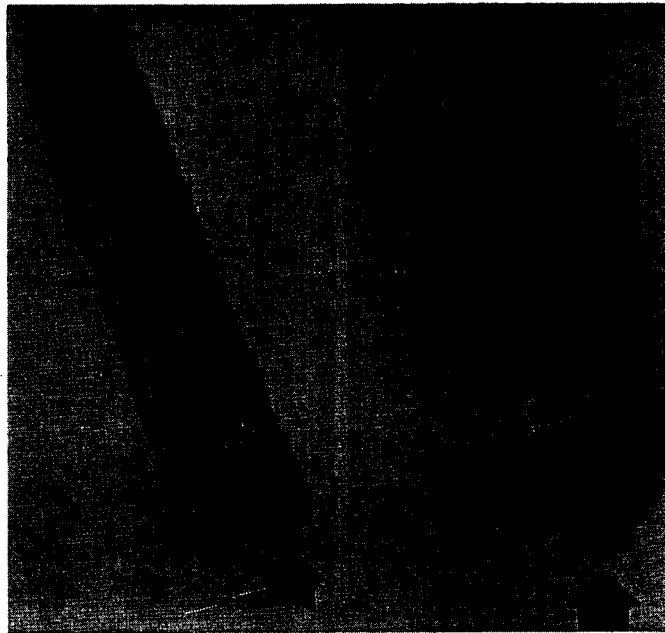
*Question 1.*—Was the bullet (399) which the Warren Commission alleges did so much damage actually "undeformed" or "pristine"?

*Question 2.*—Were the bullet fragments left in Governor Connally indeed too many to have come from bullet 399?

*Question 3.*—Was the ammunition used by Oswald actually unreliable?

### *Was Bullet 399 "Pristine" (Undeformed)?*

To the question, "Was the bullet (Warren Commission Exhibit 399), which was alleged by the Commission to have pene-



*Fig. 1.*—Test bullet (right) has been flattened the same amount as bullet 399 (left), even though the flattening of bullet 399 does not show in this view. Note the portion of lead "core" extruded (arrow, right) from rear end of test bullet, caused by this flattening. Only a tiny amount of extruded "core" remains, protruding from the base of bullet 399 (arrow, left). The rest had been scraped off, presumably by its passage through Governor Connally's wrist.

trated both President Kennedy and Governor Connally, actually "pristine" (undeformed) when found?" the answer was clearly "NO." When actually examined by one of us (J.K.L.), this bullet (399) was found to be flattened as if from a severe blow on one side and to a significant degree (photographs taken from the side view do not show this flattening) (Fig. 1). During the course of the experiments described below, it became obvious that a great deal of force was required to impose this much deformity (flattening) on a "fully-jacketed," very compact, military bullet of this type.

The soft lead at the "base" end of bullet 399 had the appearance of having been "scooped out" to a slight extent, with fine transverse scratch marks across the base in the direction of the scooping effect. Some of the soft lead of the interior of the bullet still projected slightly from the base of the bullet, at the edge towards which the "scooping" effect led (see arrow, Fig. 1, left, lower end). This extruded bit of lead was on the side of the bullet away from the flattened side.

The fact that bullet 399 was fired from Oswald's rifle has been verified by tests done by the F.B.I. laboratory staff who found that the rifling scratches on bullet 399 conformed exactly to the rifling scratches on the test bullets fired from the same gun.<sup>8,9</sup> No one appears to have contested this point.

### *Were the Bullet Fragments in Governor Connally Excessive?*

Could fragments of the bullet of the number and size of those seen in Governor Connally on his preoperative roentgenograms have come from bullet 399, as alleged in the Warren Commission Report? Or is the loss of weight of bullet 399 too small to account for all four fragments? Three were in his wrist and one in his leg (Figs. 2A and B). To examine this question, it was necessary to carefully weigh 100 sample bullets of exactly the same type as the ones fired by Oswald.

First, however, the fragments of the bullets removed from President Kennedy's head, from Governor Connally's wrist and

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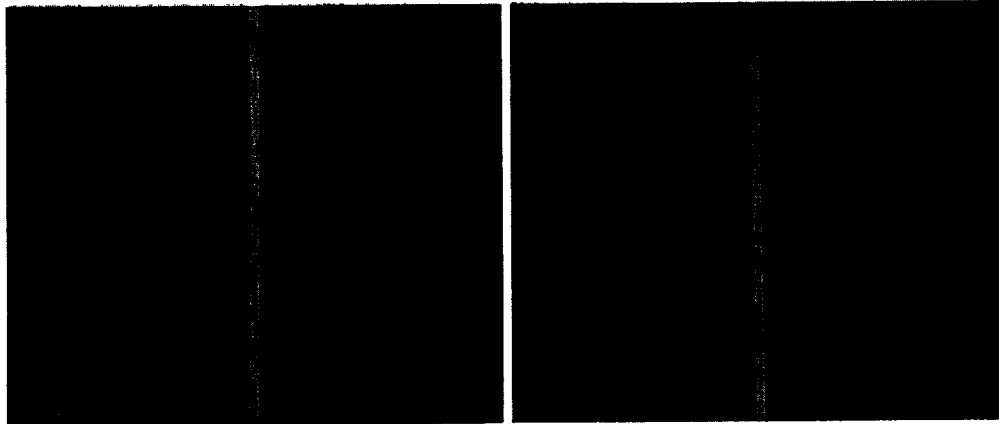


Fig. 2.—Extruded portion of lead core of test bullet (Fig. 1, right) divided into four portions and superimposed on roentgenograms of test wrist (JKL-right-2A) and femur, at arrow (JKL-right-2B). They are only slightly larger than those seen in corresponding preoperative roentgenograms of Governor Connally (arrow, left).

from the automobile were examined closely. The unfired cartridge found in Oswald's rifle was next examined at the National Archives in Washington, D.C. (The officers of the National Archives did not violate any of the requests of President Kennedy's family concerning this evidence.) After considerable difficulty, a substantial supply of exactly the same cartridges was obtained. It was determined that four different lots of these cartridges had been manufactured about 1944 and we were able to procure samples of lots 6001, 6002 and 6003, while the F.B.I. obtained samples from lots 6000 and 6003, all of which proved consistent and reliable.<sup>10</sup> One hundred of these bullets were pulled from cartridges and weighed on a precision balance in the laboratories of the Englewood School for Boys (by J.L.). The weights ranged from 159.80 grains for the lightest bullet to 161.50 grains for the heaviest with an average weight of 160.844 grains and a median weight of 160.80 grains.

This compared fairly closely with the weight range of three sample bullets weighed by the F.B.I. laboratory and reported by firearms expert Robert Frazier. He found them to weigh 160.85 grains, 161.1 grains and 161.5 grains with an average weight of 161.15 grains, whereas our larger sample yielded a mean weight of 160.84 grains.

Since bullet 399 weighed 158.6 grains when found, we have assumed that it had lost between 1.2 grains and 2.9 grains with a mean probability of 2.2 grains.

Next, a bullet like Warren Commission Exhibit 399 was compressed sideways in a special vice until its configuration was as close as possible to that of bullet 399. This required great force because of the high structural density of these bullets, but it did cause the softer lead from the center of the bullet to be extruded from the open

rear of the encompassing jacket (which was made of a tougher, copper-colored metal) much as toothpaste is extruded from a tube (see arrow, Fig. 1, right).

The extruded leaden metal was then sliced off flush with the base of the bullet and the cylindrical fragment weighed. It was found to weigh exactly 2.1 grains, so was highly comparable with the 2.2 grains estimated to be missing from the base of bullet 399.

The extruded cylinder of metal (weighing 2.1 grains) (Fig. 3) was first placed on the wrist of one of us (J.K.L.) (Fig. 2A, right) in the same location as the large fragment seen on the roentgenograms of Governor Connally's wrist (Fig. 2A, left). Three additional particles the same size as the other particles in Governor Connally were then removed from the extruded cylinder and arranged in the same configuration as those seen on his roentgenograms of the wrist and thigh and films were taken for comparison (Figs. 2A and B).

It was seen that the largest fragment from our test bullet was slightly larger in area than the largest fragment in Governor Connally (Figs. 2A and B).

Next, the remainder of this extruded cylinder of metal was sliced into the thinnest possible fragments, each approximate-

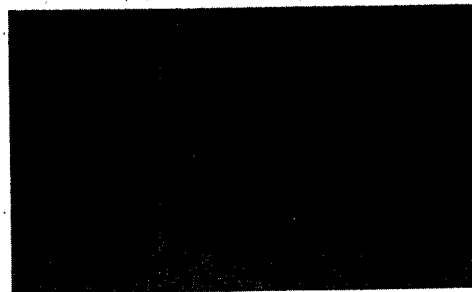


Fig. 3.—Extruded portion of lead core of test bullet (weighing 2.1 grains) was sliced off and divided into four fragments (three shown here).

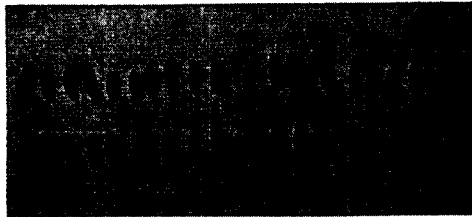


Fig. 4.—Largest portion of lead core (weighing 2.1 grains) extruded from test bullet could still be sliced into the 41 additional fragments shown here.

ly the same area (size) as those seen in Governor Connally's roentgenograms to see how many such fragments could be obtained from it.

A grand total of 41 such fragments (slices) were made from the extruded metal (Fig. 4), as compared with the total of only four fragments seen in Governor Connally's arm (three fragments) and leg (one fragment) roentgenograms (Fig. 2). It should be noted that while one of the fragments in Governor Connally's wrist was about twice the diameter of our test slices, the other three were much smaller than our slices.

For those who might argue that bullet 399 in its unfired state might have weighed only as much as our lightest sample bullet, namely 159.8 grains, we still have the fact that 22 such slices could have been produced from the 1.2 grains of metal which would have been involved.

At the other extreme, if we were to assume that bullet 399 happened to weigh as much as our heaviest sample bullet, namely 161.5 grains, then 53 slices might have been produced from the missing portion.

It must be pointed out that only one of the four Connally fragments was slightly thicker than those from our sample of 41, and that certainly the number of metallic fragments was not a valid criterion for judging how much weight was missing from bullet 399. Using the actual amount

of metal (2.1 grains) extruded from our test bullet, the 41 fragments we were able to produce from it are shown in Figure 4.

Next, the fragments extruded from the experimental bullet were examined as to appearance, color and texture and were found to be a similar lead-grey color (containing none of the copper color of the bullet jackets) and to be of the same texture as the fragment removed from Governor Connally's wrist. In both cases the fragments appeared to be extruded soft lead like that from the centers of both the test bullet and bullet 399.

The experiment of compressing bullets to the same extent as bullet 399 was repeated ten times. This was done to rule out possible gross differences in the malleability of the materials in different bullets. The results were closely similar in every sample tested.

Thus the answer to the question, "Are the bullet fragments in Governor Connally excessive?" (to match the lead missing from bullet 399) was also clearly "NO"! His bullet contributed four fragments, but our bullet could contribute any number up to the 41 fragments actually produced (more thinly sliced), while both bullets lost the same amount of weight from the same deformation.

### *Reliability of the Ammunition*

Was the ammunition used by Oswald unreliable? To test this, 100 rounds of the same type of cartridges as those used by Oswald (lots 6001, 6002 and 6003) manufactured by the Western Cartridge Co., a branch of the Winchester Repeating Arms Co., in the same year as that used by Oswald, were procured and used in other experiments which will be reported when completed. None of these rounds has failed to fire even though an additional four years has elapsed since the Kennedy shooting.

making this ammunition 23 years old at the time of testing. Nichols has reported the same degree of dependability<sup>12</sup> and the F.B.I. agents who fired ammunition from lots 6000 and 6003 in Oswald's rifle more than 100 times also reported no failures to fire.<sup>13</sup> These various samples represented every lot manufactured, so must have included the lot from which Oswald's ammunition came. In all, more than 500 rounds of this Western Cartridge Company 6.5 millimeter ammunition have been fired in these tests, without a single failure to fire on the first attempt.

One hundred and eighty complete loaded cartridges of this type were then weighed to see if there were gross differences in powder charges which might thus be detected, but each lot was internally consistent within 0.01 gram. Oswald's unfired round still bore the original lacquer placed on it by the Western Cartridge Co. and bore no traces of tampering, resizing or reloading. The three empty rifle cartridge cases found near his firing location were also inspected by us, under magnification, and showed no signs of reloading or resizing.

It should be pointed out that Oswald used American-made, brass-cased, "Western" cartridges, which should not be confused with imported cartridges which had inferior powder cases, varied more in gross weight and performance and were found to be dangerous because of a tendency of the cases to burst when fired.

The answer to the question, "Was Oswald's ammunition unreliable?" was also clearly "NO"!

### *Discussion*

It should be remembered that bullet 399 is the one which is thought to have hit President Kennedy's neck. It did not hit any bones in President Kennedy and indeed did not hit any vital structures.<sup>15</sup> It

should not be confused with the second bullet which struck President Kennedy in the right side of the back of the head, which was severely disrupted (and which proved fatal).

The intensity of the attacks on the veracity of the Warren Commission Report by persons who did not conduct any actual experimentation has been notable. It seemed appropriate, therefore, that some experiments should be conducted to test some of the points made in the Warren Commission Report. Since the preliminary findings presented here at least make the conclusion of the Warren Commission appear tenable insofar as the ammunition and bullet fragments are concerned, it may be of interest for investigators to look further into more complex facets of the matter such as the human capabilities involved, the capability of the rifle and the reactions of these bullets in bones and tissues.

*Ability of Bullet to Penetrate Two Persons.*—In tests conducted by Dr. John Marshall Nichols of the Department of Pathology, University of Kansas Medical School,<sup>12</sup> military rifle cartridges like those used by Oswald (lot 6002) were fired into a stack of pine boards bound tightly together and were found to have marked penetrating power. Wooden blocks 36 inches thick were easily penetrated. It was necessary to construct a wooden block 48 inches thick before the bullet would stop just inside the wood.

Because of the great penetrating ability, it is the opinion of these investigators that the bullet which struck Governor Connally would have shattered his femur and traversed his thigh completely if it had not been slowed down prior to striking him.

Passing through the soft tissues of the neck of President Kennedy with its two layers of tough skin would have slowed the bullet slightly more than 30% according to the figures of Nichols.<sup>12</sup> The passage

through the thorax of Governor Connally with its two additional layers of skin and a glancing (tangential) contact with his fifth rib would have slowed it still more, although less than the passage through President Kennedy. Only the additional fact that it apparently traveled sideways as it traversed the skin and bone of Governor Connally's wrist could have accounted for the loss of so much energy that it did not break his leg bone.

As has often been pointed out by Dr. Milton Helpert, Chief Medical Examiner of the City of New York, human skin is elastic and tough. It is very effective in slowing down pistol bullets, but the penetrating ability of high-speed military rifle bullets is of quite another order of magnitude unless these bullets begin to travel sideways (in the process of "tumbling" or "yawing") as this one apparently did in penetrating Governor Connally's wrist. The sizes and shapes of the various bullet holes in the governor support the view that the bullet turned as described above.

It is our opinion based on the experiments we have done and observed that if the bullet had struck Governor Connally's back as its first point of impact without previously passing through President Kennedy, it surely would have shattered Governor Connally's femur and probably would have traversed his leg completely in addition to his thorax and wrist. In addition it would have made a small punctate wound of entrance on his back rather than an elongated one. The shock of being hit was so great that Governor Connally was not even aware that his wrist and leg had also been hit, even though the large bone in his wrist had been shattered into many fragments (Fig. 2A) by the tangential passage of the bullet. It was only when he awoke from anesthesia and saw the cast on his wrist and the bandage on his leg that he asked what they were for.<sup>14</sup>

The possibility that the first bullet to strike Governor Connally had been under-powered due to a deficient powder charge (as suggested by some) is not credible in our opinion, because the net effect of an under-powered cartridge would have been to make the bullet drop so severely that it would have hit a portion of the automobile behind President Kennedy. We did, moreover, weigh 180 of the rounds to check any sign of "under-charging" and found none, at least in these "factory-loaded" cartridges.

### *Summary*

A series of feasibility studies was conducted to see if any gross inaccuracies could be found in one part of the medical and forensic data frequently attacked by critics of the Warren Commission Report having to do with bullet 399.

This actual bullet (a long, narrow 6.5 millimeter Mannlicher-Carcano, fully-jacketed military "ball" type projectile), which the Warren Commission postulates penetrated both President Kennedy's neck and Governor Connally's thorax, wrist and leg, was carefully examined. It was found to be flattened as if by a heavy blow on one side. Some of the soft lead core of the bullet was found to be missing from the base-end of the bullet which had a slightly "scooped-out" configuration. The weight of the bullet was 2.2 grains less than the mean and median weights of 100 "duplicate" bullets from the same manufacturer weighed by these investigators. Thus on actual inspection this bullet (No. 399) was not truly "pristine" as described by many critics and writers. It was definitely deformed and some of its interior metal had been extruded and then broken off as if by its passage through firm material such as Governor Connally's wrist bone.

A bullet of this type was deformed to a comparable extent by compressing it in a

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special vise. Great force was required to so deform this bullet. The soft lead which then extruded from its base was compared as to size, color, texture and roentgen ray appearance with the fragments seen by roentgen ray and found at surgery in the wrist and leg of Governor Connally. The samples were compatible in all these respects. Our extruded plug of lead was slightly larger (by roentgen ray) than the largest of the four fragments seen on roentgenograms of Governor Connally, even after slicing off from it three additional fragments the same size as the others seen in Governor Connally's roentgenograms. In fact, by then slicing this largest fragment into extremely thin slices, it was possible for us to slice this 2.1 grain extruded lead core into a maximum of 41 fragments, instead of the four seen in Governor Connally. Thus, the four fragments left by bullet 399 in Governor Connally were by no means "excessive," as contended by some critics. Ten such bullets were similarly deformed, always with similar results.

The reliability of the Western Cartridge Company ammunition used by Oswald was tested by firing 100 rounds in a Mannlicher-Carcano carbine of the exact type used by Oswald. More than 500 additional rounds were fired by these and other investigators, and there was not a single failure to fire.

These experiments were designed to test only the feasibility of some of the allegations and statements about the ammunition and the first bullet and its fragments, which the Warren Commission believed penetrated both President Kennedy and Governor Connally. With regard to the possibility of whether the bullet fragments in Governor Connally could have come from a bullet deformed as was bullet 399, no discrepancies, inconsistencies or incompatibilities were detected between the data as determined in these experiments and the

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contentions of the Warren Commission. Furthermore, the type of ammunition used by Oswald was found to be highly consistent and reliable in performance. We were left with no doubt that bullet 399 could have penetrated President Kennedy's neck and then Governor Connally as the Warren Commission proposed.

**Abstract**

The so-called "pristine" bullet (Warren Commission Exhibit 399), which critics have been claiming could not have penetrated both President Kennedy's neck and Governor Connally's thorax and wrist and still remain undeformed, was found by these investigators to be, in fact, deformed (flattened) in a manner which required great force to duplicate on test bullets from the same lots.

The four fragments which the Warren Commission contends bullet 399 left in Governor Connally, while losing 2.2 grains of its weight, are by no means excessive, since these experimenters were able to slice 41 fragments from the 2.1 grain cylinder of lead extruded from their test bullet under parallel conditions.

It is the opinion of these investigators that it is highly probable that bullet 399 was slowed down by traversing President Kennedy's neck before it penetrated Governor Connally. Otherwise, had it hit Governor Connally directly, we believe it would have shattered his femur in addition to his rib and wrist bones. Furthermore, it would have left only a punctate wound of entry on the Governor's body rather than the elongated wound it did leave.

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The type of Western Cartridge Company ammunition used by Oswald was found to be highly reliable by these investigators, confirming the finding of other experimenters.



Insofar as the above factors are concerned, it appeared completely feasible that this one bullet could have done all the things which the Warren Commission contended it did.

With regard to the possibility of whether the bullet fragments in Governor Connally could have come from a bullet deformed as was bullet 399, there was no inconsistency nor incompatibility between the facts, as determined by these experiments, and the contentions of the Warren Commission.

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