

## MEMORANDUM

To: Jeremy Gunn  
From: Phil Golrick  
Date: April 26, 1995  
Re: Simmons Warren Commission Testimony -- Ballistics Evidence  
File No. 4.02 (Forensics)

This memorandum summarizes the Warren Commission testimony of Ronald Simmons on March 31, 1964. Simmons was the "Chief of the Infantry Weapons Evaluation Branch of the Ballistics Research Laboratory of the Department of the Army." III WC 441. He had specialized in the evaluation of military rifles since 1953, and became chief of the "laboratories on small arms" in 1957. III WC 441-42.

### Nature of Testing

In performing his duties, Simmons does not fire rifles himself. Rather, "employees of the development and proof services" do the actual shooting. The examinations performed by Simmons are "concerned with establishing a framework by which we can put numbers to the performance of military rifles in tactical employment, . . . for example, round-to-round dispersion, the accuracy with which they can be employed, and the wounding power of the projectiles." III WC 442.

### Dispersion Testing of CE 139

Simmons identified CE 139 as a rifle he had tested for "round-to-round dispersion." Twenty rounds were fired from CE 139 "on a machine rest," and the measured dispersion was "of a conventional magnitude, about the same that we get with our present military rifles, and the standard deviation of dispersion is .29 mil."<sup>1</sup> III WC 442. "As far we can determine from bench-rest firing," CE 139 is as accurate as the M-14 rifle presently used by the U.S. Army. At 100 yards, this degree of dispersion translates to a little more than one inch. This testing used 6.5 mm Mannlicher-Carcano ammunition "labeled Type Ball" and "made by the Western Cartridge Co., Division of Olin Industries." III WC 443.

### Muzzle Velocity of CE 139

Simmons also measured the muzzle velocity of approximately ten of the rounds fired from CE 139 on a machine rest. Simmons concluded that "the nominal muzzle velocity is of the order of 2,200 feet per second, and the velocity at about 200 feet from the muzzle is approximately 2,000 feet

---

<sup>1</sup>"A mil is an angular measurement." "There are 17.7 mils to a degree." III WC 442.

per second.” There was a “relatively small” variation in velocity from round to round, “as there is with all small-arms ammunition.” III WC 443.

### Yaw

Simmons’s laboratory measured for yaw, and found that “all measurements of yaw were . . . small. We had no values in excess of 2 degrees, and many values were less than 1 degree in yaw, indicating that the round is quite stable.” The laboratory measured for yaw by taking “spark shadowgraph pictures at various stations down range from the muzzle, so that we actually have pictures of the position of the bullet relative to the top and bottom of our range.” Simmons did not have these with him and agreed to provide them to the Commission. He cautioned, however, that these were not photographs, but were “on large pieces of glass.” When asked whether they could be “read by a layman,” Simmons responded: “That I do not know. I do not read them.” III WC 443.

### Sighting Difficulties

The persons who ran the machine-rest tests

“could not sight the weapon in using the telescope, and no attempt was made to sight it in using the iron sight. We did adjust the telescopic sight by the addition of two shims, one which tended to adjust the azimuth and one which adjusted an elevation. The azimuth correction could have been made without the addition of the shim, but it would have meant that we would have used all of the adjustment possible, and the shim was . . . a more permanent means of correction.”

III WC 443-44. Exhibits 576, 577, and 578 were the three shims that the FBI reported were on CE 139 when it was returned to the FBI laboratory. Simmons recalled being told that a machinist in his laboratory had added two shims. He agreed to take Exhibits 576, 577, and 578 and attempt to determine whether his shop had added all three exhibits to CE 139. III WC 444.

### Observations Regarding Testing Conditions and CE 139

Before the above-described tests, each marksman took 2 to 3 minutes of “dry-run” practice with CE 139, aiming the unloaded rifle at the targets and working the bolt without pulling the trigger.

The marksmen did not pull the trigger during the “dry runs” because Simmons was “a little concerned about breaking the firing pin.” A total of 47 shots were fired from CE 139, without a misfire. III WC 449.

The marksmen made “several comments” concerning CE 139,

“particularly with respect to the amount of effort required to open the bolt. As a matter of fact, Mr. Staley had difficulty in opening the bolt in his first firing exercise. He thought it was completely up and it was not, and he had to retrace his steps as he attempted to open the bolt after the first round. There was also comment made about the trigger pull, which is different as far as these firers are concerned. It is in effect a two-stage operation where . . . in the first stage the trigger is relatively free, and it suddenly required a greater pull to actually fire the weapon.”

III WC 447. This feature of the trigger pull caused the test firers to "mov[e] the shoulder into the weapon." III WC 451.

### Testing for Rapid-Fire Accuracy

Simmons's laboratory

“placed three targets, which were head and shoulder silhouettes,<sup>[2]</sup> at distances of 175 feet, 240 feet, and 265 feet, and these distances are slant ranges from the window ledge of a tower which is about 30 feet high. We used three firers in an attempt to obtain hits on all three targets within as short a time interval as possible. . . . [T]he angular distance from the first target to the second was greater than from the second to the third . . . [so that t]he movement of the rifle was greater from the first to the second target than from the second to the third.”

The shooters took “as much time as they desired” before firing at the first target 175 feet away, then fired for speed at the target at 240 feet, then for speed at the target at 265 feet. The Warren Commission had specified these distances. III WC 444.

The marksmen in these tests were all “rated as Master[s] by the National Rifle Association” (III WC 446), and had “all participated in [NRA] national match competitions.” III WC 450. Simmons stated: “There is really no comparison between the rating of master in the NRA and the rating of sharpshooter in the Army.” III WC 450.

“Each [marksman] fired two series of three rounds, using the telescopic sight. Then one of the firers repeated the exercise using the iron sight.” A total of 21 rounds were fired. The times and results for each series were as follows:

Hendrix, first series: 8.25 seconds (hit first, missed second)

Hendrix, second series: 7.0 seconds (hit first)

---

<sup>2</sup>The target silhouettes were “approximately 2 square feet in area.” III WC 445.

Staley, first series: 6.75 seconds (hit first, missed second)  
 Staley, second series: 6.45 seconds (hit first)

Miller, first series: 4.6 seconds (hit first, missed second, hit third)  
 Miller, seconds series: 5.15 seconds (hit first, missed second, hit third)  
 Miller, iron sighting: 4.45 seconds (hit first, hit second, missed third badly)

III WC 446-47.<sup>3</sup>

Simmons testified that, with respect to the second target, “we had rather an unusual coincidence . . . . This involved the displacement of the weapon to a sufficient angle that the basic firing position of the man had to be changed. And because they knew time was very important, they made the movement very quickly. And for the first four attempts, the firers missed the second target.” After learning that the marksmen had missed the second target in the first tests, “there was a conscious effort made on the additional rounds to hit the second target.” III WC 446.

Only two rounds -- one of them fired through the iron sight -- missed the third target at 265 feet. Simmons noted that “the angle through which the weapon had to be moved to get to the third target from the second was relatively small.” III WC 446.

Simmons measured where each shot struck the targets and calculated the average “aiming error.” In calculating aiming error, Simmons “subtracted out the round-to-round dispersion” that had already been measured. III WC 446. Simmons testified that it was “quite likely that in fact each man was aiming at a different portion of the target -- there were no markings on the target visible to the firer,” and they were not instructed to fire at any particular part of the target. III WC 445. However, in calculating aiming error, Simmons assumed that all of the marksmen had aimed at the same particular point on the target.<sup>4</sup> III WC 446. The aiming errors, so calculated, were as follows: for the first target, “about 0.7 mils;” for the second target, 1.4 mils; and for the third target, 1.2 mils. From 100 yards, an error 0.7 mils “is approximately 2 inches. 1.4 mils is approximately 4 inches. And 1.2 mils is approximately 3-1/2 inches.” III WC 446.

Using these calculated aiming errors, and factoring back in the measured round-to-round dispersion, Simmons had calculated “what the probability of a hit would be on specific sizes of

---

<sup>3</sup>Simmons did not provide each shooter’s complete performance in each series.

<sup>4</sup>Simmons assumed “that all the riflemen had aimed at the intersection of the lines . . . drawn on” the targets after the shootings. III WC 446. These lines may be seen on CE 580, 581, and 582.

target." In these calculations, Simmons used two target sizes, a circle with a four-inch radius and a circle with a nine-inch radius. III WC 447. CE 586, a table presenting the results of these calculations, is attached.

Although I am by no means an expert in statistics, I believe that the only relevant "hit probabilities" at a given distance are those calculated from the aiming error measured at the same distance. In my view, the other calculated probabilities shown on CE 586 are nearly meaningless.

#### Assessment of Difficulty of Alleged Assassination Shots

Simmons testified that, "in order to achieve three hits [under the conditions Oswald is alleged to have done so], it would not be required that a man be an exceptional shot." He added, however, that the shooter would have to be "proficient" with CE 139, i.e., to have taken "the opportunity to use the weapon and to get familiar with it." Specifically, a shooter would need familiarity with "the action of the bolt itself, and the force required to open it; and . . . the action of the trigger, which is a two-stage trigger." Although "dry-run" practice could familiarize a shooter with the bolt action, "familiarity with the trigger would best be achieved with some firing." III WC 450. Simmons opined that, "with the opportunity to use the weapon and to get familiar with it, we could probably have the results reproduced by more than one firer." III WC 450.

#### Analysis

It is questionable whether the circumstances of Simmons's tests -- particularly the stationary targets -- were sufficiently similar to those allegedly faced by Oswald to yield a valid comparison. Moreover, even under these testing conditions, highly-skilled marksmen had difficulty consistently registering "hits" with what they described as an idiosyncratic weapon.