



Shotgun Distance Determination Test No. 23-5306 Summary Report

Each sample set consisted of images of questioned shotgun pattern and known shotgun pattern distances. Participants were requested to examine the questioned shotgun pattern and report a distance range that the muzzle of the shotgun could have been from the target at the time of discharge. Data were returned from 34 participants and are compiled into the following tables:

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This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

Manufacturer's Information

Each sample set consisted of a questioned shotgun pattern, known shotgun distance standard patterns from 3 to 30 feet, and additional known shotgun distance standard patterns supplemental digital images. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the questioned shotgun pattern at the time of discharge.

SAMPLE PREPARATION: The shotgun used to produce the distance standards and evidence item was a Blue Line Pump 12 gauge shotgun and the ammunition was Sellier & Bellot 12 gauge 2 3/4" 00 Buck Shot 9 pellet. The shotgun was set on a fixture and the paper was placed at predetermined distances from the shotgun muzzle for each of the known distance standard patterns and the questioned shotgun pattern.

KNOWN DISTANCE STANDARDS (K1): Items designated as "K1" consisted of a collection of shotgun distance standard patterns on 24" wide, white printer paper. The shotgun was fired three consecutive times for each of the predetermined distance standard patterns. After firing, the shotgun distance standard patterns were photographed. For each of the known distance standard patterns, the first shot was printed and the first, second, and third consecutive shots were provided as supplemental digital images.

QUESTIONED ITEM (Q1): Item designated as "Q1" consisted of a shot pattern on 24" wide, white printer paper. The target was placed 8 feet away from the muzzle of the shotgun. After firing, the shot pattern was photographed and printed.

SAMPLE SET ASSEMBLY: The questioned item and known distance standard photographs were rolled up and placed into a pre-labeled sample set plastic sleeve. For the digital download, the three consecutively fired known distance standards were then loaded onto the CTS Portal.

VERIFICATION: All predistribution laboratories reported a greater than/less than distance range that was in close proximity to the expected target distance of 8 feet.

Summary Comments

This test was designed to allow participants to assess their proficiency in determining the muzzle to target distance using known shotgun pattern distances. Each sample consisted of a questioned shotgun pattern, known shotgun distance standard patterns from 3 to 30 feet, and additional known shotgun distance standard patterns supplemental digital images. Participants were requested to examine and report the range of distances that the muzzle of the shotgun could have been from the questioned shotgun pattern at the time of discharge. The questioned shotgun pattern was prepared with the firearm set on a fixture and the white paper target placed 8 feet away from the muzzle of the shotgun (refer to the Manufacturer's Information for preparation details).

In all areas below where distance is discussed, the unit of measurement is feet.

In Table 1, all 34 responding participants (100%) reported a greater than distance between 3 and 6 and a less than distance between 9 and 15. The majority fell within a range of greater than 3 and less than 12. In the Summary of this table, CTS has grouped the responses provided by the participants based on their greater than/less than distance results and provided a tally of the participants' ranges as calculated by CTS.

For greater than/less than distances, a ± 3 allowance from the known shot distance (8) was used as the baseline. All participants reported a greater than/less than range that included the known target distance of 8.

For calculated ranges, all of the participants (100%) reported a range of distances that spanned from 6 to 12.

CTS is aware that laboratory reporting policies differ and there are varying acceptable ranges. It will therefore be at the discretion of the laboratory to further evaluate participants' results based on their own policies and procedures.

Distance Determination Results

What is the distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge? Please report a numeral response (e.g. "3") from the supplied distance standards.

TABLE 1 (Distance in Feet)

WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range	WebCode	Greater Than	Less Than	Calc. Range
2GX47R	6	12	6	GK36KU	3	15	12	V9J9LG	3	12	9
3QKNMA	3	12	9	H4XX7R	3	15	12	VMJ8AD	3	12	9
69AL27	3	12	9	HY349Q	3	12	9	VWRH4X	3	9	6
6TYXQQ	3	9	6	JNFNHT	3	12	9	YJRACX	3	9	6
7ZYKF7	3	12	9	K2FM6P	6	12	6				
89KZML	3	15	12	KW36N9	3	12	9				
98AKTK	4	11	7	L4KULN	3	12	9				
ACXKJK	3	15	12	L823AM	3	12	9				
AZHW9Y	3	12	9	LD7YV9	3	15	12				
C4W7CG	3	15	12	LG7ANM	3	9	6				
C9PB4Y	3	15	12	LPKT9M	3	15	12				
CC7JRY	3	12	9	NNY2AL	3	12	9				
CVLRRZ	3	12	9	P23KLL	3	15	12				
GEY2WF	3	12	9	RXWZBJ	4	12	8				
GHXCTF	3	12	9	TZH6L2	3	12	9				

Response Summary				Participants: 34	
Greater Than Distance	Participants Reporting	Less Than Distance	Participants Reporting	CTS Calculated Range	Participants Reporting
1	0 (0.00%)	1	0 (0.00%)	3	0 (0.00%)
3	30 (88.24%)	3	0 (0.00%)	6	6 (17.65%)
6	2 (5.88%)	6	0 (0.00%)	9	17 (50.00%)
9	0 (0.00%)	9	4 (11.76%)	12	9 (26.47%)
12	0 (0.00%)	12	20 (58.82%)	15	0 (0.00%)
15	0 (0.00%)	15	9 (26.47%)	18	0 (0.00%)
18	0 (0.00%)	18	0 (0.00%)	21	0 (0.00%)
21	0 (0.00%)	21	0 (0.00%)	24	0 (0.00%)
24	0 (0.00%)	24	0 (0.00%)	27	0 (0.00%)
27	0 (0.00%)	27	0 (0.00%)	30	0 (0.00%)
30	0 (0.00%)	30	0 (0.00%)	Other	2 (5.88%)
33	0 (0.00%)	33	0 (0.00%)		
Other	2 (5.88%)	Other	1 (2.94%)		
No Response	0 (0.00%)	No Response	0 (0.00%)		

Conclusions

TABLE 2

WebCode	Conclusions
2GX47R	after examining the questioned mark with the unknowns. We excluded the distance greater than 12 feet as these marks were very different than the questioned mark. further comparison was done between the questioned mark and the known marks (3 , 6 , 9 , 12) feet. at the end we concluded that the questioned mark falls under 6 to 12 feet.
3QKNMA	Items – Description/Visual Examination Item K1: Ten (10) test shot patterns from distances of approximately 3 to 30 feet. Item Q1: One (1) questioned shot pattern. Examination Results Item Q1 – question shot pattern. Based on visual comparison, the question shot pattern (Item Q1) is consistent with test patterns (Item K1) produced between 3 and 12 feet. The approximate distance of the firearm muzzle from Item Q1 at the time of firing is greater than 3 feet and less than 12 feet.
69AL27	The distance range between the muzzle of the shotgun and the target was between 3 feet to 12 feet.
6TYXQQ	The distance from the muzzle of the shotgun to the poster is greater than 3 feet and less than 9 feet. The confidence interval for individual shots was estimated ~ 6 feet.
7ZYKF7	Considering the unknown shotgun pattern and the known distances patterns observed, we strongly support that the shooting range, between the muzzle of the shotgun and the target, is between 3 feet and 12 feet.
89KZML	When examining and comparing the test patterns to the questioned pattern, it would indicate the muzzle to target distance was greater than 3 feet and less than 15 feet.
98AKTK	The muzzle to target surface distance at the time of discharge was determined to be between four to eleven feet.
ACXKJK	Based on available data, we estimate that the shooting distance was most likely greater than 3 and less than 15 feet.
AZHW9Y	A visual pattern recognition comparison was performed on the shotgun distance standards from 3' to 30' and the distance range that the muzzle of the shotgun could have been from the target at the time of discharge was greater than 3 feet and less than 12 feet.
C4W7CG	In my opinion the questioned pattern was produced by a gun that was fired when its muzzle was more than 3' away from the target but not as far away as 15'.
C9PB4Y	The shot pattern in Q1 is consistent in pattern size and density with having been produced at an approximate distance between 3 and 15 feet from the muzzle of the recovered shotgun.
CC7JRY	Results/Opinions and Interpretations: Examination of the submitted Item 11 piece of paper found it to have a shotgun pattern located in its approximate center. The shot pattern was visually analyzed and compared to the Items 1 through 4 known patterns. Using the provided test patterns, the muzzle to target distance was determined to be between 3 and 12 feet. Items 5 through 10 were not required for analysis.
CVLRRZ	In my opinion the shotgun was discharged at a distance from the target, of greater than 3ft, but less than, 12ft
GEY2WF	Item Q1 was visually compared with the ten distance standards, K1. The results show that the shooting distance is greater than 3 feet and less than 12 feet.

TABLE 2

WebCode	Conclusions
GHXCTF	According to the shotgun patterns of the tests compared to the shotgun pattern recovered from the crime scene, the distance of the muzzle from the target was greater than 3 feet and lesser than 12 feet.
GK36KU	Item Q1 was visually examined and four small round defects and one irregular defect consistent with a shotgun pattern was observed. Results: Item Q1 was visually compared to the known distance standards provided within Item K1. The shot dispersion pattern found in Item Q1 was consistent in pattern size and density with having been produced at a muzzle-to-target distance that is further than 3 feet and closer than 15 feet.
H4X7R	At the time of discharge the muzzle of the shotgun was a distance greater than 3 feet and less than 15 feet from the target.
HY349Q	Item 1.1 is a photograph of a questioned shotgun pattern. Item 1.2 consists of photographs of known shotgun patterns from three feet to thirty feet. Using the provided known distance standards (Item 1.2) and visually comparing them to the questioned pattern (Item 1.1), the questioned pattern was reproduced at a distance greater than three feet and less than twelve feet.
JNFNHT	[No Conclusions Reported.]
K2FM6P	Based on comparisons to the known patterns, the distance range of the muzzle of the shotgun from the target (Item Q1) at the time of discharge was greater than six feet and less than twelve feet.
KW36N9	The muzzle of the shotgun was between 3 ft and 12 ft from the questioned pattern when the shot was discharged.
L4KULN	The distance between the muzzle of the exhibit shotgun and the questioned pattern at the time of discharge was greater than 3-feet but less than 12-feet.
L823AM	A visual pattern recognition comparison was performed on the shotgun distance standards from 3' to 30' and the distance that the muzzle of the shotgun could have been from the target at the time of discharge. The distance was determined to be greater than 3 feet and less than 12 feet.
LD7YV9	Comparisons have been made between the questioned pattern (Q1) and control patterns on the assumption that the incident gun and same ammunition type was used to generate the control patterns. The findings indicate that the firing distance between the gun and muzzle and surface of the questioned item patter (Q1) was between 3 and 15 feet. The best correspondence with the questioned item was found for the control pattern at firing distance of 6 feet.
LG7ANM	The distance of the muzzle of the shotgun to the target was between 3 and 9 feet at the time of discharge.
LPKT9M	The Item Q1 shotgun pattern is consistent with tests fired at a muzzle-to-target distance greater than 3 feet and less than 15 feet, using the supplied K1a, K1b, and K1c known distance standards.
NNY2AL	The shot spread question shotgun pattern indicates a muzzle to target distance of greater than 3 feet and less than 12 feet.

TABLE 2

WebCode	Conclusions
P23KLL	The distance range between the muzzle of the shotgun and the target (Item Q1) was greater than 3 feet and less than 15 feet.
RXWZBJ	The estimated shooting distance from the muzzle to the questioned target (Q1) was between 4 and 12 feet.
TZH6L2	[No Conclusions Reported.]
V9J9LG	Visual examination of Item Q1 revealed a pellet pattern which is consistent in size with the muzzle of a firearm having been greater than approximately 3 feet and less than approximately 12 feet, from this area at the time of firing.
VMJ8AD	The examination of the Questioned Shotgun Pattern reveals that the distance from the muzzle to the target was greater than 3 feet and less than 12 feet, when using the Known Shotgun Pattern and known brand cartridge.
VVRH4X	Shotgun distance determination test was conducted and results for muzzle to target distance were no less than 3 feet and no greater than 9 feet.
YJRACX	Impact pattern comparison allows us to indicate that questioned shotgun pattern presents morphological characteristics compatible with a shooting distance greater than 3 feet and less than 9 feet.

Additional Comments

TABLE 3

WebCode	Additional Comments
3QKNMA	Test shotgun pattern @9 feet could be an outlier. If there was access to the firearm and ammo additional patterns would be produced @9 feet for reproducibility.
C4W7CG	In my opinion the range of firing appears most likely to have been somewhere from 6' to 12' with somewhere close to 9' most likely, but reported as 3' to 15' to allow for uncertainty of measurement for the patterns, particularly given the variation seen at the same distances (e.g. some 6' and 12' patterns very close to the questioned pattern). In a real case I would have done more test firing at 4', 5', 7', 8', 10' and 11' to produce a narrower range of firing result if the case circumstances made that necessary.
C9PB4Y	A duplicate test pattern for each distance would be beneficial for future tests.
GEY2WF	Usually we have atleast three known testfires of the same known distance to see variations between the shots.
GHXCTF	We suspect an inversion between the shotgun patterns for the 6 feet and 9 feet distances. If it is the case, the distance of the muzzle from the target was greater than 6 feet and lesser than 12 feet.
GK36KU	Limitations: Distance determination bracketed ranges are based on the evaluation, documentation, and images provided by Collaborative Testing Services (CTS).
H4XX7R	Additional repeats of the known distance test shots may have allowed for further discrimination of the range determination. For example the spread of the pellets at 6 feet was larger than the spread observed with the test shot at 9 feet. Further repeats may have shown that this is an anomaly and give a better indication of the spread at each distance. With further repeats more confidence can be obtained regarding the expected spread of pellets and allow for a better estimation of the range.
KW36N9	The shot pattern on the 9ft known was smaller than the shot pattern on the 6ft known and could not be excluded.
LG7ANM	The questioned pattern did not have any visible propellant/buffer impacts as seen with the known pattern at 3 feet. The questioned pattern had a total defect area of approx. 55 x 55mm, which is consistent with the known pattern at 6 feet.
RXWZBJ	The procedure we normally use, at least three reference shots are taken at the same distance, which provides information of the variation in the shot dispersion at one distance. The chosen reference distances, usually five, are around the estimated unknown distance.
VMJ8AD	The distance could be further reduced with further test taken at 4foot, 5foot, 10foot and 11foot.

-End of Report-
(Appendix may follow)

Test No. 23-5306: Shotgun Distance Determination

DATA MUST BE SUBMITTED BY **Dec. 11, 2023, 11:59 p.m. EST** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: 9RUHBW

The Accreditation Release section can be accessed by using the "Continue to Final Submission" button above. This information can be entered at any time prior to submitting to CTS.

Scenario:

Police recovered a questioned shotgun pattern, along with a Blue Line Pump 12 gauge shotgun and Sellier & Bellot 12 gauge 2-3/4" 00 Buck Shot 9 pellet ammunition from an apprehended suspect. Investigators are asking you to compare the recovered questioned shotgun pattern with the known distance standards provided to determine the distance range that the muzzle of the shotgun could have been from the target at the time of discharge.

Please note the following:

-The distance determination for this test should be reported by pattern recognition only. Chemical processing cannot be performed, as the questioned shotgun pattern is a printed image.

Items Submitted (Sample Pack SDD):

Item Q1: Questioned shotgun pattern.

Item K1: Known distance standards from 3' to 30'.

To verify a complete and accurate download, the hash value for the downloaded .ZIP file is as follows:

23-5306_Supplemental.zip MD5 hash value: 1186dbf971971a985ba2da14623fc404

23-5306_Supplemental.zip SHA1 hash value: f0a2d128423af99646c5638de30941e767ac1729

1.) What is the distance range that the muzzle of the shotgun could have been from the target (Q1) at the time of discharge? Please report a numeral response (e.g. "3") from the supplied distance standards.

Greater than (feet) and Less than (feet)

Please note: Any additional formatting applied in the free form spaces below will not transfer to the Summary Report and may cause your information to be illegible. This includes additional spacing and returns that present your responses in lists and tabular formats.

2.) What would be the wording of the Conclusions in your report?

3.) Additional Comments

RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB, and/or A2LA. Please select one of the following statements to ensure your data is handled appropriately.

- This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section below must be completed.)
- This participant's data is **not** intended for submission to ASCLD/LAB, ANAB, and/or A2LA.

Have the laboratory's designated individual complete the following steps only if your laboratory is accredited in this testing/calibration discipline by one or more of the following Accreditation Bodies.

Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory.

ANAB Certificate No.
(Include ASCLD/LAB Certificate here)

A2LA Certificate No.

Step 2: Complete the Laboratory Identifying Information in its entirety.

Authorized Contact Person and Title

Laboratory Name

Location (City/State)