



Shooting Reconstruction - Angle Determination

Test No. 19-5620 Summary Report

Each sample set contained a wooden box that consisted of one entrance hole, one exit hole and a "TOP" label to distinguish the orientation of the box. In addition, one "A" label and one "1" label was placed on opposing sides of the box to assist participants when reporting the entrance/exit holes and direction of travel. Participants were requested to determine the character associated with the entrance hole, the direction of travel and calculate the angles. Data were returned from 90 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 contained a wooden box that consisted of one entrance hole, one exit hole and a "TOP" label to distinguish the orientation of the box. In addition, one "A" label and one "1" label was placed on each side of the box to assist participants when reporting the entrance/exit holes and direction of travel. Participants were requested to determine the character associated with the entrance hole, the direction of travel and calculate the angles. The front of the box containing the "1" label was associated with the entrance hole and the direction of travel was right to left, downward. The angles as measured during production are described below.

PRODUCTION: The sample was placed onto a fixed angle set up (jig). A .22 LR Ruger MKIII firearm was affixed above the jig and a digital angle finder was placed on the jig to confirm the angle to be shot.

The Horizontal (Azimuth) angle was measured at 7° from perpendicular, 83° right to left or 97° left to right. The Vertical angle was measured downward at 52.8° or 37.2° and 127.2° upward.

SAMPLE SET ASSEMBLY: After each sample was shot, it was securely placed in a sample pack box. This process was repeated until all of the desired samples were produced.

VERIFICATION: All three predistribution laboratories reported Horizontal and Vertical angles within $\pm 5^\circ$ from the expected responses.

Summary Comments

This test was designed to allow participants to assess their proficiency in shooting reconstruction, with a focus on angle determination. Each sample set consisted of a wooden box (Item 1) containing an entrance and exit hole. The wooden box was designated with a "TOP" label to assist participants with the orientation of the sample. In addition, one "A" label and one "1" label were placed on opposite sides of the box to assist participants when reporting the entrance/exit holes and direction of travel. [Refer to Manufacturer's Information for preparation details.]

ENTRANCE HOLE: Of the 90 responding participants, 89 identified the side labeled "1" and one identified the side labeled "A" as being the area containing the entrance hole.

DIRECTIONALITY: Of the 90 responding participants, 89 reported a right to left direction and one participant reported a left to right direction. In regards to upward/downward directionality, 87 participants reported a downward direction and one reported an upward direction. There were two participants who did not report an upward or downward direction.

ANGLE DETERMINATION:

HORIZONTAL

Any reported horizontal angles that fell outside ranges 2° - 12° (from perpendicular), 78° - 88° (right to left) and 92° - 102° (left to right) were highlighted as inconsistent. These ranges were determined by using a factor of $\pm 5^{\circ}$ from the expected response.

Of the 84 participants that reported horizontal angles, 62 (74%) reported angles ranging from 78° to 88° (right to left), 18 (22%) reported angles ranging from 2° to 12° (perpendicular) and two (2%) reported angles ranging from 92° to 102° (left to right). Two participants reported angles that did not fall within $\pm 5^{\circ}$ from the expected response.

VERTICAL

Any reported vertical angles that fell outside ranges 122° - 132° (upward) and 32° - 42° or 48° - 58° (downward) were highlighted as inconsistent. These ranges were determined by using a factor of $\pm 5^{\circ}$ from the expected response.

Of the 84 participants that reported vertical angles, 81 (96%) reported angles ranging from 32° to 42° or 48° to 58° (downward) and one (1%) reported an angle ranging from 132° to 142° (upward). Two participants reported angles that did not fall within $\pm 5^{\circ}$ from the expected response.

Six participants did not report any angles. CTS is aware that some labs will report directionality only and will not report any angle measurements. In addition, one participant reported inconsistent angles that were also opposite of what they discussed in their conclusions.

Entrance Hole

Which label on the box represents the entrance hole?

TABLE 1

WebCode	Character	WebCode	Character
2724LW	1	D8VBWQ	1
2JPPR7	1	DBDVW7	1
2QPZ7B	1	DFPCGB	1
2TTVNT	1	E3ULTP	1
37CZBF	1	EVFVB4	1
3VCARU	1	EXMJX2	1
3XHVGE	1	FELNQB	1
3XJZ6G	1	FKTPZX	1
4KRTM7	1	G3NEU7	1
4VB8Q9	1	G8YRC6	1
64ML94	1	HQCPDG	1
6CVRR8	1	HZMQYG	1
6CW8UD	1	JX8LHD	1
6XHEHM	1	JYLDQE	1
8LD7RF	1	K7V7CV	1
8MNFT7	1	K89DHR	1
8NKTTD	1	KGAXKJ	1
8X6RWB	1	L6HLT7	1
9649UE	1	LYANED	1
9GWRB7	1	M6X6C4	1
9J6DAL	1	MP2RVM	1
9TNEG2	1	MXWXP	1
9W7QPX	1	MYBM7Z	1
A6EZBH	1	N6CRNQ	1
ANB9MU	1	N7MTBP	1
ARYDAJ	1	NCQZM8	1
BELMUM	1	NJDXPU	1
CDMLLA	1	NKJ89X	1
CHFBVA	1	NPF66X	1
CNZHBT	1	NV3MBZ	1
CV2QY9	1	P9M7MG	1

WebCode	Character	WebCode	Character
PAHENQ	1		
QBPLF6	1		
QPTFXM	1		
QQ4ERV	1		
QUJEZ4	1		
T4YHAR	1		
TAQQUL	1		
TFCBQT	1		
TMC37V	1		
TPJQW2	1		
TXFKWK	1		
UV6WGX	1		
VCBLMQ	1		
VJL89Z	1		
VLCAEN	1		
VLUVVX	A		
W8ARQE	1		
WAYB28	1		
WMLMDG	1		
WP7MCX	1		
X7C7QF	1		
XM2GCH	1		
Y3N4CE	1		
YPZMDL	1		
YRNYEC	1		
YT26L9	1		
YXE9PB	1		
ZFNF4J	1		

Response Summary		Participants: 90
Which label on the box represents the entrance hole?		
Character:	A	1
Total:	1	89
Percent:	1.1%	98.9%

Direction of Travel

What is the direction of travel of the bullet through the box? (check all that applies)

TABLE 2

WebCode	Left / Right	Upward / Downward
2724LW	Right to Left	Downward
2JPPR7	Right to Left	Downward
2QPZ7B	Right to Left	Downward
2TTVNT	Right to Left	Downward
37CZBF	Right to Left	Downward
3VCARU	Right to Left	Downward
3XHVGE	Right to Left	Downward
3XJZ6G	Right to Left	Downward
4KRTM7	Right to Left	Downward
4VB8Q9	Right to Left	Downward
64ML94	Right to Left	Downward
6CVRR8	Right to Left	Downward
6CW8UD	Right to Left	Downward
6XHEHM	Right to Left	Downward
8LD7RF	Right to Left	Downward
8MNFT7	Right to Left	Downward
8NKTD	Right to Left	Downward
8X6RWB	Right to Left	Downward
9649UE	Right to Left	Downward
9GWRB7	Right to Left	Downward
9J6DAL	Right to Left	Downward
9TNEG2	Right to Left	Downward
9W7QPX	Right to Left	Downward
A6EZBH	Right to Left	Downward

TABLE 2

WebCode	Left / Right	Upward / Downward
ANB9MU	Right to Left	Downward
ARYDAJ	Right to Left	Downward
BELMUM	Right to Left	Downward
CDMLLA	Right to Left	Downward
CHFBVA	Right to Left	Downward
CNZHBT	Right to Left	Downward
CV2QY9	Right to Left	Downward
D8VBWQ	Right to Left	Downward
DBDVW7	Right to Left	Downward
DFPCGB	Right to Left	Downward
E3ULTP	Right to Left	Downward
EVFVB4	Right to Left	Downward
EXMJX2	Right to Left	Downward
FELNQB	Right to Left	Downward
FKTPZX	Right to Left	Downward
G3NEU7	Right to Left	Downward
G8YRC6	Right to Left	Downward
HQCPDG	Right to Left	Downward
HZMQYG	Right to Left	Downward
JX8LHD	Right to Left	Downward
JYLDQE	Right to Left	Downward
K7V7CV	Right to Left	Downward
K89DHR	Right to Left	Downward
KGAXKJ	Right to Left	
L6HLT7	Right to Left	Downward
LYANED	Right to Left	Downward

TABLE 2

WebCode	Left / Right	Upward / Downward
M6X6C4	Right to Left	Downward
MP2RVM	Right to Left	Downward
MXWXPX	Right to Left	Downward
MYBM7Z	Right to Left	Downward
N6CRNQ	Right to Left	Downward
N7MTBP	Right to Left	Downward
NCQZM8	Right to Left	Downward
NJDXPU	Right to Left	Downward
NKJ89X	Right to Left	Downward
NPF66X	Right to Left	Downward
NV3MBZ	Right to Left	Downward
P9M7MG	Right to Left	Downward
PAHENQ	Right to Left	Downward
QBPLF6	Right to Left	Downward
QPTFXM	Right to Left	Downward
QQ4ERV	Right to Left	Downward
QUJEZ4	Right to Left	Downward
T4YHAR	Right to Left	Downward
TAQQUL	Right to Left	Downward
TFCBQT	Right to Left	Downward
TMC37V	Right to Left	Downward
TPJQW2	Right to Left	Downward
TXFKWK	Right to Left	Downward
UV6WGX	Right to Left	Downward
VCBLMQ	Right to Left	Downward
VJL89Z	Right to Left	Downward

TABLE 2

WebCode	Left / Right	Upward / Downward
VLCAEN	Right to Left	Downward
VLUVX	Left to Right	Upward
W8ARQE	Right to Left	Downward
WAYB28	Right to Left	Downward
WMLMDG	Right to Left	Downward
WP7MCX	Right to Left	Downward
X7C7QF	Right to Left	Downward
XM2GCH	Right to Left	Downward
Y3N4CE	Right to Left	
YPZMDL	Right to Left	Downward
YRNYEC	Right to Left	Downward
YT26L9	Right to Left	Downward
YXE9PB	Right to Left	Downward
ZFNF4J	Right to Left	Downward

Response Summary				Participants: 90		
What is the direction of travel of the bullet through the box?						
<i>Direction:</i>	Right to Left	Left to Right	No Response	Upward	Downward	No Response
Total:	89	1	0	1	87	2
Percent:	98.9%	1.1%	0%	1.1%	96.7%	2.2%

Angles

TABLE 3 - Horizontal (Azimuth)

WebCode	Angle Measurement	Uncertainty (in degrees)
2724LW	82.5	5
2JPPR7	85	1
2QPZ7B	96	5
2TTVNT	85	5
37CZBF	34	1
3VCARU	85	5
3XHVGE	7 (measured from 90)	5
3XJZ6G		
4KRTM7	84	5
4VB8Q9	3	
64ML94	83	5
6CVRR8	5	1
6CW8UD	88	5
6XHEHM	86	5
8LD7RF	88	3
8MNFT7	~80	not determined
8NKTDD		
8X6RWB	84	5
9649UE	86	
9GWRB7	84	
9J6DAL	90-81=9	5
9TNEG2	85	5
9W7QPX	85	
A6EZBH	85	5
ANB9MU	52	7
ARYDAJ	86	5
BELMUM	81	5
CDMLLA	85	
CHFBVA	85	5
CNZHBT	82	
CV2QY9	84	5
D8VBWQ	7 degrees from perpendicular	7
DBDVW7		

TABLE 3 - Horizontal (Azimuth)

WebCode	Angle Measurement	Uncertainty (in degrees)
DFPCGB	85	5
E3ULTP	6	7
EVFVB4	85	5
EXMJX2	85	5
FELNQB	85.5	5
FKTPZX	84	5
G3NEU7	84	
G8YRC6	85	5
HQCPDG	85	5
HZMQYG	88.0 Right to Left	5
JX8LHD	82	5
JYLDQE	84	5
K7V7CV	86	5
K89DHR	82 R-L	5
KGAXKJ	84	5
L6HLT7	96	5
LYANED	85	5
M6X6C4	86	5
MP2RVM	85	2
MXWXPB	4	1
MYBM7Z	87	
N6CRNQ	84	5
N7MTBP	4	5
NCQZM8	85°	5°
NJDXPU	86	5
NKJ89X	84	
NPF66X		
NV3MBZ	85	3
P9M7MG	84 from the right	5
PAHENQ	85	5
QBPLF6	84	5
QPTFXM	4	1
QQ4ERV	85.7	
QUJEZ4	83 (Right to Left)	5
T4YHAR		

TABLE 3 - Horizontal (Azimuth)

WebCode	Angle Measurement	Uncertainty (in degrees)
TAQQUL	83	5
TFCBQT	84	5
TMC37V	82	
TPJQW2	85	
TXFKWK	85	5
UV6WGX	~85 degrees right to left	3
VCBLMQ	8	5
VJL89Z	4	5
VLCAEN	86	5
VLUVVX	84	5
W8ARQE	NATO 6	5
WAYB28	6	
WMLMDG	5	1
WP7MCX	84	5
X7C7QF	5	5
XM2GCH	5	2
Y3N4CE	5	0
YPZMDL		
YRNYEC	83 right to left	5
YT26L9	7	1
YXE9PB	82	5
ZFNF4J	82	5

TABLE 3 - Vertical

WebCode	Angle Measurement	Uncertainty (in degrees)
2724LW	-38	5
2JPPR7	55	1
2QPZ7B	38	5
2TTVNT	40	5
37CZBF	4	1
3VCARU	35	5
3XHVGE	37	5
3XJZ6G		
4KRTM7	36	5
4VB8Q9	37	
64ML94	36	5
6CVRR8	35	1
6CW8UD	40	5
6XHEHM	38	5
8LD7RF	38	3
8MNFT7	~40	not determined
8NKTDD		
8X6RWB	33	5
9649UE	33	
9GWRB7	35	
9J6DAL	36	5
9TNEG2	-36	5
9W7QPX	36	
A6EZBH	39	5
ANB9MU	3	7
ARYDAJ	38	5
BELMUM	-38	5
CDMLLA	37	
CHFBVA	36	5
CNZHBT	37	
CV2QY9	39	5
D8VBWQ	37 degrees from perpendicular	7
DBDVW7		
DFPCGB	33	5

TABLE 3 - Vertical

WebCode	Angle Measurement	Uncertainty (in degrees)
E3ULTP	35	7
EVFVB4	37	5
EXMJX2	-37	5
FELNQB	35	5
FKTPZX	-37	5
G3NEU7	37	
G8YRC6	55	5
HQCPDG	-36.2	5
HZMQYG	-36	5
JX8LHD	50	5
JYLDQE	35	5
K7V7CV	-36	5
K89DHR	56	5
KGAXKJ	36	5
L6HLT7	34	5
LYANED	-36	5
M6X6C4	40	5
MP2RVM	52	2
MXWXPX	35	1
MYBM7Z	39	
N6CRNQ	53	5
N7MTBP	37	5
NCQZM8	36°	5°
NJDXPU	-37	5
NKJ89X	32	
NPF66X		
NV3MBZ	40	3
P9M7MG	37 upward from horizontal plane	5
PAHENQ	35	5
QBPLF6	39	5
QPTFXM	36	3
QQ4ERV	37.3	
QUJEZ4	36 (- downward)	5
T4YHAR		

TABLE 3 - Vertical

WebCode	Angle Measurement	Uncertainty (in degrees)
TAQQUL	-37	5
TFCBQT	34	5
TMC37V	36	
TPJQW2	38	
TXFKWK	38	5
UV6WGX	~38 degrees downwards	3
VCBLMQ	45	5
VJL89Z	36	5
VLCAEN	37	5
VLUVVX	128	5
W8ARQE	NATO 36.7	5
WAYB28	36	
WMLMDG	35	1
WP7MCX	34	5
X7C7QF	35	5
XM2GCH	37	2
Y3N4CE	35	0
YPZMDL		
YRNYEC	-34.2	5
YT26L9	35	1
YXE9PB	36.5	5
ZFNF4J	-37	5

Conclusions

TABLE 4

WebCode	Conclusions
2724LW	Results: There were at least two (2) areas of damage on the section of partition wall, Exhibit ITEM 1, consistent with projectile damage. One of the damaged areas is consistent with a primary projectile impact and the second damaged area is consistent with an exit. Conclusions: The two (2) areas of damage observed on the section of partition wall, Exhibit ITEM1, are consistent with having been caused by a single fired projectile originating from an area to the right of the partition wall on a downward trajectory.
2JPPR7	The glaring element (bullet) damaging the two walls of the evidence box (marked as No. 1 and No. A) moved from the side of the No. 1 wall (bullet inlet) towards the wall No. A (bullet outlet) from top down at the angle of 55 degrees +/- 1 degree (measured against the wall surface marked No. 1) and from right to left at an angle of 85 degrees +/- 1 degree (measured against the wall surface marked No. 1)
2QPZ7B	The initial observations of the item indicate that the defect on side 1 was the entrance. Due to the degree of splintered wood on side A this was believed to be the exit defect. The placement of a trajectory rod through both defects illustrated a projectile path entering side 1 with a path slightly to the left and exiting through side A. Use of an angle finder showed the projectile entered side 1 with a downward angle of approximately 38 degrees (+/- 5 degrees). The horizontal angle was determined using a protractor with the protractor placed under the defect and the 90-degree mark of the protractor lined up with the leading edge (left) side of the defect. When reading the protractor in a left to right fashion, from the 0-degree line to where the trajectory rod aligned with the protractor was approximately a 96-degree angle (+/- 5 degrees).
2TTVNT	[No Conclusions Reported.]
37CZBF	[No Conclusions Reported.]
3VCARU	On the section of a partition wall submitted by investigators, were found two holes. The hole labeled as "1" corresponds to an entrance hole, and the hole labeled as "A" corresponds to an exit hole. The Trajectory 1 related with the defects ("1") and ("A") was caused by a bullet traveling from the face "1" of the wall to the face "A" of the wall and from the right to the left in downward direction.
3XHVGE	There is an elliptical shaped hole on side "1" with gray coloring around the perimeter. The perimeter around the hole on side "1" is smooth, which indicates an entrance hole. There is an irregular shaped hole on side "A" with gray coloring around the perimeter. The perimeter around the hole on side "A" is jagged, which indicates an exit hole. The vertical angle is approximately 37 degrees downward. The horizontal angle is approximately 7 degrees from right to left.
3XJZ6G	Pathway A (including impacts A, A1) is consistent with a bullet traveling from side "1" to side "A", right to left, and in a downward direction.
4KRTM7	bullet entered side 1 with a downward angle of 36 degrees +/- 5 degrees. Bullet traveled from right to left with an angle of 84 degrees +/- 5 degrees to the surface plane of the wall (6 degrees +/- 5 degrees to orthogonal)
4VB8Q9	The projectile was travelling from side "1" towards side "A", 3 degrees right to left, and at a 37 degree downward angle.
64ML94	One defect, labeled as 1 in photographs, was observed in the wall of the garage. Defect 1 appeared to be the entrance and was elliptical in shape. Defect 1 demonstrated downward directionality, from the right to left. A rod was placed in the defect to demonstrate the directionality of the bullet flight path. The following approximate hand measurements were obtained from the defect: Azimuth (horizontal) Angle: 82 degrees from right to left (+/- 5 degrees) and Vertical Angle: 36 degrees downward (+/- 5 degrees)

TABLE 4

WebCode	Conclusions
6CVRR8	Test object, witness object number 62-QMC-3214-0001 Test No. 19-5620 is a wooden box with holes found due to 1 shot of a projectile fired by a projectile into the front wall. (The side where the sticker is found in the top right corner, specify Test No. 19-5620 1) and the bullet penetrates through the back wall of the wooden box. (The side where the sticker is found in the top right corner, specify Test No. 19-5620 A) with the gun trajectory firing from the front wall to the back wall (From hole 1 to hole A), from top to bottom. top to base is an angle of about 35 degrees to the horizontal level And from the right to the left at an angle of about 5 degrees (Azimuth)
6CW8UD	The bullet entrance hole on the wall was the strike marked #1. The bullet struck the wall at about a 40degree downward angle and a slight right to left angle of 88 degrees with a +/- 5 degree of uncertainty.
6XHEHM	I observed what appeared to be a possible impact point on a section of a partition wall from a garage. The flight path appears to be from front to back, right to left, and with a downward direction. The horizontal angle is 86 degrees and the vertical angle is 38 degrees (all measurements are approximate).
8LD7RF	[No Conclusions Reported.]
8MNFT7	The bullet traveled in a right-to-left and downward direction and went through the wall. The bullet entered the side labeled "1" and exited the side labeled "A".
8NKTDD	Pathway 1 (including impacts 1 and A) is consistent with a bullet traveling from side '1' to side 'A', right to left, and in a downward direction.
8X6RWB	The projectile entered the wall on side "1" and exited on side "A". The projectile entered traveling right to left at an angle of approximately 84° and downward at an angle of approximately 33° (+/- 5°).
9649UE	A single perforating defect was in the wood block. An elliptical entrance was in the side labeled "1". This defect had apparent bullet wipe around the defect. An irregular shaped exit defect was in the side labeled "A". The trajectory associated with this bullet defect was measured as a downward elevation angle of 33 degrees and a right to left horizontal angle of 86 degrees.
9GWRB7	A single perforating bullet hole was in the submitted block of wood reported to be a section of partition wall. A slightly elliptical-shaped entrance hole was in the side marked '1'. The defect had a blackish-gray deposit around most of the circumference. An irregular-shaped exit hole was in the side marked 'A'. The trajectory associated with this bullet defect was measured as a downward elevation angle of 35 degrees and a right to left horizontal angle of 84 degrees (clockwise from the front of the wood block).
9J6DAL	after examining the box the entrance hole would be point 1 and while measuring the size of the hole it seems to be of .22 round and when calculating the horizontal (Azmith) angle was found to be 81 (keeping the bullet entrance hole reference at 90 degree) so we subtracted it with 90 which will make the bullet entrance hole reference at 0 degree
9TNEG2	An arrow was written on one side of the box and pointed towards the side of the box with the label that read in part, "TOP." The side of the box with the label that read "Test No. 19-5620 1" had a circular/oval hole in the approximate center of the box and had gray material (bullet wipe) on the upper margins. This hole was determined to be the entrance hole of the projectile. The side of the box with the label that read "Test No. 19-5620 A" had an irregular hole with jagged margins near the bottom edge of the box. This hole was determined to be the exit hole of the projectile. Due to the small size of the entrance hole, a small caliber rifle cleaning rod was used an improvised trajectory rod to illustrate the path of this projectile; vertical and azimuth angles were measured. The path of this projectile was determined to be downward and slightly from right to left. The vertical angle was measured to be -36 degrees (down) and the azimuth angle was measured to be 85 degrees relative to the face of the box labeled as "1."
9W7QPX	Item 19-5620 has perforating bullet damage with an entrance near the center of side 1 and an exit near the base of side A. The trajectory of the bullet was approximately 36 degrees downward and approximately 85 degrees relative to the wall surface from right to left.

TABLE 4

WebCode	Conclusions
A6EZBH	The projectile entered through side 1 and exited through side A. The angle of the projectile was found to have a 39 degree angle descending and a 85 horizontal degree angle from right to left.
ANB9MU	Defect "1" is oval in shape, with smooth edges and the material appears to be pushed inward. Defect "A" is irregular in shape and appears to have been splintered outward and is missing material. The bullet that created this defect entered the wooden box causing defect "1" and was traveling at a downward angle of 52 degrees from perpendicular. The bullet passed through the wooden box at a 3 degree right to left angle from perpendicular and exited the other side and causing defect "A".
ARYDAJ	One bullet perforated the wooden box with an entrance at side "1" and an exit at side "A". The measured trajectory associated with the bullet path is from right to left and downward.
BELMUM	Results: There are two (2) areas of damage on the partition wall, Item 1, consistent with having been caused by the passage of a single projectile. Conclusions: Damage to side 1 of the partition wall, Item 1, is consistent with a primary projectile impact originating from an area to the right of the wall on a downward trajectory. Damage to side A of the partition wall, Item 1, is consistent with an exit associated to the damage on side 1 of the wall.
CDMLLA	The submitted piece of wall was perforated by a bullet that entered on the side that was marked with the number 1 and exited on the side marked with the letter (A). The bullet perforated the wall at a vertical angle of 37 degrees downward and at a horizontal angle of 85 degrees from right to left.
CHFBVA	The section of the submitted wall was found to have a pair of defects. A single bullet likely perforated the section of the submitted wall on surface "1" and exited from surface "A". The trajectory, viewed facing surface "1", was determined to be approximately 80° to 90° from right to left, and 31° to 41° downwards.
CNZHBT	Item AD side 1 has a hole in the approximate middle and the hole looks to be slightly oval. The hole measures approximately ¼" by ¼". There is visible grey residue within the hole as well as at the top margin of the hole in side 1. I tested the exterior of the hole in side 1 with presumptive chemical tests for copper and lead. The hole tested negative for copper residues and presumptive positive for lead. The hole in side 1 is consistent with being an entrance hole. Item AD Side A has a hole with a damaged area surrounding it located near the bottom edge of side A in the approximate middle. The hole is irregularly shaped, and it measures approximately 3/16" wide by approximately 9/32" long. I tested the exterior of the hole in side A with presumptive chemical tests for copper and lead. The hole in side A screened negative for copper and tested presumptive positive for lead at the top margin of the hole. The hole at the bottom of side A is consistent with an exit hole. The holes in sides 1 and A are in line with each other and consistent with being made by the passage of a single bullet. The approximate trajectory for the bullet that entered side 1 and exited side A is from right to left (as facing the wood box from side 1) and up to down. The downward/vertical angle is approximately 37° and the horizontal angle (measured from the right side as facing side 1) is approximately 82°.
CV2QY9	I examined the bullet hole(s) and used a probe to document the trajectory. The lead in mark and a "lead" wipe were observed on the entry hole on Side 1. The blown-out appearance of the wood was observed on the exit side, Side A. The bullet path was right to left, front to back, and downward. I measured the probe with an inclinometer and using a protractor with a plumb bob to get the angles. The trajectory is approximately 39 degrees down and 84 degrees from the right side.
D8VBWQ	The apparent entrance defect is located on side 1. The defect on side 1 is approximately 6mm by 5mm. The apparent exit defect is located on side A. The defect on side A is approximately 10mm by 9mm. The apparent direction of travel is downward and from the right to the left. The horizontal angle is approximately 7 degrees from perpendicular. The vertical angle is approximately 37 degrees from perpendicular.
DBDVW7	Pathway A (including impacts A, A1) is consistent with a bullet traveling from side 1 to side A, right to left, and in a downward direction.
DFPCGB	The wall from the garage were fired once, from "1" to "A", from right to left and downward.

TABLE 4

WebCode	Conclusions
E3ULTP	Defect A-1. General Location - Prepared wooden box. Target Surface - Wood board. Classification of Defect - Perforation hole or through and through hole. Appearance of Defect - Circular. Size of Defect - approx. 6 mm in diameter. Vertical distance - 2 7/8 inch from the bottom. Horizontal - 3 1/4 inch from the left edge. Additional Information - A trajectory rod was inserted through the corresponding bullet holes. An angle measurement reader was placed on the rod and determined to be - 35 degrees +/- v. (downward). A protractor was placed along the target surface with the established horizontal angle to be 6 degrees from perpendicular.
EVFVB4	A trajectory analysis was performed on Item 1 and the following opinions were determined: A bullet struck wall 1 ~ 2 7/8 inches above the floor and 3 1/4 inches from the left side of the wall at Hole 1 and traveled through the wall exiting wall A at Hole 2. The vertical component of the bullet's path through the wall was approximately 37 degrees downward, and the azimuth component was approximately 85 degrees with a right-to-left track. The interpretations and opinions in this document are based upon my knowledge of the case factors available to me the time this report was authored.
EXMJX2	One perforating bullet hole was observed in the submitted section of the partition wall (Exhibit 1). The bullet entered the wall at an observed perforating defect (Defect 1) and exited the opposite side of the wall through an additional observed perforating defect (Defect A). Generally the bullet traveled in a slightly right to left direction with a downward angle.
FELNQB	Photos were taken of the item and the defect on the item throughout the process to include approximate measurements. The defect was what appeared to be a bullet hole with an entrance on the side labeled as "1" and exit on the side labeled as "A". The direction of travel was in a downward angle of approximately 35 degrees and slightly right to left at approximately 85.5 degrees.
FKTPZX	The submitted section of a partition wall was examined for the presence of a bullet passage. Two holes were located. Based on physical characteristics of the two holes it was determined that the hole located in side "1" was an entrance and the hole located in side "A" was an exit. The vertical component of the bullet's path through the wall was approximately 37 degrees downward (-37) and the azimuth component was approximately 84 degrees out of the plane of the struck wall with a slight right to left track as one views the wall.
G3NEU7	A bullet traveling downward (37 degrees) and from right to left (84 degrees) struck side 1 of the wall partition. A perforating bullet defect was in side 1. A bullet exit defect was in side A.
G8YRC6	The direction is from up to down 55 degrees (+- 5 degrees) and from right to left 85 degrees (+- 5 degrees).
HQCPDG	From my examination I formed the opinion that the projectile has perforated the partition wall with the entry into the side labelled '1' and has exited out of the side labelled 'A'. When facing the side labelled 1 the trajectory of the projectile was from right to left and downwards.
HZMQYG	Based on the location and features of the two perforations, it was established that the trajectory was consistent with the passage of a bullet from front (side of box marked Test No. 19-5620 1) to back, and right to left with a downwards trajectory. A trajectory rod was placed through the perforations and the horizontal and vertical angles were measured using a protractor and plumb line. The vertical angle was established to be -36 degrees and the horizontal angle was established to be 88 degrees, right to left. Angles were confirmed with photographic methods and with an inclinometer.
JX8LHD	A perforating defect into a wall with an entrance defect approximately 2 5/8" down from the top edge and approximately 3 1/8" in from the left edge. The trajectory travels slightly from right to left and downward. The exit defect is approximately 3/4" up from the rear bottom edge. The vertical angle is approximately 50 degrees (trig method produced an approximate angle of 45 degrees). The horizontal angle is approximately 82 degrees. Both angles measured using trajectory rod.
JYLDQE	The wall section, ITEM 1, has damage that is consistent with having been caused by the passage of a fired bullet traveling from the side labeled "1" to the side labeled "A". A trajectory rod inserted through the holes produced a vertical angle of -35 degrees (downwards) and an azimuth angle of 84 degrees, right to left (6 degrees right of perpendicular when facing the side labeled "1").

TABLE 4

WebCode	Conclusions
K7V7CV	A bullet entrance hole (Marker 1) was observed primarily centered on one side of the partition. A corresponding bullet exit hole (Marker A) was observed on the bottom near the middle of the partition on the opposite side. The bullet perforated this wooden partition with a path of travel that was determined to be right to left at 86 degrees from the horizontal plane, and at a 36 degree downward angle. All trajectories measured in this report reflect a plus/minus 5 degree variance unless otherwise noted.
K89DHR	The bullet impact was on side label (1) of the block wood, the bullet traveled from right to left downward angle. The horizontal angle measurement is (82 ± 5) degree and the vertical angle measurement is (56 ± 5) degree.
KGAXKJ	The bullet path is consistent with a bullet that entered side 1 of the wall section and exited side A with a downward angle of approximately 36° from horizontal and traveling right to left at an angle of approximately 84° from the wall surface.
L6HLT7	A wood block was provided for the CTS Test containing a side labeled as the top, a side labeled as 1 and the opposite side labeled as A. Side 1 had an apparent bullet hole which was marked as Exhibit 1. Side A had an apparent bullet hole which was marked as Exhibit A. Digital photography was used to document the box and the exhibits. The apparent bullet holes were measured and a rod was placed to determine approximate angles. Exhibit 1 was oval in shape with smooth edges and apparent wipe. It appeared to be an entrance. It measured 3.5 mm width by 4.9 mm length. The angle was 34 degrees +/- 5 degrees vertical and 96 degrees +/- 5 degrees horizontal, downward and right to left. Exhibit A was irregular in shape and had pieces of splintered and missing wood around it. It appeared to be an exit. It measured 4.8 mm width by 7.7 mm length. The angle was 34 degrees vertical and 96 degrees horizontal, downward, and left to right. A sketch was made.
LYANED	There were two areas of bullet related damage to the wall. The bullet entry was located on the front face of the wall marked '1' and was located approximately 82mm from the left edge and approximately 77mm up from the base of that wall. The actual damage measured approximately 6.6mm by 5.7mm. I also noticed an area of bullet wipe surrounding the actual damage between the 7 o'clock to 4 o'clock positions. A bullet exit was located on the opposite side of the wall marked 'A'. This area of damage was located approximately 73mm from the left edge and approximately 17mm from the base of that wall. The actual damage measured approximately 13.1mm by 4.8mm. In my opinion these areas of damage are consistent with having been caused by the discharge and subsequent impact of a bullet discharged from a firearm. The trajectory was determined to be from side 1 to side A, slightly right to left and downwards.
M6X6C4	Projectile 1 (P1) penetrated through the front wall and exited the back wall. The trajectory was determined to be 86 degrees right to left and 40 degrees descending.
MP2RVM	The measured horizontal angle of impact from the projectile was 85 degrees (where 90 degrees would mean a perpendicular impact), traveling from right to left, as it impacted and penetrated the surface of the target. The measured vertical angle of impact from the projectile was 52 degrees (where 90 degrees would mean a perpendicular impact), traveling from top to bottom as it impacted and penetrated the surface of the target. These angles have a 2 degree +/- uncertainty due to the irregular hole produced by the projectile when it exited the back of the target.
MXWXPJ	The wooden box is found 1 shooting shot which has entrance hole on label "1" surface and exit hole on label "A" surface. The direction of travel of the bullet through the box are: Right to Left has Horizontal Angle Measurement about 4 ± 1 degrees, Downward has Vertical Angle Measurement about 35 ± 1 degrees
MYBM7Z	Bullet defect A was a perforating bullet defect located towards the center of the wooden box on the side labeled '1'. The trajectory associated with bullet defect A was from side '1' to side 'A', slightly right to left at an azimuth angle of 87 degrees, and downwards at a vertical angle of 39 degrees.

TABLE 4

WebCode	Conclusions
N6CRNQ	Suspected bullet trajectory appeared to be from the front of the box (side "1") to the rear (side "A") in a right to left horizontal direction at an 84 degree angle. Subsequently, trajectory was also in an downward direction (elevation) at a 53 degree angle. All angles measured are reported with a +/- 5 degree level of accuracy.
N7MTBP	The trajectory of the projectile was in an downward angle ~37 degrees and approximately 4 degrees from right to left both were +/- 5 degrees.
NCQZM8	The box was shot through the wall labeled "1" towards the wall labeled "A", with a downward direction and from right to left.
NJDXP	A perforating defect through the partition wall was located. The apparent bullet hole on side 1 was consistent with an entry hole. The apparent bullet hole on side A was consistent with an exit hole. The angle of incidence for the defect was measured to be a horizontal angle of 86° and a vertical angle of -37°. 1. All reported angles of incidence include a ±5° uncertainty of measurement. 2. Negative (-) vertical angles are associated with shots downward, towards the ground. Positive vertical angles are associated with shots upward, towards the sky. The bullet striking this section of partition wall was travelling from side 1 to side A.
NKJ89X	A portion of a wall from a garage with a perforating hole was examined. The entrance hole on the side marked "1" was used for measurements. This hole was located 2 1/2 inches from the right edge and 2 3/4 inches from the bottom edge. The azimuth angle was 84 degrees from right to left and the vertical angle was 32 degrees downward.
NPF66X	Pathway A (including impacts A, A1) is consistent with a bullet traveling from side 1 to side A, right to left, and in a downward direction.
NV3MBZ	The trajectory of the bullet through the box, Item 1, was 40 degrees downwards (+/- 3 degrees) from the horizontal plane and 85 degrees right to left (+/- 3 degrees) from the view of the shooter.
P9M7MG	When viewed from side 1 of the submitted partition wall section: One semi-circular, perforating entrance defect with a smooth margin in the side labeled "1" of the submitted partition wall section. A marginal abrasion is visible around the periphery of the upper half of the defect, with the top of the margin being thicker than both sides. The defect at the outer margin measures approximately 5mm x 8mm. The defect is approximately 3 1/4 inches from the left side and approximately 2 7/8 inches upward from the bottom. When viewed from the opposite side, labeled "A", of the submitted partition wall section: One generally rectangular, perforating exit defect. The rectangular perimeter of the defect is at the surface of the wall section, with a rough margined, semi-circular defect visible in the interior margin of the hole. Material fragments protrude outward from the interior margin. The defect at the outer surface measures approximately 11mm x 35mm. The defect is approximately 2 15/16 inches from the left side and approximately 5/8 inches upward from the bottom. Trajectory is side "1" to side "A", right to left and downward: Horizontal angle 84 degrees right to left, +/- 5 degrees; vertical angle 37 degrees upward from the horizontal plane, +/- 5 degrees. Angles were determined using a trajectory rod centered through the corresponding entrance and exit defects. An angle finder was utilized to determine the vertical angle and a 180 degree protractor and plumb bob was used to determine the horizontal angle.
PAHENQ	The trajectory was determined to be downward and slightly right to left.
QBPLF6	One perforating hole type defect was found on the item. This defect is consistent with the passage of a projectile entering the item on the "1" side and exiting on the "A" side. The direction of travel is approximately 84 degrees from right to left and approximately 39 degrees in a downward direction.
QPTFXM	A small calibre bullet has been fired through the box, entering the side labelled "1", in a downward and from right to left. The downward angle is measured and calculated to 34 degrees (+/- 3 degrees) related to the horizontal plane. The angle from right to left is measured and calculated to 4 degrees (+/- 1,5 degrees) related to the vertical plane.

TABLE 4

WebCode	Conclusions
QQ4ERV	Defect 1 is a perforating entrance bullet defect which exits at defect A moving from right to left and top to bottom. The elevation trajectory angle was measured as 37.3 degrees downward. The azimuth trajectory angle was measured as 85.7 degrees from right to left.
QUJEZ4	On Monday, September 23, 2019 at approximately, 0900 hours I began an examination of a Collaborative Testing Services (CTS) "Shooting Reconstruction Angle Determination" Proficiency Test. The white, cardboard box was labeled, "2019 CTS Forensic Testing Program Test No. 19-5620: Shooting Reconstruction: Angle Determination Sample Pack: AD" was sealed with a single piece of red and white evidence tape and marked "CTS" across the seal. The box contained a section of the portioned wall reported to be "Item 1". Based on visual examination it was determined the section was manufactured of wood and measured 5 3/4" x 3" x 6", and was clearly marked with three white stickers labeled, "Front Label Test No. 19-5620 1", "Rear Label Test No. 19-5620 A" and "Top Label Test No. 19-5620 TOP". Item 1 was photographed on all sides and on examination a defect was located on side "1" consistent with a possible projectile entry location. This area was also noted to have a greyish coloring around the entry hole consistent with a bullet wipe. A lead check (Sodium Rhodizonate) test kit was performed at this location and a positive presence of lead was noted (results photographed). The reverse side of Item 1, which is labeled "A" is consistent with a projectile exit location as the wood at this area was pushed outward and the appearance of the defect was slightly larger than the entry defect. It was determined the projectile entered side "1" and exited side "A". A laser, inclinometer and tri-pod were used to determine the angle of entry on side "1". The vertical angle of entry was found to be ~36° downward (+/- 5°). A trajectory rod was inserted into Item 1 through the entry and exit defect to determine the angle of entry was slightly right to left and downward. A protractor, trajectory rod, and plumb line were utilized to determine a horizontal (azimuth) angle measurement of ~83° (+/- 5°) from right to left. Item 1 was returned to its container and sealed with evidence tape along the front edge. All examination findings were noted on the CTS proficiency test check sheet, and a copy of this report was attached.
T4YHAR	Pathway J (including impacts J, J1) is consistent with a bullet traveling from side 1 to side A, right to left, and in a downward direction.
TAQQUL	A projectile perforated the wall, entering on side "1", exiting on side "A", traveling downward, and from right to left.
TFCBQT	The projectile entered the wood box on Side 1, traveled through the box and exited the wood box on Side A. The projectile traveled slightly right to left at a downward angle.
TMC37V	One shot perforated the partition. Side 1 contains a bullet entry defect. Side A contains a bullet exit defect. The trajectory for the bullet perforating the partition is Side 1 to Side A, approximately 82 degrees right to left, and 36 degrees downward.
TPJQW2	Shot struck at 1 from right to left, up to down, exits at A.
TXFKWK	The bullet passed through the box by face 1 to A. The entry hole is face 1 and the exit hole is face A. The trajectory of the bullet is from the right side to the left with a 85 degree angle between the wall of the box and the rod (when facing the entry hole face 1). The downward component of this path is 38 degree.
UV6WGX	The section of partition wall has an entrance bullet hole defect on the upper area of the side marked as "1". The bullet hole is surrounded with an ovoid area of bullet wipe consistent with an downward directed entrance bullet hole defect. On the opposite side of the partition wall is an exit bullet hole defect on the bottom area of the side marked as "A". The bullet hole is surrounded by an irregular area of cratering/splintering of the plywood fibers in the direction of bullet travel and consistent with an exit bullet hole defect. The entrance and exit bullet hole defects are associated with a single perforating bullet path through the partition wall. The bullet path is from right to left with an azimuth angle of approximately 85 degrees (+/- 3 degrees) measured from right to left facing the entrance side marked as "1". The bullet path is at a downward vertical angle of approximately 38 degrees (+/- 3 degrees) top to bottom.

TABLE 4

WebCode	Conclusions
VCBLMQ	The trajectory is described regarding 3 reference planes. Horizontal plane (parallel to top and bottom faces), longitudinal plane (parallel to « 1 » and « A » faces) and transversal plane (perpendicular to both others planes). The bullet progressed through the box from face 1 (entrance hole) to face A (exit hole) on an axis oriented from top to bottom with an angle of 45° from horizontal plane and from right to left when following the bullet path with an angle of 8° from the transversal plane
VJL89Z	*This laboratory test report contains the conclusions, opinions and interpretations of the member whose initials/signature appears on the report. Results relate only to the items tested. Unless otherwise noted, all activities performed at [Address]. This is a supplement to the original report.* On August 6th, 2019, I was assigned a work order by [Name] regarding a reckless handling of a firearm case. An investigator had submitted a section of a partition wall from a garage in which a shooting took place. This section was packaged in a sealed white cardboard box and identified as Item #1. The only testing requested by the investigator was to determine the angle at which the partition wall had been shot. The section of partition wall was approximately 5 7/8" wide x 5 7/8" tall x 3 1/8" deep. The box was constructed of plywood. The following sides had been marked with white labels: Side A, Side 1, Top. Prior to conducting my angle determination, I conducted a visual inspection of the defects on Item 1. The defect was located near the center of side 1. The area around the defect on Side 1 was smooth and appeared to be the entry hole. The defect had an oval appearance vertically and appeared to have been shot at a downward angle. The defect on Side A was located in the bottom in the center. The area around side A was rough protruding outwards, appearing to be the exit hole. This defect also had an oval appearance consistent with Side 1. Prior to using trajectory rods to determine the angle, I completed the following sketches: Side 1, Side 2, Top, Side. The sketches were to scale and included the placement of both defects. I marked center mass on each defect and drew a line connecting them. Using a protractor, I was able to determine the approximate vertical and horizontal angles in which the projectile entered Side 1. The results are listed below: Approximate Vertical Angle: 36 degrees downward angle, Approximate Horizontal Angle: 4 degrees right-to-left angle. Using a trajectory rod and a protractor, I was able to confirm the approximate angles obtained using the sketches. Item 1 was initialed, repackaged, and placed in a temporary storage locker at [Laboratory]. Nothing further to report. CASE STATUS: TOT CID
VLCAEN	I observed an apparent bullet hole (A) on the portion of wall that was submitted. I probed bullet hole A and determined a trajectory path from side "1" to side "A", slightly right to left with a downward angle. The bullet hole and trajectory was photographically documented using overall, midrange, and close-up photography. A total of 31 digital photographs were stored onto a CD.
VLUVVX	There is a single perforating bullet hole to a wall (particle board) surface. The entrance is located approximately three feet from the left edge of the wall and approximately 1/2 inch from the base of the wall. The exit is located approximately three inches from the left and 2 3/4 inches from the base of the wall. The bullet traveled slightly left to right in a steam upward trajectory.
W8ARQE	One round was fired in a right-to-left direction at a downward angle, penetrating the box on side 1.
WAYB28	The direction of travel of the bullet through the box was from bullet hole 1 to bullet hole A. The trajectory was at a 36 degree downward angle and right to left at a 6 degree angle from perpendicular to the wall surface.
WMLMDG	A box (Test No.19-5620) have one entrance hole and one exit hole. 1 side is entrance hole and A is exit hole. The direction of travel of the bullet through the box is Right to Left in 5+-1 degrees (Horizontal) and downward 35+-1 degrees (Vertical).
WP7MCX	Apparent entrance defect and apparent exit defect. Azimuth angle approximately 84 right to left and vertical angle approximately 34 downward. All trajectories are opinions and all measurements are approximate. This section may contain the opinions, conclusions, or interpretations of the CSI whose signature appears at the end of this report

TABLE 4

WebCode	Conclusions
X7C7QF	Introduction: On 8/7/19, I, [Laboratory] Manager [Name] received Item 1, a section of the partition wall which contains one entrance and one exit hole. Instructions were included with the submission to "Examine testing materials according to your normal laboratory procedures". The partition wall was a wooden box that was fastened together using nails and staples. One side of the box was labeled "1" and the other side of the box was labeled "A". There was a perforating defect through side "1" and another perforating defect through side "A". The top of the box was also labeled. Trajectory Examination: Upon examination, it was determined that the defect through side "1" was likely the entrance side and the defect through side "A" was likely the exit side. The defect through side "1" was approximately 2 15/16 inches from the bottom and 3 1/4 inches from the left side. The defect through side "A" was approximately 3/4 inches from the bottom and 3" from the left side. The projectile was traveling downward at an approximately 35 degree angle from the horizontal and an approximately 5 degree angle from right to left (with 0 degrees being perpendicular to side "1" of the box). The accepted angle variation in dealing with trajectory is plus or minus five degrees.
XM2GCH	[No Conclusions Reported.]
Y3N4CE	The bullet was entranced on side 1 and through the box then exited on side A. The trajectory is down angle (35 degree) and from right to left (5 degree).
YPZMDL	Pathway A (including impacts 1, A) is consistent with a bullet traveling from side 1 to side A, right to left, and in a downward direction.
YRNYEC	The entrance hole was located in Side 1 at approximately 6.8cm from the right edge of the block and approximately 7cm from the bottom edge. The shot entered the block at an approximately 83 degree angle (right to left) and descending at an approximately 34.2 degree angle and exited out of Side A.
YT26L9	According with the characteristics, the wooden block has a pair of bullet holes, entrance (side 1) and exit (side A) conforming only one trajectory. After examination using ballistic rods and angle conveyor, the reconstruction define an entrance hole with a side deviation angle of 7° right to left and vertical inclination angle of 35° downward.
YXE9PB	The section of wall (with sides labeled side #1 and side A) contained two apparent corresponding bullet defects. The defect on side #1 (labeled defect #1 in photographs) appeared to be the entrance. When facing side #1, the trajectory appeared to be right to left and downward. The following hand measurements were obtained: Horizontal angle: 82 degrees (+/- 5 degrees), right to left; Vertical angle: 36.5 degrees (+/- 5 degrees), downward.
ZFN4J	Based on bullet wipe and no defects I determined that the bullet entered the side of the wood box marked as 1. Based on a concave surface, defects, and splintering I determined that the bullet exited the side of the wood box at A. The vertical angle was measured with an angle finder and was determined to be -37° (downward). The Azimuth angle was measured using a protractor and a plumb line and was determined to be 82° right to left.

Additional Comments

TABLE 5

WebCode	Additional Comments
2JPPR7	The shot was fired from a small caliber weapon - most likely 22 LR (lead trace at the inlet). The bullet at the moment of hitting the box had a low speed, which could have occurred when shooting from a long distance from a long weapon (rifle) on the falling part of the track which would indicate an accidental bullet or when firing from a short weapon from a distance of several meters. It was not an attachment shot - no characteristic traces around the entrance.
2QPZ7B	Horizontal angle was recorded reading protractor left to right from 0-degrees against the left side of the box to 96-degrees where the rod was located.
64ML94	The vertical angle was measured using an inclinometer. The horizontal angle was measured using a protractor, with the zero point as the wall.
8MNFT7	Sides right and left were established by using the side labeled "1" as forward-facing. Laboratory policy does not include reporting angle measurements, and no uncertainty of measurement has been determined. Notes specify the angle measurements as right-to-left and downward rather than using the terms azimuth and vertical.
9GWRB7	Use a larger caliber bullet so a typical size trajectory rod will fit through the defect without causing damage/alteration to the bullet holes.
9TNEG2	The entrance hole was too small for the lab's commercially purchased trajectory rods to fit. A small caliber rifle cleaning rod was used as an improvised trajectory rod to complete the proficiency test. If this situation presented itself at a crime scene, the projectile path would not have been probed. CTS should use a larger caliber bullet when designing this test.
CNZHBT	The nails used to secure the box together were not hammered flush with the bottom of the box. Due to the varying heights of the nail heads protruding from the box bottom, the box did not set flat against the table. Additionally, since the box bottom was not flat, the box rocked back and forth (front to back). Since we are being asked to measure angles, these should have been flat.
FELNQB	The rod we used was bought because the standard kit rods did not fit.
HQCPDG	The Azimuth (Horizontal) angle is measured from the partition wall (Shooting reconstruction method).
KGAXKJ	The angle terms used by CTS are Azimuth and vertical. I use Azimuth as the bird's eye looking down. the azimuth angle is the angle made from the wall surface to the bullet path. I use elevation angle (CTS-vertical). The elevation angle is the angle made from the bullet path to the horizontal plane from the bullet hole.
NKJ89X	The laboratory does not have a calculated uncertainty established.
NV3MBZ	The box was received with quite a large chunk of wood splintered out at the exit. The exit hole was not well defined.
P9M7MG	[From Table 2 - Direction of Travel: "Right to Left when viewed from the front (side #1)"].
QPTFXM	We would like to suggest offering a graphic illustration of the box. That would help to point out which angle the measurement is referring to in relation to which plane. That would probably help to ensure a more uniformed reply from all your participants.
TMC37V	Defects were not tested for lead and copper. The defects are assumed to be bullet defects. The conclusions described herein are limited to the analysis of the trajectory. Further description of the partition and defects would be contained in the Methods and Observations section of the report.
YXE9PB	The horizontal angle was measured from right to left using a protractor, where the wall was considered 0 degrees. The vertical angle was measured using an inclinometer.

-End of Report-
(Appendix may follow)

Test No. 19-5620: Shooting Reconstruction - Angle Determination

DATA MUST BE SUBMITTED BY **Oct. 7, 2019, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: DUL9AE

Scenario:

Investigators have submitted a section of a partition wall from a garage in which a shooting took place. They are asking you to conduct your analysis using your laboratory's procedures.

Please note:

-For this exercise, the sample contains a "TOP" label for orientation purposes.

-The sample has been labeled with two different characters ("A" and "1") in which participants can use as reference in reporting.

-Make sure to place the sample on a flat surface when measuring angles.

Items Submitted (Sample Pack AD):

A section of the partition wall which contains one entrance hole and one exit hole.

1.) Which label on the box represents the entrance hole?

- A 1

2.) What is the direction of travel of the bullet through the box? (Select one from each column)

- | | |
|-------------------------------------|--------------------------------|
| <input type="radio"/> Left to Right | <input type="radio"/> Upward |
| <input type="radio"/> Right to Left | <input type="radio"/> Downward |

3.) Please record your angles below. (If the angle type below differs from your normal terminology, you may use your preferred terminology in the conclusions section of the data sheet.)

Angle Type (i.e. Azimuth, Vertical, Horizontal)	Angle Measurement (in degrees)		Uncertainty (in degrees)
Horizontal (Azimuth)	<input type="text"/>	±	<input type="text"/>
Vertical	<input type="text"/>	±	<input type="text"/>

Please note: Any additional formatting applied in the free form space 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.

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

5.) 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)