



W O U N D B A L L I S T I C W O R K S H O P

Host Agency: Ft. Collins Police Department
Date: June 26th, 2008



Hosted By:

**Ft. Collins Police
Department**



Attending Agencies:

Ft. Collins Police Department
Longmont Police Department
Johnstown Police Department
Loveland Police Department
Colorado Springs Police Department
Sterling Police Department
Larimer County D.A.

ATK Distributor Information



Lana Ulmer

Ultramax Ammunition
2112 Elk Vale Rd
Rapid City, SD 57701
Office: 605-342-4141
Cell: 605-484-7869
E-mail: ultramax@amerion.com



Contact Information

Ty Windhorst

ATK Law Enforcement Sales
2299 Snake River Ave
Lewiston, ID 83501
Office: 208-750-4745
Cell: 208-816-1779
E-mail: ty.windhorst@atk.com

ATK Factory

2299 Snake River Ave
Lewiston, ID 83501
(800)256-8685

www.le.atk.com

Wound Ballistic Workshop Report

On June 26th, 2008 Fort Collins Police Department hosted a Wound Ballistic Workshop at their training facility to evaluate performance duty ammunition. Invitations went out and the following agencies were present:

Fort Collins Police Department
Longmont Police Department
Johnstown Police Department
Loveland Police Department
Colorado Springs Police Department
Sterling Police Department
Larimer County D.A.



In some workshops we begin in the classroom with a discussion of wound ballistic theory and history of ammunition selection. These discussions are usually centered around the science that agencies should be basing their ammunition selection on and why. After an approximate hour and a half classroom presentation on ballistics the class will then move to the range for hands on ballistic testing. Due to time restraints on the range the participants opted out of the classroom presentation to focus more on the hands on ballistic testing. However, out on the range we did discuss wound ballistics. When conducting a workshop often times firearms instructors, SWAT personnel, criminalists, rangemasters, lab technicians, and snipers are present which brings a vast array of application and knowledge to the table when evaluating ballistic performance.

The workshop follows the FBI Wound Ballistic Testing Protocol. This test is specific to penetration, retained weight and expansion through multiple test events. These events are listed below by corresponding number:

- | | |
|-----------------------------|-----------------------------|
| #1 – Bare Gelatin @ 10 ft | #5 – Plywood @ 10 ft |
| #2 – Heavy Clothing @ 10 ft | #6 – Auto Glass @ 10 ft |
| #3 – Steel @ 10 ft | #7 – Heavy Clothing @ 20 yd |
| #4 – Wallboard @ 10 ft | #8 – Auto Glass @ 20 yd |

The agencies then chose which rounds that they were going to shoot through which protocol. The agencies keyed on events #1 – Bare Gelatin, #2 – Heavy Clothing, #6 – Auto Glass. Demonstrated Calibers - 9MM, 45 Auto, and some 223.

****NOTE: ALL COMPETITORS AMMUNITION WAS SUPPLIED BY AGENCY NOT ATK PERSONNEL ***
*** THE PURPOSE OF THIS IS TO ENSURE THE INTEGRITY OF THE TEST ****

Please note that the shooting, measuring, weighing, and data entry is all done by the participants and not by ATK personnel. This is to allow participants a “hands on” and “unbiased” approach to ballistic testing.

Test Event #1 – Bare Gelatin @ 10 Feet

The gelatin used for this test is 10% gelatin as called out in the FBI Protocol and was calibrated by temperature as well as BB penetration at a specified velocity.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	9MM 147 gr.	13.25”	0.821”	101.50%
Winchester SXT	9MM +P 127 gr.	13.25”	0.641”	99.37%
Remington GS	9MM 147 gr.	15.00”	0.593”	99.86%
Speer GDHP	9MM +P 124 gr.	13.25”	0.665”	102.74%

**Retained weight may exceed 100% due to test media being trapped in the bullet.*

As noted in the table above both the Federal HST and Speer GD had larger expansions and retained more weight than Winchester SXT and Remington Golden Saber. The expanded diameter of the HST was 38% larger than the Golden Saber and 28% larger than the SXT.



Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	45 Auto 230 gr.	12.25”	0.995”	100.04%
Winchester SXT	45 Auto 230 gr.	11.00”	0.960”	101.57%
Remington GS	45 Auto 230 gr.	13.75”	0.725”	102.22%
Speer GDHP	45 Auto 230 gr.	13.50”	0.735”	101.52%
Federal Tactical	45 Auto 230 gr.	13.50”	0.715”	96.43%

**Retained weight may exceed 100% due to test media being trapped in the bullet.*

In the 45 Auto 230 grain all manufactures performed very well. However, the HST expanded to .995” which is almost 37% larger than the Golden Saber. All bullets retained over 95% of their original weight which is exceptional.

Test Event #4 – Wallboard @ 10 feet

Two pieces of 1/2” standard gypsum board are set 3.5” apart. The pieces are 6” square. The gelatin is covered with light clothing and set 18” behind the rear most piece of gypsum. The shot is made at 10’, measured from the muzzle to the front most piece of gypsum. This test event simulates a typical interior building wall.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	45 Auto 230 gr.	14.00"	0.815"	100.30%
Winchester SXT	45 Auto 230 gr.	24.75"	0.450"	100.91%
Remington GS	45 Auto 230 gr.	10.00"	0.520"	81.17% **
Speer GDHP	45 Auto 230 gr.	16.00"	0.690"	100.87%

***Denotes Core Jacket Separation.*

As evident in the table above, the Winchester SXT plugged through wallboard causing the bullet to over-penetrate through the gelatin. The Remington Golden Saber failed to penetrate to the FBI standards of 12-18" due to core jacket separation. The Federal HST and Speer Gold Dot rounds had excellent expansions and penetrated to the FBI standards.

Test Event #6 – Auto Glass @ 10 Feet

One piece of A.S.I. ¼" laminated automobile safety glass measuring 15" X 18" is set at an angle of 45 degrees to the horizontal. The line of bore of the weapon is offset 15 degrees to the side, resulting in a compound angle of impact for the bullet upon the glass. The shot is made at ten feet, measured from the muzzle to the center of the glass pane. This test event with its two angles simulates a shot taken at the driver of a car from the left front quarter of the vehicle, and not directly in front of it.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	40 S&W 180 gr.	12.75"	0.510"	63.50% **
Winchester SXT	40 S&W 180 gr.	10.25"	0.465"	71.83% **
Remington GS	40 S&W 180 gr.	10.50"	0.560"	68.11% **
Speer GDHP	40 S&W 180 gr.	13.00"	0.760"	84.89%

***Core Jacket Separation ***



Core jacket separation is common when firing through auto glass, however the Speer GDHP round did not shed its jacket and penetrated almost 2.50-2.75" further than the SXT and Golden Saber loads. With the further penetration and larger expansion the Gold Dot bullet is creating a larger permanent wound cavity than the SXT and Golden Saber.

Overall, the Speer Gold Dot had greater weight retention, larger expansion, and retained its jacket when being shot through auto glass. In almost all of the test events the HST and Gold Dot loads had the largest expansions and retained weights.



Wound Ballistic Workshop

Rep Initials: TW
 Date of Workshop: 6/26/2008
 Host Agency: Ft. Collins PD
 Agency Contact: Sgt. Haywood
 Agency Telephone: 970-221-6832
 Range Contact: Dave Haywood

Recorder: Ty Windhorst
 Statistician: Chris Burchowiel
 Shooter: Mike Tomasini
 Judge: Richard Beck/ Todd
 Agencies Attending: Ft. Coll., Long, Johns., CO Springs, Sterli., Larim
 Agency Personnel: 13

Type of Range: Indoor
 Chronograph: Chrony
 Temperature: 70
 Weather: Indoor
 ATK Rep: Ty Windhorst
 5 Shot BB Avg: 3.5

Shot #	Firearm	Test Event	Part Number	Lot Number	Ammo Mfg	Ammo Type	Bullet Weight (Grains)	Velocity (Ft./Sec.)	Penetration (Inches)	Expand (Low)	Expand (High)	Expand (Avg)	Retained Weight (Grains)	Retained Weight (Percent)	Comments	
1	SIG P250 5.0" 1:5	1	FED-P9HST2		Federal	HST	9MM	147	998	13.25	0.747	0.894	0.821	149.2	101.50%	
2	SIG P250 5.0" 1:5	1	WIN-RA9TA		Winchester	T-Series	9mm +P+	127	1149	13.25	0.611	0.67	0.641	126.2	99.37%	
3	SIG P250 5.0" 1:5	1	REM-GS9MMC		Remington	Golden Sabe	9MM	147	0	15	0.556	0.63	0.593	146.8	99.86%	
4	SIG P250 5.0" 1:5	1	SPE-53617		Speer	Gold Dot HP	9MM +P	124	1197	13.25	0.58	0.75	0.665	127.4	102.74%	
5	XDM 5.0"	1	FED-P40HST1		Federal	HST	40 S&W	180	1028	12.25	0.86	0.96	0.910	183.4	101.89%	37.5 Degree Gelatin
6	XDM 5.0"	1	WIN-RA40T		Winchester	SXT	40 S&W	180	962	10.25	0.72	0.81	0.765	178.2	99.00%	
7	XDM 5.0"	1	REM-GS40SWE		Remington	Golden Sabe	40 S&W	180	960	12.75	0.66	0.74	0.700	184.5	102.50%	
8	XDM 5.0"	1	SPE-53962		Speer	Gold Dot HP	40 S&W	180	995	13.5	0.63	0.69	0.660	183.3	101.83%	
9	S&W SW1911 5.0" barrel	1	FED-P45HST1		Federal	HST	5 AUTO +	230	922	12.25	0.93	1.06	0.995	230.1	100.04%	
10	S&W SW1911 5.0" barrel	1	WIN-RA45T		Winchester	SXT	45 AUTO	230	891	11	0.91	1.01	0.960	233.6	101.57%	
11	S&W SW1911 5.0" barrel	1	REM-GS45APB		Remington	Golden Sabe	45 Auto	230	790	13.75	0.68	0.77	0.725	235.1	102.22%	38 Degree Gelatin
12	S&W SW1911 5.0" barrel	1	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	830	13.5	0.721	0.75	0.735	233.5	101.52%	
13	S&W SW1911 5.0" barrel	1	FED-LE45T1		Federal	BHP	45 AUTO	230	913	13.5	0.69	0.74	0.715	221.8	96.43%	
14	SIG P250 5.0" 1:5	6	FED-P9HST2		Federal	HST	9MM	147	998	9.5	0.57	0.7	0.635	123.1	83.74%	
15	SIG P250 5.0" 1:5	6	WIN-RA9TA		Winchester	T-Series	9mm +P+	127	1149	10.75	0.45	0.54	0.495	72.9	57.40%	Core Jacket Separation
16	SIG P250 5.0" 1:5	6	REM-GS9MMC		Remington	Golden Sabe	9MM	147	0	11.25	0.41	0.6	0.505	132.9	90.41%	
17	SIG P250 5.0" 1:5	6	SPE-53617		Speer	Gold Dot HP	9MM +P	124	1197	12.25	0.42	0.56	0.490	94	75.81%	

#1	Bare Gelatin @ 10 Feet	#3	Steel @ 10 Feet	#5	Plywood @ 10 Feet	#7	Heavy Clothing @ 20 Yards	#9	IWBA 4 Layers of Denim
#2	Heavy Clothing @ 10 Feet	#4	Wallboard @ 10 Feet	#6	Auto Glass @ 10 Feet	#8	Auto Glass @ 20 Yards		



Wound Ballistic Workshop

Shot #	Firearm	Test Event	Part Number	Lot Number	Ammo Mfg	Ammo Type	Bullet Weight (Grains)	Velocity (Ft./Sec.)	Penetration (Inches)	Expand (Low)	Expand (High)	Expand (Avg)	Retained Weight (Grains)	Retained Weight (Percent)	Comments	
18	XDM 5.0"	6	FED-P40HST1		Federal	HST	40 S&W	180	1028	12.75	0.4	0.62	0.510	114.3	63.50%	Core Jacket Separation
19	XDM 5.0"	6	WIN-RA40T		Winchester	SXT	40 S&W	180	962	10.25	0.4	0.53	0.465	129.3	71.83%	Core Jacket Separation
20	XDM 5.0"	6	REM-GS40SWE		Remington	Golden Sabe	40 S&W	180	960	10.5	0.43	0.56	0.495	122.6	68.11%	Core Jacket Separation
21	XDM 5.0"	6	SPE-53962		Speer	Gold Dot HP	40 S&W	180	995	13	0.58	0.76	0.670	152.8	84.89%	
22	S&W SW1911 5.0" barrel	6	FED-P45HST1		Federal	HST	5 AUTO +	230	922	10.75	0.6	0.74	0.670	205.2	89.22%	
23	S&W SW1911 5.0" barrel	6	WIN-RA45T		Winchester	SXT	45 AUTO	230	891	10.75	0.62	0.79	0.705	226.5	98.48%	
24	S&W SW1911 5.0" barrel	6	REM-GS45APB		Remington	Golden Sabe	45 Auto	230	790	12.5	0.51	0.72	0.615	206.3	89.70%	
25	S&W SW1911 5.0" barrel	6	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	830	12.75	0.54	0.76	0.650	207.6	90.26%	
26	S&W SW1911 5.0" barrel	6	FED-LE45T1		Federal	BHP	45 AUTO	230	913	14	0.52	0.8	0.660	213	92.61%	
27	SIG P250 5.0" 1:5	2	FED-P9HST2		Federal	HST	9MM	147	998	15.25	0.6	0.62	0.610	148.1	100.75%	
28	SIG P250 5.0" 1:5	2	WIN-RA9TA		Winchester	T-Series	9mm +P+	127	1149	12.5	0.62	0.68	0.650	127.1	100.08%	
29	SIG P250 5.0" 1:5	2	REM-GS9MMC		Remington	Golden Sabe	9MM	147	0	20	0.54	0.6	0.570	145.2	98.78%	Plugged with over penetration
30	SIG P250 5.0" 1:5	2	SPE-53617		Speer	Gold Dot HP	9MM +P	124	1197	17	0.51	0.58	0.545	125.4	101.13%	
31	XDM 5.0"	2	FED-P40HST1		Federal	HST	40 S&W	180	1028	13.75	0.68	0.75	0.715	184.3	102.39%	
32	XDM 5.0"	2	WIN-RA40T		Winchester	SXT	40 S&W	180	962	14.75	0.61	0.65	0.630	174.1	96.72%	
33	XDM 5.0"	2	REM-GS40SWE		Remington	Golden Sabe	40 S&W	180	960	14.25	0.65	0.68	0.665	180.5	100.28%	
34	XDM 5.0"	2	SPE-53962		Speer	Gold Dot HP	40 S&W	180	995	14.75	0.61	0.64	0.625	180.1	100.06%	
35	S&W SW1911 5.0" barrel	2	FED-P45HST1		Federal	HST	5 AUTO +	230	922	14.5	0.76	0.85	0.805	231.7	100.74%	
36	S&W SW1911 5.0" barrel	2	WIN-RA45T		Winchester	SXT	45 AUTO	230	891	11.25	0.89	0.96	0.925	233.9	101.70%	
37	S&W SW1911 5.0" barrel	2	REM-GS45APB		Remington	Golden Sabe	45 Auto	230	790	14.75	0.75	0.78	0.765	233.5	101.52%	
38	S&W SW1911 5.0" barrel	2	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	830	13.75	0.68	0.7	0.690	230.8	100.35%	
39	S&W SW1911 5.0" barrel	2	FED-LE45T1		Federal	BHP	45 AUTO	230	913	12.25	0.73	0.77	0.750	229.1	99.61%	
40	S&W SW1911 5.0" barrel	4	FED-P45HST1		Federal	HST	5 AUTO +	230	922	14	0.79	0.84	0.815	230.7	100.30%	

#1	Bare Gelatin @ 10 Feet	#3	Steel @ 10 Feet	#5	Plywood @ 10 Feet	#7	Heavy Clothing @ 20 Yards	#9	IWBA 4 Layers of Denim
#2	Heavy Clothing @ 10 Feet	#4	Wallboard @ 10 Feet	#6	Auto Glass @ 10 Feet	#8	Auto Glass @ 20 Yards		



Wound Ballistic Workshop

Shot #	Firearm	Test Event	Part Number	Lot Number	Ammo Mfg	Ammo Type	Bullet Caliber	Weight (Grains)	Velocity (Ft./Sec.)	Penetration (Inches)	Expand (Low)	Expand (High)	Expand (Avg)	Retained Weight (Grains)	Retained Weight (Percent)	Comments
41	S&W SW1911 5.0" barrel	4	WIN-RA45T		Winchester	SXT	45 AUTO	230	891	24.75	0.45	0.45	0.450	232.1	100.91%	Plugged/No expansion/over pe
42	S&W SW1911 5.0" barrel	4	REM-GS45APB		Remington	Golden Sabe	45 Auto	230	790	10	0.45	0.59	0.520	186.7	81.17%	core jacket separation
43	S&W SW1911 5.0" barrel	4	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	830	16	0.68	0.7	0.690	232	100.87%	partial expansion
44	RRA LAR-15 16" barrel 1:	1	SPE-24448		Speer	SD Soft Poin	.223 cal	64	2575	17	0.36	0.56	0.460	56.2	87.81%	
45	RRA LAR-15 16" barrel 1:	1	WIN-RA223R		Winchester	SP	223	55	0	10	0.36	0.5	0.430	25	45.45%	partial fragmentation
46	RRA LAR-15 16" barrel 1:	1	FED-T223E		Federal	TRU BTHP	223	55	2873	10.5	0	0	0.000	0	0.00%	Fragmented/non-recoverable
47	RRA LAR-15 16" barrel 1:	1	FED-LE223T3		Federal	Bonded SP	223	62	2766	18	0.41	0.44	0.425	60.3	97.26%	
48	RRA LAR-15 16" barrel 1:	6	SPE-24448		Speer	SD Soft Poin	.223 cal	64	2575	9.25	0.41	0.43	0.420	34.3	53.59%	
49	RRA LAR-15 16" barrel 1:	6	FED-T223E		Federal	TRU BTHP	223	55	2873	4.5	0	0	0.000	0	0.00%	Fragmented/non-recoverable
50	RRA LAR-15 16" barrel 1:	6	FED-LE223T3		Federal	Bonded SP	223	62	2766	14.5	0.35	0.35	0.350	35	56.45%	
51	RRA LAR-15 16" barrel 1:	6	BH-55SP		Black Hills	SP	.223	55	0	6	0	0	0.000	0	0.00%	Fragmented/non-recoverable
52	RRA LAR-15 16" barrel 1:	1	BH-55SP		Black Hills	SP	.223	55	0	13	0.35	0.37	0.360	31.5	57.27%	

#1	Bare Gelatin @ 10 Feet	#3	Steel @ 10 Feet	#5	Plywood @ 10 Feet	#7	Heavy Clothing @ 20 Yards	#9	IWBA 4 Layers of Denim
#2	Heavy Clothing @ 10 Feet	#4	Wallboard @ 10 Feet	#6	Auto Glass @ 10 Feet	#8	Auto Glass @ 20 Yards		