40X XMP Model 700 Varmint – EET Report

Executive Summary:
The 40X XMP trigger assembly was originally designed to be a direct replacement for the current 40X trigger assembly which is used in the Custom Shop and a variant of which is used on the XR-100 Rangemaster. The standard 40X style trigger assembly affords the user the ability to adjust the trigger pull force without removing the action from the stock (which can adversely affect the rifle's zero). The 40X XMP trigger assembly unites the trigger return capabilities of the XMP trigger assembly design with the 40X's external trigger pull force adjustability in a single trigger assembly.

The 40X XMP trigger assembly was originally intended to be used only on the XR-100, but the current production volumes have dropped to the point that they are not sufficient to make the project economically viable by themselves. By adding use of the 40X XMP trigger assembly in the Model 700 Varmint product lines (M/700 SPS Varmint, M/700 VLS, M/700 VLSS-TH, M/700 VS-SF II, and Sendero SF II) it is hoped that the project economics will improve sufficiently to make the project economically viable.

Using the 40X XMP trigger assembly on the M/700 Varmint family represents a fundamental change in program direction that was not contemplated when the preceding EET and DAT were conducted. Given the original program direction (i.e. a target trigger for a target gun), the 40X XMP trigger assembly had been tested solely for use on target rifles. The M/700 Varmint product families are classified as hunting rifles by SAAMI, which have different testing requirements than target rifles.

This change of program direction necessitated the conducting of an EET level SAAMI Jar-Off, SAAMI Rotation, and SAAMI Drop test of the 40X XMP trigger assembly with three different configurations of M/700 Varmint rifle. The purpose of this testing was not meant to provide a definitive answer on the fitness of use of the 40X XMP trigger assembly with the M/700 Varmint family, but rather to provide an indication of whether or not further testing was worth pursuing. To this end, three new 40X XMP trigger assemblies were SAAMI jar-off/rotation/drop tested on two separate M/700 varmint actions with three different stock types to determine whether the contemplated DAT was worthwhile.

The positive outcome of the EET level SAAMI Jar-off/Rotation/Drop testing indicated that DAT level testing is worth pursuing.

Background:
The 40X XMP trigger assembly was designed to be a drop-in replacement for the 40X trigger assembly variant on the XR-100 Rangemaster as well as on 40X rifles from the Remington Custom Shop. The 40X XMP takes the trigger return mechanism of the XMP trigger assembly design and pairs it with an externally adjustable trigger pull force design similar to the M/24 SWS to permit user adjustment of the trigger pull force. Since the original intended application of the trigger assembly was for target use only, all previous EET and DAT testing forewent SAAMI Jar-Off/Rotation/Drop testing as these tests were not applicable to target firearms.

After the successful DAT of the 40X XMP on the XR-100 was completed, marketing reported that the production volumes for the XR-100 had dropped significantly since the inception of the 40X XMP program and were insufficient by themselves to support the business case for implementation of the 40X XMP trigger assembly. Adding the Model 700 Varmint family production volumes substantially increased the projected production volumes for the unique components in the 40X XMP trigger assembly, which in turn improved the economic viability of the program.

The Model 700 varmint rifle families are classified as hunting rifles by SAAMI which necessitates meeting additional functional specifications (e.g. 3 lb. minimum trigger pull force from the factory) and additional testing (SAAMI Jar-Off/Rotation/Drop) before a design can be deemed acceptable. Since the XR-100 DAT had not included SAAMI Jar-Off/ Rotation/Drop testing, a small EET was run to conduct these tests with the 40X XMP on several variants of the Model 700 varmint rifle.

Test Procedure:
Three unused 40X XMP trigger assemblies (leftover from the XR-100 DAT) were built using M/700 RH safety assemblies and bolt stop releases for the SAAMI Jar-Off/Rotation/Drop EET. Two M/700 VS varmint rifles (E6223233 – 220 Swift and G6208631 – 308 Win) were selected from the Elizabethtown Gun Library for use in this testing. The firing pin assemblies of both rifles were replaced with fluted firing pin assemblies to ensure consistency with current production. Three different stock types were included in the testing:

- SPS varmint (injection molded plastic)
- VLS (laminated wood)
- VS (composite structure with integral aluminum bedding block)

The 40X XMP trigger assemblies were mounted on the actions and the nominal settings were made:

- Minimum trigger pull force = 2.5 lbs. (set using only the primary trigger pull spring)
- Minimum engagement = 0.019 in.
- Trigger Motion in Safe (TMIS) = .003-.006
- Actual trigger pull force for test = 3.5 lbs (set with the secondary trigger pull spring)

The rifles were then subjected to SAAMI Jar-Off testing, after which the trigger assembly settings were remeasured, recorded, and reset if necessary for the SAAMI Rotation test. After the SAAMI Rotation test, the measurement regimen was repeated and the rifles were readied for SAAMI Drop testing. The trigger assembly settings were readied again after SAAMI Drop and the trigger assemblies were removed from the actions for archival purposes after the final measurements were made.

Test Results:

The three 40X XMP trigger assemblies in the three different stock types tested passed all SAAMI Jar-Off, SAAMI Rotation and SAAMI Drop testing. Copies of the datasheets from the EET are included in Appendix A to this report. It was noted that the primary trigger pull spring was just barely able to achieve the 2.5 lb minimum trigger pull force when the trigger assembly was well lubricated per the test specifications and will need to be redesigned to provide more force. All other performance parameters for the trigger assembly were noted as acceptable.

Conclusion:

The positive outcome of the 40X XMP SAAMI Jar-Off/Rotation/Drop EET warrants conducting of a full scale DAT to establish the fitness for use of the 40X XMP trigger assembly on Model 700 varmint rifles. It is expected that this activity will only entail testing of firearm performance aspects not previously evaluated in the XR-100 DAT (i.e. SAAMI Jar-Off, SAAMI Rotation, SAAMI Drop, and the SAAMI 40 lb Safety test).

Appendix A

TLW
Project #: 241460

SAAMI Jar-Off Test

Serial #:	E6223233	Model:	700 VS	Date:	5/14/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #19	Stock Type:	H-S Precision
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

Engagement:	0.0191	Trigger Pull:	3.477
	0.0191		3.485
	0.0191		3.472
Average:	**0.0191**		3.490
			3.441
TMIS:	0.003		3.466
	0.003		3.453
	0.003		3.520
Average:	**0.003**		3.607
			3.521
		Average:	**3.493**

Comments:

Orientation:	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		
Barrel Horizontal, Bottom Side Down:	X		

Tester's Initials: JWR/JLS

Notes:

End:

Engagement:	0.0193	Trigger Pull:	3.645
	0.0187		3.631
	0.0188		3.661
Average:	**0.0189**		3.655
			3.664
TMIS:	0.003		3.685
	0.003		3.655
	0.003		3.607
Average:	**0.003**		3.664
			3.654
		Average:	**3.652**

TLW
Project #: 241460

SAAMI Rotation Test

Serial #:	E6223233	Model:	700 VS	Date:	5/14/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #19	Stock Type:	H-S Precision
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

	Engagement:	Trigger Pull:
	0.0191	3.582
	0.0191	3.600
	0.0191	3.587
Average:	**0.0191**	3.632
		3.702
TMIS:	0.003	3.719
	0.003	3.676
	0.003	3.664
Average:	**0.003**	3.677
		3.762
		Average: **3.660**

Comments:

Orientation:	Pass	Fail	Comments
Barrel Vertical, Drop So Left Side Is Up:	X		
Barrel Vertical, Drop So Right Side Is Up:	X		

Tester's Initials: JWR/JLS

Notes:

End:

	Engagement:	Trigger Pull:
	0.0193	4.077
	0.0193	4.082
	0.0193	4.112
Average:	**0.0193**	4.072
		4.127
TMIS:	0.003	4.119
	0.003	4.107
	0.003	4.145
Average:	**0.003**	4.149
		4.085
		Average: **4.108**

TLW
Project #: 241460

SAAMI Drop Test

Serial #:	E6223233	Model:	700 VS	Date:	5/15/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #19	Stock Type:	H-S Precision
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

	Engagement:	Trigger Pull:
	0.0193	3.602
	0.0193	3.536
	0.0193	3.562
Average:	**0.0193**	3.500
		3.511
TMIS:	0.003	3.456
	0.003	3.465
	0.003	3.568
Average:	**0.003**	3.511
		3.606
		Average: **3.532**

Comments:

Orientation:

	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		
Barrel Horizontal, Bottom Side Down:	X		

Tester's Initials: JWR/JLS

Notes:

End:

	Engagement:	Trigger Pull:
	0.0189	3.393
	0.0191	3.453
	0.0191	3.428
Average:	**0.0190**	3.369
		3.346
TMIS:	0.003	3.327
	0.003	3.364
	0.003	3.426
Average:	**0.003**	3.448
		3.421
		Average: **3.398**

TLW
Project #: 241460

SAAMI Jar-Off Test

Serial #:	G6208631	Model:	700 SPS Varmint	Date:	5/14/07
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #21	Stock Type:	SPS Varmint
Previous Rds/Cycles:	unknown	Caliber:	308 Win		

Start:

Engagement:	0.0190	Trigger Pull:	3.580
	0.0190		3.582
	0.0191		3.594
Average:	**0.0190**		3.577
			3.560
TMIS:	0.003		3.749
	0.003		3.549
	0.003		3.569
Average:	**0.003**		3.784
			3.570
		Average:	**3.611**

Comments:

Orientation:

	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		
Barrel Horizontal, Bottom Side Down:	X		

Tester's Initials: JWR/JLS

Notes:

End:

Engagement:	0.0206	Trigger Pull:	3.665
	0.0204		3.642
	0.0203		3.702
Average:	**0.0204**		3.718
			3.696
TMIS:	0.003		3.721
	0.003		3.768
	0.003		3.747
Average:	**0.003**		3.756
			3.796
		Average:	**3.721**

TLW
Project #: 241460

SAAMI Rotation Test

Serial #:	G6208631	Model:	700 SPS Varmint	Date:	5/14/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #21	Stock Type:	SPS Varmint
Previous Rds/Cycles:	unknown	Caliber:	308 Win		

Start:

	Engagement:	TMIS:	Trigger Pull:
	0.0193	0.003	3.538
	0.0194	0.003	3.680
	0.0193	0.003	3.518
Average:	**0.0193**	**0.003**	3.511
			3.636
			3.575
			3.628
			3.608
			3.613
			3.555
			Average: **3.586**

Comments:

Orientation:	Pass	Fail	Comments
Barrel Vertical, Drop So Left Side Is Up:	X		
Barrel Vertical, Drop So Right Side Is Up:	X		

Tester's Initials: JWR/JLS

Notes:

End:

	Engagement:	TMIS:	Trigger Pull:
	0.0193	0.003	3.420
	0.0193	0.003	3.399
	0.0192	0.003	3.478
Average:	**0.0193**	**0.003**	3.492
			3.489
			3.522
			3.465
			3.380
			3.429
			3.466
			Average: **3.454**

TLW
Project #: 241460

SAAMI Drop Test

Serial #:	G6208631	Model:	700 SPS Varmint	Date:	5/15/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #21	Stock Type:	SPS Varmint
Previous Rds/Cycles:	unknown	Caliber:	308 Win		

Start:

	Engagement:	TMIS:	Trigger Pull:
	0.0193	0.003	3.420
	0.0193	0.003	3.399
	0.0192	0.003	3.478
Average:	**0.0193**	**0.003**	3.492
			3.489
			3.522
			3.465
			3.380
			3.429
			3.466
			Average: **3.454**

Comments:

Orientation:	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		
Barrel Horizontal, Bottom Side Down:	X		
Tester's Initials:			

Notes:

End:

	Engagement:	TMIS:	Trigger Pull:
	0.0190	0.004	3.574
	0.0190	0.004	3.598
	0.0192	0.004	3.485
Average:	**0.0191**	**0.004**	3.507
			3.578
			3.504
			3.614
			3.540
			3.499
			3.588
			Average: **3.549**

TLW
Project #: 241460

SAAMI Jar-Off Test

Serial #:	E6223233	Model:	700 VLS	Date:	5/15/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #22	Stock Type:	laminated wood
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

	Engagement:	Trigger Pull:
	0.0192	3.505
	0.0193	3.515
	0.0193	3.509
Average:	**0.0193**	3.572
		3.547
TMIS:	0.003	3.532
	0.003	3.518
	0.003	3.574
Average:	**0.003**	3.619
		3.509
		Average: **3.540**

Comments:

Orientation:

	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		
Barrel Horizontal, Bottom Side Down:	X		

Tester's Initials: JWR/JLS

Notes:

End:

	Engagement:	Trigger Pull:
	0.0203	3.425
	0.0204	3.434
	0.0205	3.471
Average:	**0.0204**	3.437
		3.453
TMIS:	0.004	3.487
	0.004	3.485
	0.004	3.440
Average:	**0.004**	3.439
		3.427
		Average: **3.450**

TLW
Project #: 241460

SAAMI Rotation Test

Serial #:	E6223233	Model:	700VLS	Date:	5/15/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #22	Stock Type:	laminated wood
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

	Engagement:	TMIS:	Trigger Pull:
	0.0192	0.003	3.586
	0.0193	0.003	3.534
	0.0192	0.003	3.504
Average:	**0.0192**	**0.003**	3.515
			3.601
			3.566
			3.523
			3.584
			3.536
			3.551
			Average: **3.550**

Comments:

Orientation:	Pass	Fail	Comments
Barrel Vertical, Drop So Left Side Is Up:	X		
Barrel Vertical, Drop So Right Side Is Up:	X		

Tester's Initials: JWR/JLS

Notes:

End:

	Engagement:	TMIS:	Trigger Pull:
	0.0186	0.003	3.952
	0.0185	0.003	4.012
	0.0183	0.003	4.033
Average:	**0.0185**	**0.003**	4.034
			4.001
			3.969
			3.964
			4.001
			4.028
			3.977
			Average: **3.997**

TLW
Project #: 241460

SAAMI Drop Test

Serial #:	E6223233	Model:	700 VLS	Date:	5/16/2007
Trigger Assembly Type:	40X XMP	Trigger Assembly #:	40X XMP #22	Stock Type:	laminated wood
Previous Rds/Cycles:	unknown	Caliber:	220 Swift		

Start:

	Engagement:	Trigger Pull:
	0.0191	3.561
	0.0191	3.534
	0.0191	3.430
Average:	**0.0191**	3.480
		3.561
TMIS:	0.003	3.553
	0.003	3.591
	0.003	3.463
Average:	**0.003**	3.566
		3.527
		Average: **3.527**

Comments:

Orientation:

	Pass	Fail	Comments
Barrel Vertical, Muzzle Up:	X		
Barrel Vertical, Muzzle Down:	X		
Barrel Horizontal, Left Side Up:	X		
Barrel Horizontal, Right Side Up:	X		
Barrel Horizontal, Bottom Side Up:	X		cracked stock through grip - replaced
Barrel Horizontal, Bottom Side Down:	X		cracked stock through grip
Tester's Initials:			

Notes:

End:

	Engagement:	Trigger Pull:
	0.0189	3.709
	0.0190	3.646
	0.0192	3.674
Average:	**0.0190**	3.709
		3.727
TMIS:	0.004	3.738
	0.004	3.755
	0.004	3.759
Average:	**0.004**	3.772
		3.788
		Average: **3.728**