

**REMINGTON ARMS COMPANY INC.
ILION, NY PLANT SITE**

**TECHNICAL DIVISION
TEST & MEASUREMENTS LAB**

TEST REPORT

**M/700 LH XMP Trigger Assembly
DAT – Trial & Pilot**

Request # 20070034

DATE: 9/24/07

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DISTRIBUTION LIST

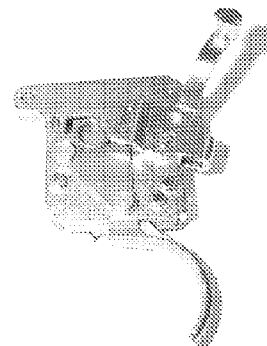
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ABSTRACT:

Remington has redesigned its bolt action trigger assembly incorporating a number of new features. The new design, called the "X-Mark Pro™" was successfully released in the M/700 and the Model Seven. The design enhancements were also extended to the Model 700 Left Hand. The Test Lab received a request to evaluate the first production run of Model 700 Left Hand XMP trigger assemblies.

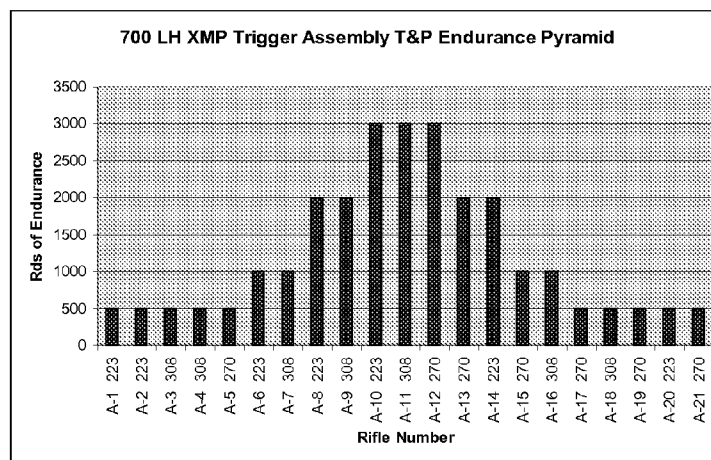
The samples of Left Hand XMP trigger assemblies submitted individually as trigger assemblies, and assembled to finished host rifles all passed testing successfully. Full test data from the host rifles is being furnished with this report as a convenience to Production and Manufacturing Engineering to assist them with any needed *rifle* follow-up activity.

**SCOPE:**

Ten individual trigger assemblies and thirty completely finished Model 700 Left Hand rifles containing the XMP trigger assembly were received for testing. The rifles were tested in 3 calibers including 7 rifles each in 223 Rcm, 270 Win and 308 Win.

Individual trigger assemblies were each subjected to dry-cycle testing to 10,000 cycles. Before the dry-cycling began, all trigger assemblies were checked for proper assembly and trigger-pull force and sear-lift was measured. The trigger assemblies subjected to dry-cycling were rechecked at 5000 cycles and again at 10000 cycles for trigger-pull and sear-lift.

The finished rifles received the standard series of measurements including trigger-pull, sear-lift and safety operation force. Following the measurement phase rifles were drop-tested. Another group was subjected to extensive jack-testing followed by field function testing. The safety was operated between each string of 5 rounds. The following graph gives the endurance test assignments with the number of rounds:

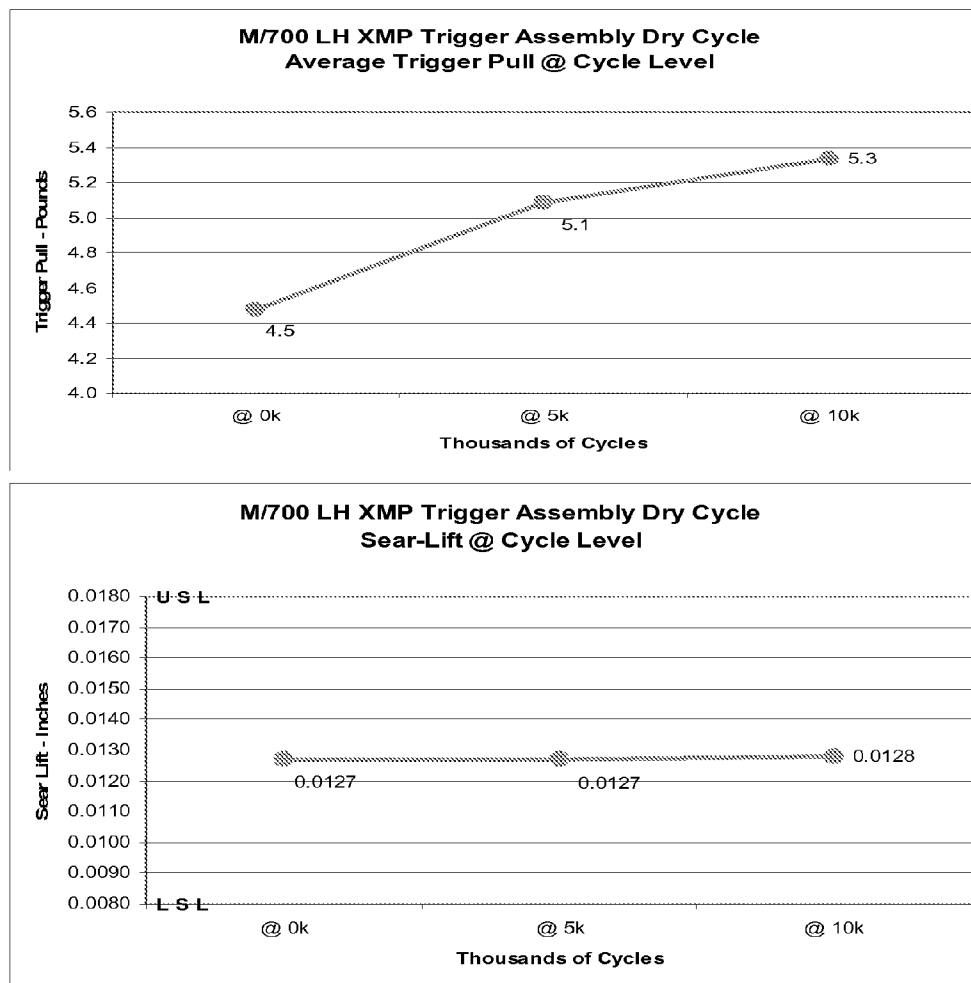


RESULTS:**Dry-Cycle Summary:**

Each of the ten individual trigger assemblies was mounted in automated, computer-controlled fixture that operates the bolt, the safety and the trigger in the same manner that a shooter would.

A complete bolt assembly and receiver are included in the setup. The bolt is fully cocked to load the sear, the safety is operated and then the trigger pulled to complete the cycle. The trigger assemblies received only lubrication attention. Trigger-pull and sear-lift measurements were taken after 5,000 cycles, half-way though the test.

All ten trigger assemblies endured the entire 10,000 dry-cycles without damage or parts working loose. The following graph shows a .8 pound increase in trigger-pull force even though the adjustment screws held tightly. Sear-lift is shown to have held steady throughout the test at just under .013 with a specification of .008 to .018.



Measurement Summary:

Measurements taken on all of the thirty rifles received for testing were found to be within specifications as received. Initial measurement data is shown in the chart below:

Ref	Caliber	Serial #	Trigger Pull (lbs)	Safety Force (lbs)		Bolt Lift Force (lbs)		Head space Min + (in)	Sear Lift (in)	Firing Pin Indent (in)
				To On	To Off	Cocked	Fired			
A-1	223 Rem	G6416876	4.8	6.9	2.5	2.5	6.2	0.001	0.012	0.0212
A-2	223 Rem	G6416737	4.2	7.2	2.5	2.4	5.2	0.001	0.013	0.0212
A-3	308 Win	G6419182	5.2	7.3	2.8	2.1	5.4	0.003	0.041	0.0200
A-4	308 Win	G6416473	4.6	6.8	2.6	2.5	5.1	0.004	0.013	0.0200
A-5	270 Win	G6518019	6.5	8.0	2.6	2.8	6.0	0.002	0.014	0.0240
A-6	223 Rem	G6416849	4.5	6.6	2.6	3.1	6.1	0.002	0.012	0.0215
A-7	308 Win	G6416500	4.4	6.8	2.7	2.8	5.9	0.003	0.013	0.0195
A-8	223 Rem	G6417517	5.3	6.1	2.5	2.2	4.9	0.003	0.011	0.0212
A-9	308 Win	G6417873	4.8	7.0	2.7	2.3	6.2	0.003	0.013	0.0202
A-10	223 Rem	G6416863	4.2	7.1	2.5	2.7	6.1	0.002	0.012	0.0217
A-11	308 Win	G6417216	4.5	7.1	2.4	2.6	5.5	0.003	0.012	0.0200
A-12	270 Win	G6517529	4.8	9.0	3.0	3.4	6.6	0.014	0.014	0.0230
A-13	270 Win	G6517431	4.9	7.7	2.6	2.5	7.2	0.001	0.013	0.0222
A-14	223 Rem	G6417484	4.6	7.0	2.5	3.3	6.0	0.003	0.013	0.0210
A-15	270 Win	G6517963	4.1	6.9	2.5	3.2	6.4	0.001	0.012	0.0227
A-16	308 Win	G6416276	4.7	6.0	2.6	2.9	5.5	0.003	0.011	0.0205
A-17	270 Win	G6518109	4.1	7.6	2.6	3.0	6.7	0.002	0.013	0.0238
A-18	308 Win	G6419156	4.3	7.2	2.5	2.0	5.2	0.004	0.014	0.0197
A-19	270 Win	G6517453	3.7	8.0	2.5	2.4	6.4	0.002	0.012	0.0253
A-20	223 Rem	G6417487	4.7	6.9	2.7	2.2	5.7	0.002	0.012	0.0217
A-21	270 Win	G6517949	4.7	8.8	3.0	3.1	7.4	0.002	0.014	0.0233
A-22	223 Rem	G6416329	4.3	7.8	2.7	2.5	6.1	0.001	0.014	0.0212
A-23	223 Rem	G6416058	4.6	7.0	2.4	2.3	6.1	0.001	0.012	0.0213
A-24	223 Rem	G6416028	4.3	7.7	2.8	2.3	5.9	0.003	0.014	0.0218
A-25	308 Win	G6417178	4.2	6.9	2.4	2.3	5.3	0.001	0.013	0.0205
A-26	308 Win	G6416395	4.5	7.6	2.5	2.8	5.5	0.003	0.013	0.0200
A-27	308 Win	G6419125	4.5	7.2	2.6	2.8	5.2	0.003	0.013	0.0202
A-28	270 Win	G6518501	5.3	7.3	2.5	4.5	6.8	0.002	0.013	0.0240
A-29	270 Win	G6518511	4.5	7.3	2.6	3.0	6.7	0.002	0.014	0.0235
A-30	270 Win	G6517438	4.1	7.0	2.4	3.3	6.6	0.003	0.012	0.0245
Average			4.6	7.3	2.6	2.7	6.0	0.003	0.0137	0.0217

Drop-Test Summary:

Nine of the thirty rifles received were subjected to SAAMI Jar-Off, Drop and Rotation testing. No trigger or firing related problems were detected in this test. The sole issue encountered was 3 instances of FPO (Floor Plate Opens) caused by the energetic jarring of the action causing the floor plate to become unlatched. A complete summary of the test series follows:

Drop-test Summary Data:

JAR OFF TEST (See S.A.A.M.I. volume VII, centerfire rifle, section 7.95.04)							
12 inch drop measured from the lowest point of the firearm. Firearm in the SAFE OFF position.							
Fire Arm	Serial #	BV, MU	BV, MD	BH, BD	BH, BU	BH, RSU	BH, LSU
A22	G6416329	OK	OK	OK	OK	OK	OK
A23	G6416058	OK	OK	OK	OK	OK	OK
A24	G6416028	OK	OK	OK	OK	OK	OK
A25	G6417178	OK	OK	OK	OK	OK	OK
A26	G6416395	OK	OK	OK	OK	OK	OK
A27	G6419125	OK	OK	OK	OK	OK	OK
A28	G6518501	OK	OK	OK	OK	OK	OK
A29	G6518511	OK	OK	OK	OK	OK	OK
A30	G6517438	OK	OK	OK	OK	OK	OK

DROP TEST (see S.A.A.M.I. volume VII, centerfire rifle, section 7.95.02)							
48 inch drop measured from the center of gravity of the firearm. Firearm in the SAFE ON position.							
Fire Arm	Serial #	BV, MU	BV, MD	BH, BD	BH, BU	BH, RSU	BH, LSU
A22	G6416329	OK	OK	OK	OK	OK	OK
A23	G6416058	OK	OK	OK	OK	OK	OK
A24	G6416028	OK	OK	OK	OK	OK (FPO)	OK
A25	G6417178	OK	OK	OK	OK	OK	OK
A26	G6416395	OK	OK	OK	OK	OK (FPO)	OK
A27	G6419125	OK	OK	OK (FPO)	OK	OK	OK
A28	G6518501	OK	OK	OK	OK	OK	OK
A29	G6518511	OK	OK	OK	OK	OK	OK
A30	G6517438	OK	OK	OK	OK	OK	OK

FPO- Floor Plate Opens

ROTATION TEST (see S.A.A.M.I. volume VII, centerfire rifle, section 7.95.03)			
With the butt on the mat, let the firearm fall to the right & left. Firearm in the SAFE ON position.			
		LEFT SIDE UP	RIGHT SIDE UP
A22	G6416329	OK	OK
A23	G6416058	OK	OK
A24	G6416028	OK	OK
A25	G6417178	OK	OK
A26	G6416395	OK	OK
A27	G6419125	OK	OK
A28	G6518501	OK	OK
A29	G6518511	OK	OK
A30	G6517438	OK	OK

Key to Test Details:

DROP ORDER	FIREARM ATTITUDES
1	BARREL VERTICAL, MUZZLE UP
2	BARREL VERTICAL, MUZZLE DOWN
3	BARREL HORIZONTAL, BOTTOM DOWN
4	BARREL HORIZONTAL, BOTTOM UP
5	BARREL HORIZONTAL, RIGHT SIDE UP
6	BARREL HORIZONTAL, LEFT SIDE UP

BH	Barrel Horizontal
BV	Barrel Vertical
MU	Muzzle Up
MD	Muzzle Down
BD	Bottom Down
BU	Bottom Up
LSU	Left Side Up
RSU	Right Side Up

Endurance Summary:

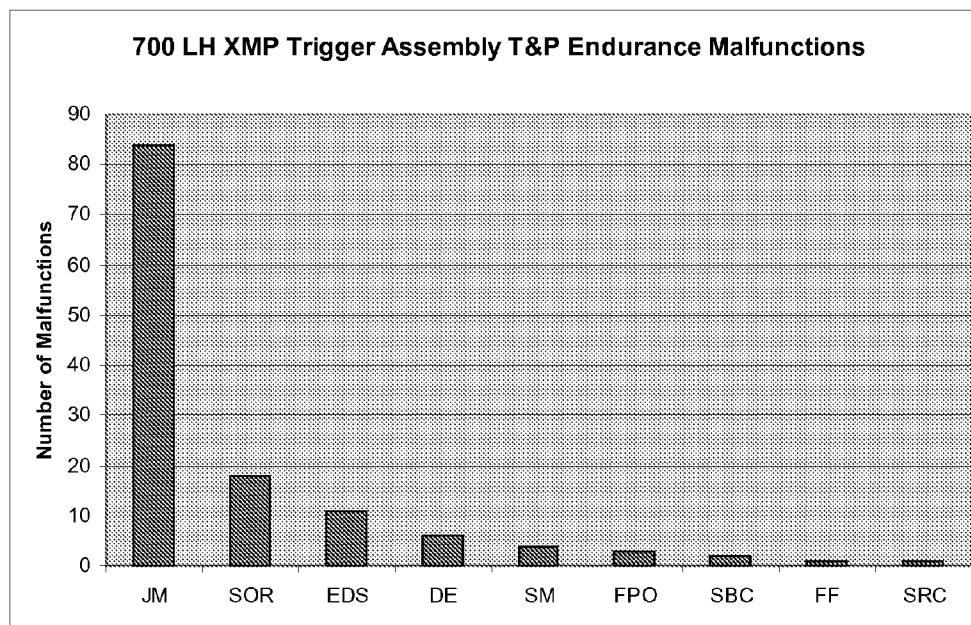
As shown on page 2, rifles A-1 through A-21 received endurance testing in a test jack. The test assignments were designed to insure that all 3 calibers were represented in the highest level test of 3000 rounds and that the overall test was well distributed among the 3 calibers. The calibers themselves were selected to offer a range of firing impulses from relatively light to relatively heavy.

26000 rounds were fired with a total of 129 malfunctions, producing an overall malfunction rate of just 0.5%. 109 of the malfunctions were feeding related and most occurred in one rifle. The table below summarizes the malfunctions:

JACK FUNCTION & ENDURANCE TEST SUMMARY													
MALFUNCTIONS SORTED BY SERIAL NUMBER													
	Serial #	# of Malf	# of Rds. Fired	Malf. Rate	JM	SOR	EDS	DE	SM	FPO	SBC	FF	SLC
A-1	223	G6416876	0	500	0.0%								
A-2	223	G6416737	0	500	0.0%								
A-3	308	G6419182	0	500	0.0%								
A-4	308	G6416473	0	500	0.0%								
A-5	270	G6518019	1	500	0.2%						1		
A-6	223	G6416849	19	1000	1.9%	19							
A-7	308	G6416500	0	1000	0.0%								
A-8	223	G6417517	6	2000	0.3%			6					
A-9	308	G6417873	0	2000	0.0%								
A-10	223	G6416863	88	3000	2.9%	65	18		4			1	
A-11	308	G6417216	0	3000	0.0%								
A-12	270	G6517529	11	3000	0.4%		11						
A-13	270	G6517431	0	2000	0.0%								
A-14	223	G6417494	0	2000	0.0%								
A-15	270	G6517963	1	1000	0.1%						1		
A-16	308	G6416276	0	1000	0.0%								
A-17	270	G6518109	0	500	0.0%								
A-18	308	G6419156	0	500	0.0%								
A-19	270	G6517453	0	500	0.0%								
A-20	223	G6417487	0	500	0.0%								
A-21	270	G6517949	3	500	0.6%					3		1	
TOTALS			129	26000	0.5%	84	18	11	6	4	3	2	0

The single FF (Fails to Fire) malfunction on rifle A-21 was not a failure of the trigger assembly but was caused by a lack of lubrication after 360 rounds were fired. A-21 completed the remainder of the test without further incident after lubrication of the trigger assembly per instructions in the owner's manual.

Key to Malfunctions	
DE	Doesn't Eject
EDS	Ejector Drops Shell
FF	Fails to Fire
FPO	Floor Plate Opens
JM	Jumps Magazine
SBC	Stems Bottom Chamber
SLC	Stems Left Chamber
SOR	Stem Over Ride
SM	Stems Magazine
STC	Stems Top Chamber

**Endurance Ammunition:**

Ammunition: 270 Win		
R270W1	Remington	100 gr Pointed Soft Point
R270W2	Remington	130 gr Core-Lokt Pointed Soft Point
R270W3	Remington	130 gr Bronze Point
R270W4	Remington	150 gr Core-Lokt Soft Point
PRA270WA	Remington	130 gr Accu Tip Boat Tail
PRC270WB	Remington	140 gr Core-Lokt Ultra Bonded PSP
RS270WA	Remington	140 gr A-Frame PSP
PRSC270WA	Remington	130 gr Swift Scirocco Bonded
P270F	Federal	130 gr Nosler Ballistic Tip
P270C	Federal	150 gr Sierra GameKing Boat Tail SP
P270T2	Federal	130 gr Trophy Bonded Bear Claw
X2703	Winchester	130 gr Super-X Silvertip
X2704	Winchester	150 gr Super-X Power Point
SBST270	Winchester	130 gr Supreme Ballistic Silvertip

Ammunition: 223 Rem		
R223R1	Remington	55 gr Pointed Soft Point
R223R3	Remington	55 gr Metal Case
R223R6	Remington	62 gr Hollow Point (Match)
L223R7	Remington	45 gr Jacketed Hollow Point
PRA223RB	Remington	50 gr Accutip-V Boat Tail
PRA223RC	Remington	55 gr Accutip-V Boat Tail
P223F	Federal	55 gr Nosler Ballistic Tip
P223E	Federal	55 gr Sierra GameKing BoatTail HP
GM223M	Federal	69 gr Sierra MatchKing BoatTail HP
XM193	Federal	55 gr Metal Case Boat Tail
SBST223	Winchester	50 gr Ballistic Silvertip
X223R	Winchester	55 gr Pointed Soft Point

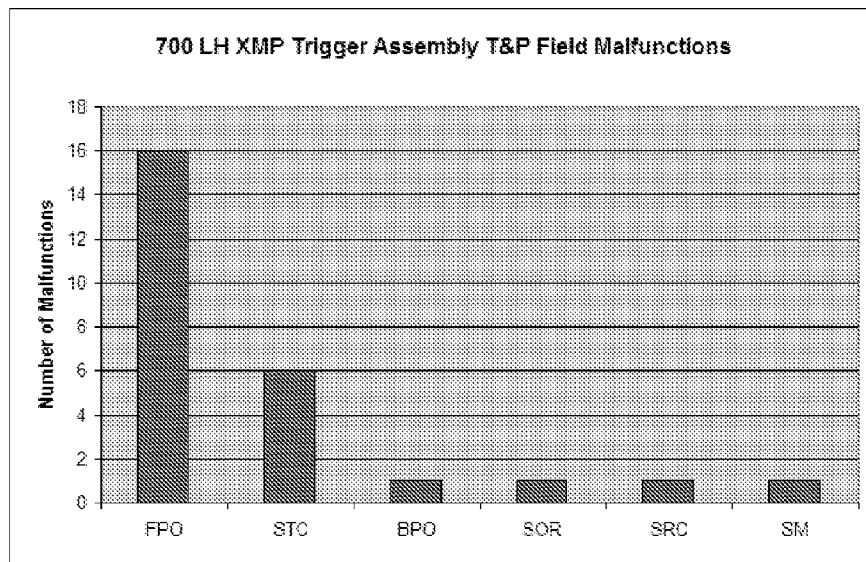
Ammunition 308 Win		
R308W1	Remington	150 gr Core-Lokt Pointed Soft Point
PRC308WC	Remington	180 gr Core-Lokt Ultra
R308W2	Remington	180 gr Core-Lokt Soft Point
PRC308WA	Remington	150 gr Core-Lokt Ultra
PRP308WB	Remington	180 gr Nosler Partition
PRA308WB	Remington	185 gr Accutip Boat Tail
RM308W7	Federal	180 gr Match King Boat Tail HP
P308C	Federal	185 gr Sierra Game King Boat Tail SP
P308F	Federal	150 gr Nosler Ballistic Tip
P308E	Federal	180 gr Nosler Partition
GM308M	Federal	168 gr Sierra Match King BTHP
SBST308	Winchester	150 gr Ballistic Silvertip
X3086	Winchester	180 gr Power Point
SBST308A	Winchester	168 gr Ballistic Silvertip

Field Test Summary:

The same types of ammunition listed for the endurance test were also used to conduct the field test. 2800 total rounds of ammunition were fired through 21 rifles with an overall malfunction rate of 0.9%. 16 of the 26 malfunctions were FPO (Floor Plate Opens) occurring in the same rifle. No malfunctions were chargeable to the trigger assembly.

FUNCTION TEST SUMMARY										
MALFUNCTIONS SORTED BY SERIAL NUMBER										
	Serial #	# of Malfr	# of Rds. Fired	Malfr Rate	FPO	STC	BPO	SOR	SRC	SM
A-1	223 G6416876	1	120	0.8%						1
A-2	223 G6416737	0	120	0.0%						
A-3	308 G6419182	4	140	2.9%		3			1	
A-4	308 G6416473	0	140	0.0%						
A-5	270 G6518019	0	140	0.0%						
A-6	223 G6416849	1	120	0.8%		1				
A-7	308 G6416500	0	140	0.0%						
A-8	223 G6417517	2	120	1.7%		2				
A-9	308 G6417873	0	140	0.0%						
A-10	223 G6416863	1	120	0.8%				1		
A-11	308 G6417216	0	140	0.0%						
A-12	270 G6517529	0	140	0.0%						
A-13	270 G6517431	0	140	0.0%						
A-14	223 G6417484	0	120	0.0%						
A-15	270 G6517963	0	140	0.0%						
A-16	308 G6416276	0	140	0.0%						
A-17	270 G6518109	1	140	0.7%			1			
A-18	308 G6419156	0	140	0.0%						
A-19	270 G6517453	0	140	0.0%						
A-20	223 G6417487	0	120	0.0%						
A-21	270 G6517949	16	140	11.4%	16					
TOTALS		26	2800	0.9%	16	6	1	1	1	1

Key to Malfunctions	
BPO	Bolt Pulls Out
FPO	Floor Plate Opens
SM	Stems Magazine
SOR	Stern Over Ride
SRC	Stems Right Chamber
STC	Stems Top Chamber



CONCLUSIONS:

The samples of Left Hand XMP trigger assemblies submitted individually as trigger assemblies, and assembled to finished host rifles all passed testing successfully.