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Research & Development Technical Center  
315 West Ring Road  
Elizabethtown, KY 42701

TLW0407

Remington Arms Company, Inc.

Test Report – Trial & Pilot Test

M/710 Centerfire

Rifle

.270 Win.

(PART A)

July 2001

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Remington Arms Company, Inc.

Test Report - Trial & Pilot Test

August 2001

M/710 Centerfire Rifle

Caliber: .270 Winchester

### ABSTRACT:

This Report covers the results of the Trial & Pilot Testing (T&P) procedures performed on the Remington M/710 .270 Win. Centerfire Rifle during December 2000 through July 2001 at the Remington Arms Company, Inc., Research & Development Technical Center located at Elizabethtown, KY.

This Testing Program was designed around the goal of determining if this new product met design specifications as specified by R&D and produced using production methods and processes at the Remington Arms Mayfield KY plant.

Several "information only" tests were also conducted during the same test program for the purpose of evaluating the products under extreme conditions.

The following general grouping of test procedures were used to determine product and process capability.

1. - Headspace and Proof Checks
2. - Initial Inspections, Tests and Measurements
3. - Firearms Measurements
4. - Functionality Endurance Testing
5. - Accuracy
6. - Environmental Tests

It should be noted that although there were a couple of minor areas of concern (primarily pertaining to firing pin head assembly, Magazine Box and Bolt Stop function, the team determined that the product presented no concerns relative to safety. There were also some concerns with the Bushnell optics that still must be addressed by Mayfield. With the understanding that these concerns will be addressed prior to warehousing, the team concluded that production could proceed and product released for shipment to the warehouse.

After reviewing each of the individual tests in the program and taking the entire series of T&P tests as a whole, the Research Test Lab and the Research Design Group have concluded that this product met the acceptance requirements as set forth by the Trial & Pilot Test Plan.

Report Prepared By:

J. R. Snedeker. \_\_\_\_\_ / August 2001.

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### INTRODUCTION

The Model 710, Centerfire Rifle is a new product line for the Remington Arms Company.

This report will review and summarize the results of various Trial & Pilot Tests (T&P) conducted during the Spring/Summer 2001 time period at the Remington Arms Company, Inc., Research & Development Technical Center located in Elizabethtown, KY.

Due to the extensive nature of the testing involving this product this report will consist of two parts. Part A (this document) presents a brief explanation of each of the individual tests that were a part of the overall Trial & Pilot test plan, along with a brief review of the results for that particular test. Part B consists of 1 large binder and contains the raw data for the T&P as well as the individual test reports and any statistical analysis associated with the test program. It is more extensive in both volume and detail and is intended to give the reader an in-depth look at each of the individual tests completed during this series. Part B also provides additional details such as the flow chart for the T&P test plan, copies of the individual test requests and any supplementary reports or data that was generated during or after the completion of a particular test.

For reference and consistency, the same section numbering scheme is used in both Part A and in Part B where appropriate.

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## 1.0 PURPOSE & SCOPE OF TEST PROGRAM

### 1.1 PURPOSE

The first purpose of this series of tests was to determine if the Model 710 Centerfire Rifle would perform as designed and meet the established function and safety criteria as proposed by the Research & Development Firearms Design Group. The second purpose of this series of tests was to assure that Mayfield production processes were capable of meeting the function, safety and design criteria established for this model by R&D.

### 1.2 SCOPE

This report covers Trial & Pilot testing of the Remington Model 710 Centerfire in .270 caliber only.

## 2.0 EXECUTIVE SUMMARY

This section of the report is a summary of the test work accomplished through a series of three Trial & Pilot (T&P) Test Programs for Remington's new Model 710 Centerfire Rifle. The testing and associated design development improvements were completed during the time period November through December 2000.

The following is a summary letter issued at the end of Trial & Pilot testing (per D. Danner) and is a good summary description of the status of the project and the necessary further steps to be taken prior to shipment of product.

The Test and Measurement organization within the Elizabethtown Research and Development facility formally supports exit from both Design Acceptance and Trial and Pilot testing of the M710 Bolt Action Firearm (configured in .270 caliber with Bushnell 763942 riflescope) subject to the following issues and conditions:

1. Prior to product shipment from Mayfield a Design Transmittal must occur to formally establish component dimensional parameters. All product must conform to these parameters or a written deviation from design must be obtained from the Design team.
2. Mayfield must address the continuing problem of the Firing Pin Head loosening from the Firing Pin Body. Test recommends a statistically significant audit of product by Mayfield to confirm resolution of the issue.
3. Mayfield must re-examine the process, which allowed two firearms to be swapped between boxes. This issue is driven by BATF serial number tracking requirements.

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4. Several issues continue to exist which Test reasonably believes will result in customer dissatisfaction. These issues have no test objective criteria associated with them so Test has no basis to withhold ship approval. Consequently, Test supports ship contingent on Marketing approval of these issues:

- Magazine Box Bottom Retention – Latest data from Series C product indicates that 17% of the product will experience this problem within the first 100 rounds of use. During the Series C test the earliest occurrence was at round 49.
- Magazine Box Difficult to Remove - This problem was pervasive on the Series C product and may potentially contribute to the Bottom Retention Issue above.
- Bolt Stop Detent Freedom – Latest data from Series C product suggests that 20% of the product will experience a loosening of the detent lever during the first 100 rounds of use.
- Bushnell Scope – Data from Series B product suggests that approximately 8% of the product will experience scope issues early in life. Bushnell has confirmed that an assembly issue exists with the scope.
- Take Down Screw Torque – Data from Series C product indicates that 37% of the product will have some loosening of the takedown screws. Further, data obtained by Mayfield and reported on 20 NOV '00 supports the conclusion that some loss of torque does occur. While this does not constitute a safety issue consumers may potentially notice the phenomena.

Test further recommends that these issues be resolved as quickly as possible via design/process change to limit negative customer exposure.

5. Test recommends that Mayfield re-examine process controls and limits around the Trigger Pull Force via a process capability study. Data obtained in E'town from the Series C product indicated that some product was slightly below the low pull specification of 4.00 pounds. All product however was in excess of the SAAMI specified minimum of 3.00 pounds.

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## 2.1 TEST SUMMARY TABLE

The following Table lists the individual test procedures that were completed during the T&P series and the Final Status of each by individual category.

1. Note on Final Status: Determination made after final review of all test data was completed by Test management team.

TEST PROCEDURE	A-	B-	C-	D-	E-	Final
TRIAL & PILOT TEST	SERIES	SERIES	SERIES	SERIES	SERIES	Status <sup>1</sup>
	Status	Status	Status	Status	Status	
3.1 INITIAL INSPECTIONS, TESTS & MEASUREMENTS						83
3.1.1 Visual Examination, Packaging Audit & Packaging Test						
3.1.1.1 TLW0407A - Visual Examination	Completed			Completed	Completed	For Information
3.1.1.2 TLW0407B - Packaging Material Audit	Completed					Passed
3.1.1.3 TLW0407C - Packaging Test	Completed					Passed
3.1.2 Headspace and Proof						
3.1.2.1 TLW0407E - Measure Headspace	See Mayfield Records					
3.1.2.2 TLW0407F - Proof Test	Completed by Mayfield					Passed (By Inspection)
3.1.2.3 TLW0407G - Re-Measure Headspace after Proof		Completed	Completed	Completed		Passed

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<b>3.1.3 Forces</b>						
3.1.3.1 TLW0407H – Measure Firing Pin Indent		Completed	Completed	Completed		Passed
3.1.3.2 TLW0407I – Measure Sear/Trigger Engagement and Sear Lift				Completed		Passed
3.1.3.3 TLW0407J – Measure Trigger Pull Forces		Completed		Completed		Passed
3.1.3.4 TLW0407K – Measure Safe On/Off Forces				Completed		Passed
3.1.3.6 TLW0407M – Measure Magazine Spring Force	Completed					For Information
3.1.3.7 TLW0407N – Measure Firing Pin Head / Sear Engagement				Completed		Passed
3.1.3.8 TLW0407O – Bolt Stop Function Check				Completed		Passed
3.1.3.9 TLW0407P – Function Check of ISS System	Completed					Passed
3.1.3.11 TLW0407AT – Perform Bore Sighting Using Bushnell Scope.	Completed					Passed
<b>3.1.5 Firearms Measurements</b>						
3.1.5.1 TLW0407T – Chamber Cast	Completed					Passed
3.1.5.2 TLW0407U – Bore Diameter	Completed					Passed
3.1.5.3 TLW0407V – Groove Diameter	Completed					Passed
3.1.5.4 TLW0407W – Twist Rate (.270)	Completed					Passed
3.1.5.5 TLW0407X – Magazine Capacity Test	Completed					Passed

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3.2 FUNCTION & ENDURANCE TESTING	A- SERIES Status	B- SERIES Status	C- SERIES Status	D- SERIES Status	E- SERIES Status	Final Status
3.2.1 Function and Endurance Testing						
3.2.1.1 TLW0407Y - Ten (10) Round Safety Function Test with Lanyard.	Completed	Completed				Passed
3.2.1.2 TLW0407Z - Basic Jack Function Test (100 Rounds with Rem. Ammo.(60 rounds for Series D & E)	Completed	Completed		Completed	Completed	Passed
3.2.1.3 TLW0407AA- Extended Function & Endurance (400 Rounds w/Rem. & Competitive Ammo)		Completed	Completed			Passed
3.2.1.4 TLW0407AB - Clean Rifle and Inspect	Completed	Completed	Completed	Completed	Completed	
3.3 ACCURACY AND POI TESTING						
3.3.1 Accuracy and POI Testing						
3.3.1.1 TLW0407AC - POI & Group Size - Initial Test with High Quality 36X Scope	Completed	Completed				Passed
3.4 ENVIRONMENTAL TESTING						
3.4.1 Temperature & Humidity Testing						
3.4.1.1 TLW0407AG - Hot Function Test		Completed				Passed
3.4.1.2 TLW0407AH - Cold Function Test		Completed				Passed

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3.4.1.3 TLW0407AI - Heat & Humidity Test		Completed				Passed
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## 3.0 T&P SUMMARY - (DETAILED)

Note: The most recent series of tests is reported on in Part A unless otherwise listed. See Part B for previous series results.

### 3.1 INITIAL INSPECTIONS, TESTS & MEASUREMENTS

#### Visual Examination, Packaging Audit & Packaging Test

3.1.1.1 TLW0407A - (T&P series "A") Visual Examination - Performed by Elizabethtown Technicians

&

3.1.1.2 TLW0407B - Packaging Audit -

(T&P Series "A") -

RECEIVING INSPECTION & PACKAGING AUDIT									
MODEL 710, 270 WIN. TRIAL & PILOT									
TLW0407									
12/11/2000									
PROOF TEST & MAGNAFLUX COMPLETED AT MAYFIELD									
SERIAL NUMBER	SERIAL NUMBER MATCH-GUN & BOX	ALL MATERIAL IN BOX, MANUAL ETC.	INTEGRATED SECURITY SYSTEM	INSPECT FOR MAGNAFLUX STAMP	TRIGGER POSITION	CONDITION OF GUN	GENERAL CONDITION OF PACKAGING		
YES/NO	YES/NO	YES/NO	ON/OFF	YES/NO	YES/NO	OK/NOT	OK/NOT		
71008145	YES	YES	ON	YES	OK	OK	OK		
71008154	YES	YES	ON	YES	OK	OK	OK		
71008138	YES	YES	ON	YES	OK	OK	OK		
71008121	YES	YES	ON	YES	OK	OK	OK		
71008176	YES	YES	ON	YES	OK	OK	OK		
71008450	YES	YES	ON	YES	OK	OK	OK		
71008104	YES	YES	ON	YES	OK	OK	OK		
71008117	YES	YES	ON	YES	OK	OK	OK		
71008102	YES	YES	ON	YES	OK	OK	OK		
71008485	NO*	YES	ON	YES	OK	OK	OK		
71008143	YES	YES	ON	YES	OK	OK	OK		
71008185	YES	YES	ON	YES	OK	OK	OK		
71008173	YES	YES	ON	YES	OK	OK	OK		
71008194	YES	YES	ON	YES	OK	OK	OK		
71008481	YES	YES	ON	YES	OK	OK	OK		
71008199	NO*	YES	ON	YES	OK	OK	OK		
71008491	YES	YES	ON	YES	OK	OK	OK		
71008171	YES	YES	ON	YES	OK	OK	OK		
71008458	YES	YES	ON	YES	OK	OK	OK		
71008135	YES	YES	ON	YES	OK	OK	OK		
71008166	YES	YES	ON	YES	OK	OK	OK		
71008139	YES	YES	ON	YES	OK	OK	OK		
71008107	YES	YES	ON	YES	OK	OK	OK		
71008453	YES	YES	ON	YES	OK	OK	OK		
71008471	YES	YES	ON	YES	OK	OK	OK		
71008152	YES	YES	ON	YES	OK	OK	OK		
71008134	YES	YES	ON	YES	OK	OK	OK		
71008188	YES	YES	ON	YES	OK	OK	OK		

\* Gun Serial Number did not match serial number on shipping box; two rifles were switched relative to the shipping boxes

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(T&P Series "D") -

RECEIVING INSPECTION & PACKAGING AUDIT										
MODEL 710, 270 WDN. TRIAL & PILOT, SERIES- D										
TLW0407										
7/13/01 PROOF TEST & MAGNAFLUX COMPLETED AT MAYFIELD										
SERIAL NUMBER	SERIAL NUMBER MATCH-GUN & BOX	ALL MATERIAL IN BOX, MANUAL ETC.	ISS KEYS IN BOX	SAFETY POSITION	INTEGRATED SECURITY SYSTEM	INSPECT FOR PROOF STAMP	INSPECT FOR MAGNAFLUX STAMP	TRIGGER POSITION	CONDITION OF GUN	GENERAL CONDITION OF PACKAGING
	YES/NO	YES/NO	YES/NO	ON/OFF	ON/OFF	YES/NO	YES/NO	RT/LF	OK/NOT	OK/NOT
71020708	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK
71022075	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021953	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71020693	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71022084	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71022155	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021961	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK
71020759	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK
71020740	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK
71020754	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021738	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71022082	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021947	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK
71022111	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021904	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71022461	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021784	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021787	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021832	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK
71021741	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK

NOTE: GUN 71021947 SCOPE MOUNTED CORRECT BUT SCOPE CROSS HAIRS ARE WAY LEFT. SCOPE NO GOOD.

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(T&P Series "E") -

RECEIVING INSPECTION & PACKAGING AUDIT											
MODEL 710, 270 WIN. TRIAL & PILOT SERIES E											
TLW0407											
DATE - 7/24/01											
PROOF TEST & MAGNALLUX COMPLETED AT MAYFIELD											
SERIAL NUMBER	SERIAL NUMBER MATCH GUN & BOX	ALL MATERIAL IN BOX, MANUAL, ETC.	ISS KEYS IN BOX	SAFETY POSITION ON/OFF	INTEGRATED SECURITY SYSTEM ON/OFF	INSPECT FOR PROOF STAMP YES/NO	INSPECT FOR MAGNALLUX STAMP YES/NO	TRIGGER POSITION RT/LF	CONDITION OF GUN BOX/NO	GENERAL CONDITION OF PACKAGING OK/NOT	NOTES or COMMENTS
71023805	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023404	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023251	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024005	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023521	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023403	YES	YES	YES	ON	OFF	YES	YES	OK	OK	NOT	BOX TURN ON SIDES
71024088	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71023302	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024057	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71023811	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023292	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023405	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023510	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023321	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023467	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71024049	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71024086	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023302	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023302	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71023302	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024031	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71024070	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023802	YES	YES	YES	ON	OFF	YES	YES	RT	OK	OK	
71024079	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024085	YES	YES	YES	ON	OFF	NO	YES	OK	OK	OK	NO PROOF STAMP (PROOFED & STAMPED 7/24/01 MKR)
71024064	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024050	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023298	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71023440	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	
71024000	YES	YES	YES	ON	OFF	YES	YES	OK	OK	OK	

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### Headspace and Proof

**Note:** For each of the submitted samples in the test series of sample rifles, the proof test and Magnaflux™ inspections were performed at Mayfield prior to shipment to R&D. R&D Technicians, as part of the incoming inspection procedure, determined for each rifle that the Proof stamp and Magnaflux™ inspection stamps were present. Actual measurements of the headspace were not made.

However, for series "B" & series "C" rifles, measurements of the headspace were recorded. These readings are summarized in the table below.

The Headspace readings are well within the Min. to Min+ 0.007" range.

3.1.1.3 TLW0407E - Measure Headspace  
(Please see Note above)

3.1.1.4 TLW0407F - Proof Test  
(Please see Note above)

3.1.1.5 TLW0407G - Re-Measure Headspace after Proof \*

(T&P, Series "B" & "C") - Specification:  $\leq$  Min. + 0.007" after Proof.

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Headspace: Series B (all readings are in the min. + range)	30	0.00113 in.	0.00051 in.	0.00095; 0.00132
Headspace: Series C (all readings are in the min. + range)	30	0.00100 in.	0.00045 in.	0.00084, 0.00116

Note that the raw data for Series "B" Headspace is found in Part B listed under tab "Series B FIRING PIN INDENT."

Raw data for Series "C" Headspace is found in Part B listed under tab "Series C PRELIMINARY MEASUREMENTS."

### Forces

3.1.1.6 TLW0407H - Measure Firing Pin Indent

(T&P Series "B") - Specification:  $\geq$  0.017 indent.

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Firing Pin Indent - Series B After Live Fire Test.	10	0.01823 in.	0.00045 in.	0.01791, 0.01855

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Firing Pin Indent - Series C After Live Fire Test	10	0.01707 in.	0.00072 in.	0.01655, 0.01758
--	----	-------------	-------------	------------------

## 3.1.1.7 TLW0407I - Trigger/Sear Engagement

(T&P, Series "C") Specification: 0.020 to 0.025 inches

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Trigger/Sear Engagement	30	0.0278 in.	0.00209 in.	0.02705, 0.02854

Sear Lift, (T&P, Series "C"); specification: 0.006 to 0.018 inches

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Sear Lift	30	0.01578 in.	0.0017 in.	0.01531, 0.01624

## 3.1.1.8 TLW0407J - Measure Trigger Pull Forces

(T&P, Series "B" & "C") specification: 4.0 to 5.5 lbs.

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Trigger Pull Forces, in Stock Series B	30	3.99 lb.	0.375	3.85 lb., 4.13 lb.
Trigger Pull Forces, in Stock Series C				
Trigger Pull Forces, out of Stock Series B	30	4.17 lb.	0.334	4.05 lb., 4.30 lb.
Trigger Pull Forces, out of Stock Series C				

(Note: spring scale used for measurements.)

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### 3.1.1.9 TLW0407K - Measure Safe On/Off Forces

(T&P, Series "C"); specification:  $\geq 1.0$  lb.

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Safe Off Force	10	3.2973	0.3080	3.0290, 3.5176
Safe On Force	10	6.130	0.696	5.632, 6.628

### 3.1.1.10 TLW0407M - Measure Magazine Spring Force

(T&P, Series "A"); no specification established - measurements taken for information.

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Magazine Spring Force @ 0.2"	10	1.6180	0.1652	1.4998, 1.7362
Magazine Spring Force @ 1.0"	10	2.8390	0.1484	2.7329, 2.9451

### 3.1.1.11 TLW0407N - Measure Firing Pin Head to Sear Engagement

(T&P, Series "C"); Specification: Minimum Vertical Engagement to be  $\geq .049$ ".

Note that the measurement method produces a dimensional range.

Variable	N	Mean (Range)	Std. Dev.	95% Confidence Interval
Firing Pin Head to Sear Engagement - range	30	0.06717 - 0.07830	0.00214	0.06640, 0.07907

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### 3.1.1.12 TLW04070 - Bolt Stop Function Check

(T&P, Series "C", no Release Detent Force specification established)

Variable	Passed	Marginal / Loose
Stop Function	10	0
Average Release Detent Force, lb.		
Release Detent	4.707	

### 3.1.1.13 TLW0407P - Function Check of ISS System

(T&P, Series "A")

All ten samples, A-1 to A-20, passed the ISS Function Test without incident.

### 3.1.1.14 TLW0407AT - Perform bore sighting Using Bushnell Scope

(T&P, Series "A"), no specification established - measurements taken for information.

Prior to the start of live fire or accuracy testing a sample of the rifles was tested to determine if production had performed a bore sighting/adjustment after mounting the Bushnell Scopes. The scopes were not adjusted prior to testing. One 5-shot group was shot from each of the test rifles.

The general goal of this test was to determine if the shots would 'hit the paper' without adjustment of the scope by the shooter. See Pattern Chart next page. The individual points represent the location of each rifles POI (Point of Impact) relative to POA (Point of Aim), (with the POA located at (0,0))

The "Overall Average Position" on the chart represents the average POI relative to POA for the ten rifles tested.

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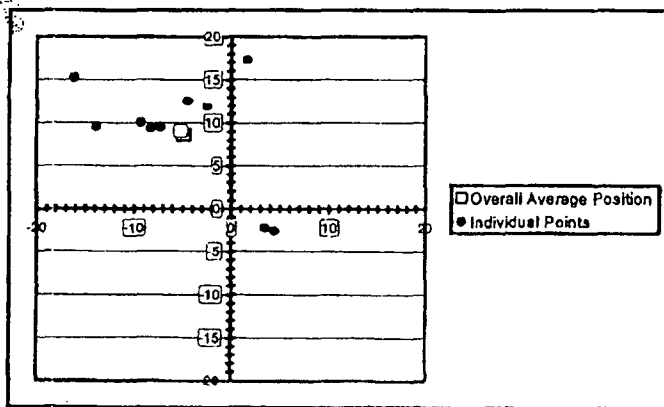
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MODEL 710 T&P POI RELATIVE TO POA BORE SIGHTING USING BUSHNELL SCOPE						
GUN	SCOPE	AMMO	GROUP SIZE	POI RELATIVE TO POA		TOTAL DISTANCE (in.)
B-21	BUSHNELL	REM R30064 180GR	2.68	X	-2.49	12.07
				Y	11.81	
B-22	BUSHNELL	REM R30064 180GR	2.37	X	-7.25	11.93
				Y	9.47	
B-23	BUSHNELL	REM R30064 180GR	2.46	X	-8.52	12.63
				Y	9.32	
B-24	BUSHNELL	REM R30064 180GR	3.52	X	-16.11	22.12
				Y	15.15	
B-25	BUSHNELL	REM R30064 180GR	1.05	X	4.45	5.17
				Y	-2.65	
B-26	BUSHNELL	REM R30064 180GR	1.54	X	1.72	17.30
				Y	17.22	
B-27	BUSHNELL	REM R30064 180GR	2.34	X	-13.83	16.78
				Y	9.50	
B-28	BUSHNELL	REM R30064 180GR	2.87	X	-4.47	13.26
				Y	12.49	
B-29	BUSHNELL	REM R30064 180GR	1.89	X	-3.50	4.17
				Y	-2.28	
B-30	BUSHNELL	REM R30064 180GR	2.87	X	-9.279	13.63
				Y	9.978	
AVERAGE						12.9
STD. DEV.						5.4



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### Firearms Measurements

#### 3.1.1.15 TLW0407T - Chamber Cast

(From series "A" - see "Variable" column for specifications)

Variable	N	Mean	Std. Dev.	95% Confidence Interval
.4708-.4728	10	0.47108	0.00109	0.47030, 0.47186
.4425-.4440	10	0.44384	0.00067	0.44336, 0.44432
30.0 - 34.0 Deg.	10	34.055°	0.283	33.8523°, 34.2577°
.308 - .310	10	0.30988	0.00038	0.30961, 0.31015

#### 3.1.1.16 TLW0407U - Bore Diameter

(T&P, Series "A"), specification: 0.270" / 0.271"

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Bore Diameter	10	0.2710	0.0000	0.2710, 0.2710

#### 3.1.1.17 TLW0407V - Groove Diameter

(T&P, Series "A"), specification: 0.277" / 0.278"

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Groove Diameter	10	0.27865	0.00090	0.27800, 0.27930

#### 3.1.1.18 TLW0407W - Twist Rate (.270)

(T&P, Series "A"), specification: 1" in 10",  $\pm 0.25"$ , RH

Variable	N	Mean	Std. Dev.	95% Confidence Interval
Twist Rate	10	1 in 9-15/16"	1 in 5/16"	1 in 10", 1 in 9-7/8"

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3.1.1.19 TLW0407X - Magazine Capacity Test

(T&P, Series "A"), specification: with 4 rounds in magazine box, must be able to load and latch into receiver.

All ten rifles (A11 to A20) passed the Magazine Capacity Test.

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## 3.2 FUNCTION & ENDURANCE TESTING

### Function and Endurance Testing

#### 3.2.1.1 TLW0407Y - Ten (10) Round Safety Function Test with Lanyard

Test completed without incident.

#### 3.2.1.2 LW0300Z - Basic Jack Function Test (60 Rounds with Remington & Winchester Ammunition.)

	E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	E 10	E 11	E 12	E 13	E 14	E 15	E 16	E 17	E 18	E 19	E 20	E 21	E 22	E 23	E 24	E 25	E 26	E 27	E 28	E 29	E 30
REM PRB270WA 140gr,																														
WIN X2703 130gr,	SL																				SL				SL					
WIN X2705 130gr.	SL																													
Totals	2																				1				1					
SL – Stem Low Malfunction																														

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3.2.1.3 TLW0407AA - 400 Round Extended Function Test

PROJECT # 214095

TLW 0407

M/710 .270 T&P (B) SERIES 400 RD EXTENDED JACK FUNCTION TEST.

GUN	AMMO	ROUNDS	STEM	
B-2	REM R270W1 100GR	40		
	REM PRB270WA 140GR	40	5	3 <sup>RD</sup> RD - 1; 5 <sup>TH</sup> RD - 4
	REM RS270WA 140GR	40	8	2 <sup>ND</sup> RD - 2; 3 <sup>RD</sup> RD - 4; 4 <sup>TH</sup> RD - 1; 5 <sup>TH</sup> RD - 2
	REM R270W4	40	4	5 <sup>TH</sup> RD - 4
	FED 270A 130GR	40		
	FED 270GS 130GR	40	1	5 <sup>TH</sup> RD - 1
	FED 270B 150GR	40	1	5 <sup>TH</sup> RD - 1
	WIN X2703 130GR	40	18	2 <sup>ND</sup> RD - 2; 3 <sup>RD</sup> RD - 4; 4 <sup>TH</sup> RD - 6; 5 <sup>TH</sup> RD - 6
	WIN X2705 130GR	40	10	3 <sup>RD</sup> RD - 2; 4 <sup>TH</sup> RD - 3; 5 <sup>TH</sup> RD - 5
	WIN X2704 150GR	40	10	3 <sup>RD</sup> RD - 2; 4 <sup>TH</sup> RD - 5; 5 <sup>TH</sup> RD - 3
	TOTAL ROUNDS	400	57	
B-6	REM R270W1 100GR	40		
	REM PRB270WA 140GR	40	5	2 <sup>ND</sup> RD - 1; 5 <sup>TH</sup> RD - 4
	REM RS270WA 140GR	40	3	3 <sup>RD</sup> RD - 5 <sup>TH</sup> RD - 2
	REM R270W4	40		
	FED 270A 130GR	40		
	FED 270GS 130GR	40		
	FED 270B 150GR	40		
	WIN X2703 130GR	40	10	2 <sup>ND</sup> RD - 1; 3 <sup>RD</sup> RD - 2; 4 <sup>TH</sup> RD - 2; 5 <sup>TH</sup> RD - 5
	WIN X2705 130GR	40	2	5 <sup>TH</sup> RD - 2
	WIN X2704 150GR	40		
	TOTAL ROUNDS	400	20	

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### 3.2.1.4 TLW0407AB - Clean Rifles and Inspect

See "Clean & Inspect Checklist, series C, T&P", Part B; raw data sheets for details of the results of inspections and measurements.

## 3.3 ACCURACY AND POI TESTING

### Accuracy and POI Testing

#### 3.3.1.1 TLW0407AC - POI & Group Size - Initial Test with High Quality 36X Scope

This point of impact test involves the verification of the firearm's sighting system adjustment and the potential to hit the point of aim. Random variation and/or extreme differences shot to shot point of impact (as well as group size) typically indicate improper barrel processing and is used as a final inspection flag in production. Standard factory ammunition is used for this test and the same code of ammunition is used throughout the test. Three, 5-shot groups were shot in each of the test rifles B-21 to B-30. For this product and this caliber the average group must be  $\leq 2.7"$  at 100 yards.

All rifles in the test sample were under the 2.7" group size with the overall average group size calculated to be 2.12", (95% confidence interval = 1.873" to 2.369").

Rifle	Scope	Ammo	Group #1	Group #2	Group #3	Average Group
B-21	Swarovski 6-24x50	Rem R270W2, 130 gr.	1.765	1.780	2.138	1.894
B-22	Swarovski 6-24x50	Rem R270W2, 130 gr.	1.719	2.694	2.856	2.423
B-23	Swarovski 6-24x50	Rem R270W2, 130 gr.	1.582	2.694	1.352	1.876
B-24	Swarovski 6-24x50	Rem R270W2, 130 gr.	1.588	1.632	2.405	1.875
B-25	Swarovski 6-24x50	Rem R270W2, 130 gr.	2.720	2.194	1.853	2.256

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B-26	Swarovski 6-24x50	Rem R30064, 180 gr.	3.769	1.584	2.288	2.547
B-27	Swarovski 6-24x50	Rem R30064, 180 gr.	3.630	1.814	2.645	2.696
B-28	Swarovski 6-24x50	Rem R30064, 180 gr.	1.065	2.077	2.830	1.991
B-29	Swarovski 6-24x50	Rem R30064, 180 gr.	2.824	1.677	1.604	2.035
B-30	Swarovski 6-24x50	Rem R30064, 180 gr.	1.118	1.987	1.724	1.640
Group Size - Overall Mean						2.12

## 3.4 ENVIRONMENTAL TESTING

### Temperature & Humidity Testing

#### 3.4.1.1 TLW0407AG - Hot Function Test

(T&P Series "B")

This test evaluates the effect(s) of extreme high temperatures on the functioning performance of firearms with special interest in the synthetic parts of the product. For this test Rifle B-2 (serial # 71008103) and 100 rounds of ammunition (Remington R270W2, Lot # M29NB6628) were placed in the environmental chamber set at a temperature of 120°F for a minimum of six hours. After six hours, the rifle and 20 rounds of ammunition were removed from the chamber and shot in the test jack, cycling the safety every five rounds. After shooting the 20 rounds the rifle is returned to the chamber and allowed to return to the chamber temperature for two hours. At that point the rifle is again removed from the chamber with another 20 rounds and the shooting test is continued. This procedure is continued until the entire 100 rounds are fired through the rifle. No malfunctions or other items of note were observed during this test.

#### 3.4.1.2 TLW0407AH - Cold Function Test

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(T&P Series "B")

This test evaluates the effect(s) of extreme low temperatures on the functioning performance of firearms. Rifle B-1 (serial # 71008100) and 100 rounds of ammunition (Remington R270W2, Lot # M29NB6628) were put in the freezer set at a -20°F for a minimum of six hours. After six hours the rifle and 20 rounds were removed from the freezer and shot with the safety being cycled every five rounds. The rifle was then replaced in the freezer for a minimum of two hours. This procedure was repeated until the 100 rounds had been shot through the rifle.

There were 12 misfires noted during the 100 rounds of testing. All misfires had a light indent.

### 3.4.1.3 TLW0407AI - Heat & Humidity Test

(T&P Series "B")

For this test, rifle B-4 (serial # 71008118) was placed in the environmental chamber with 100 rounds of ammunition (Remington R270W2, Lot # M29NB6628) for a minimum of six hours. The chamber was set at 100°F and 90% Relative Humidity. After the initial six hours of conditioning the rifle and 20 rounds of ammunition were removed and shot in the test jack. The safety was cycled every five rounds. Every 20 rounds the test was repeated. There were no malfunctions noted during this test.

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