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RESEARCH TEST and MEASUREMENT REPORT - Report No. 82 0502

MODEL 700 CLASSIC - .257 Roberts FEEDING EVALUATION

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TEST & MEASUREMENT LAB REPORT

REPORT NUMBER: 82 0502

REPORT TITLE: MODEL 700 CLASSIC - .257 Roberts FEEDING EVALUATION

MODEL(S): 700 Classic

GAGE OR CALIBER: .257 Roberts

DATE: 3-24-82

WORK ORDER NO.: C-1803-000

PART NAME:

DESIGNER/ENGINEER: S.R. Franz

TEST TYPE:

1. PHOTO LAB
2. STRENGTH TEST- NO. OF GUNS TESTED _____
3. X FUNCTION TEST- NO. OF GUNS TESTED 15 - 10 257 Roberts
5 7mm Mauser
4. ACCURACY TEST- NO. OF GUNS TESTED _____
5. MEASUREMENTS- TYPE: _____
6. ENVIRONMENTAL TEST
7. AMMUNITION TESTING & EVALUATION- TYPE: _____
8. VISUAL EVALUATION- _____ OUT OF _____ GUN SAMPLE
9. ENDURANCE- NO. OF GUNS TESTED: _____

NO. OF ROUNDS PER GUN: _____

TOTAL ROUNDS FIRED IN TEST: _____

AMMO TYPE: MAGS. _____; TARGET: _____

RIMFIRE _____ CENTERFIRE: _____

REMINGTON ARMS COMPANY, INC.
Firearms Research Division

March 26, 1982

TO: R. E. NIGHTINGALE
FROM: S. R. FRANZ Report No. 82 0502
SUBJECT: MODEL 700 CLASSIC - .257 Roberts FEEDING EVALUATION

ABSTRACT

A limited quantity of Model 700 Classic rifles will be chambered in the popular .257 Roberts Caliber. This chambering will be made in the long action to accommodate a cartridge longer than present factory rounds. Handloaders have stated that better performance can be obtained with the .257 Roberts when the bullet is seated out further. The longer handloaded cartridges will not fit in short action M/700s. This leaves the long action rifle as the only short term alternative to accommodate these rounds. Since the .257 Roberts, a short cartridge, has never been built in a long action rifle, a feeding evaluation was needed to test this combination. The Current Arms Section supplied ten long action M/700s to the Test Lab for the evaluation.

SCOPE OF TEST

To evaluate feeding of the .257 Roberts cartridge in a long action Model 700 Rifle.

TEST RESULTS

The following problems were found when feeding the short Caliber .257 Roberts in a standard long action M/700 Rifle:

- Increase in stem low malfunctions
- Variable magazine loading position
- Third round loose in magazine

Some design changes were made and tested to eliminate or reduce the above problems. But the importance of these changes were minimized when a comparison test was run between the standard long action .257 Roberts and the 7mm Mauser, last year's limited Model 700 offering. The standard long action .257 Roberts compared favorably with the 7mm Mauser rifles. Overall malfunction rates were 1.6% in 3200 feeding cycles for the .257 Roberts rifles, and 5.2% in 1075 feeding cycles for the 7mm Mausers. These comparison test results prompted the decision made at the March Operations Committee Meeting to go with the standard long action rifle without any changes. (See report test section for specific details)

M700 Classic - .257 Roberts Feeding Evaluation

REPORT TEXTA. Initial Testing

Initial testing was done to determine what feeding problems existed with long action M/700s chambered in .257 Roberts. Two rifles were subjected to a jack feeding test where both magazine loading position and feed rates were varied. Dummy rounds were used that contained Remington 117 gr. bullets. The results were:

| <u>Gun</u> | <u>Rds. Cycled</u> | <u>Malf.</u> | <u>Rate</u> |
|------------|--------------------|--------------|-------------|
| B6365190 | 225 | 6 | 2.7% |
| B6367483 | 180 | 7 | 3.9% |
| Totals | 405 | 13 | 3.2% |

See Appendix A, page 1 for a complete description of malfunctions.

The remaining eight rifles were tested as above in order to increase the test sample size. Each rifle was cycled 30 times with the magazine loading position varied from the front, middle and rear. In addition, the feed rate was also varied with slow, medium and fast speeds used. Only one malfunction occurred, a stem left chamber, with the round loaded forward in the magazine on Rifle No. B6365144. This yields a 0.3% malfunction rate over 300 feeding cycles.

See Appendix A, Page 1 for a complete description of malfunctions.

Stemming of the magazine box and the feed ramp accounted for 64% of the above malfunctions. In addition, 50% of the malfunctions occurred with the rounds loaded toward the front. This gives a high correlation between stem low malfunctions and loading toward the front of the magazine.

B. Design Changes

Three changes were made and tested to reduce the stem low malfunctions. They consisted of using:

- Thicker magazine springs.
- Teflon coated magazine boxes.
- Intermediate follower and spacer.
- Altered magazine box tapers.

Magazine Spring Test

Increasing magazine spring thickness increased spring forces but did not reduce the stem low malfunctions. Two spring thicknesses, one .001 in. and the other

M700 Classic - .257 Roberts Feeding Evaluation

Report No. 82 0502

-3-

Magazine Spring Test Continued

.003 in. thicker than the current production springs were tested. Two .003 in. thicker springs had four malfunctions (a 5% rate) while two .001 in. thicker springs had three malfunctions (a 3.75% rate). Each spring was cycled forty times. Six of the seven were stem magazine box malfunctions.

See Appendix A, page 2 for data.

Teflon Coated Magazine Boxes

Magazine boxes were Teflon coated to reduce friction between the magazine box and follower, which would reduce stem low malfunctions. Field cycle and control jack feed tests using .257 Roberts and 7mm Mauser (7x57) rifles with and without Teflon boxes showed the Teflon did not change the feeding performance. Three .257 Roberts rifles shot 270 total rounds clean, both with and without Teflon coated boxes, while two 7mm Mauser rifles had 15 malfunctions in 150 rds. with the standard box and 19 malfunctions in 150 rds. with Teflon coated boxes.

Shortened Follower

One long action follower was shortened .550 in. and used with a nylon spacer in a long action rifle. The shortened follower was long enough to accommodate longer handloaded cartridges. In addition, this change reduced the wide variation in loading position present with standard long action followers. This modified long action performed extremely well. No malfunctions occurred in 200 feeding cycles. The only drawback with this was implementation time. Alterations to the follower, magazine box, and floor plate in addition to making a spacer are needed, making this a longer term solution.

Altered Magazine Box Tapers

The long magazine box taper was changed to secure the third round loaded in the magazine. This round is free to slide forward or rearward in a standard long action rifle. Two boxes were made with the short box taper, one extended forward to the long box length, the other extended rearward. The rearward extended box did not secure the third round. But the forward extended box did when rounds were loaded toward the front. Both boxes were tested with the following results obtained.

M700 Classic - .257 Roberts Feeding Evaluation

Report No. 82 0502

-4-

Altered Magazine Box Tapers Continued

| | <u>Rds. Cycled</u> | <u>No.Malf.</u> | <u>Rate</u> |
|-----------------------|--------------------|-----------------|-------------|
| Forward Extended Box | 120 | 5 | 4.2% |
| Rearward Extended Box | 120 | 2 | 1.7% |

Modifying the magazine boxes did not improve feeding. Furthermore, investigation showed that this third loose round characteristic is present in other Model 700 rifles. These facts made correction of this problem not feasible at this time.

Appendix A contains a listing of all test data.

PROCEDUREA. Determine Problem

Standard long action M/700s were tested in the shooting jacks. Dummy rounds were cycled with magazine loading position and feed rates varied. The loading positions were in the front, middle and rear of the magazine box while the feed rates consisted of slow, medium and fast speeds.

B. Test Design Changes

Changes were made to correct the feeding problems found in Part A. Control jack feeding and field cycle tests were used to evaluate:

- Thicker magazine springs
- Teflon magazine boxes
- Shortened follower with spacer
- Altered magazine box tapers

Live Remington and competitive ammunition (see below) was used with magazine loading position and feed rates varied as above.

C. Final Evaluation

Five 7mm Mausers were added for controls in the jack feed and field cycle tests. Malfunction rates were used to compare the feeding performance between the .257 Roberts and the 7mm Mausers.

M700 Classic - .257 Roberts Feeding Evaluation

Report No. 82 0502
-5-

PROCEDURE Continued

D. Ammunition

.257 Roberts

Rem. 117 gr.SP
Win. 117 gr.SP
Win. 100 gr. Silvertip

7mm Mauser (7x57)

Rem. 140 gr. PSP
Rem. 175 gr. SP
Fed. 139 gr. SP
Fed. 175 gr. SP
Win. 175 gr. SP

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A P P E N D I X A

(Malfunction Data)

M700 Classic - .257 Roberts Feeding Evaluation

Report No. 82 0502

TEST DATAA. Initial Testing

1. Test: Control jack feed - standard long action

Ammo: Dummy rounds

| <u>Gun No.</u> | <u>Rds. Cycled</u> | <u>Malf.</u> | <u>Position</u> | <u>Rate</u> | <u>Malf. Rate</u> |
|----------------|------------------------|--------------|-----------------|-------------|-----------------------|
| B6365190 | 225 | Override | Rear | Slow | |
| | | Stem Box | Middle | Medium | |
| | | Stem Box | Front | Slow | 2.7% |
| | | Stem Ramp | Front | Slow | |
| | | Stem Ramp | Front | Slow | |
| | | Override | Front | Slow | |
| B6367483 | 180 | Stem Left | Middle | Slow | |
| | | Stem Ramp | Rear | Fast | |
| | | Stem High | Front | Slow | |
| | | Stem Ramp | Middle | Slow | 3.2% |
| | | Stem Ramp | Front | Medium | |
| | | Stem Ramp | Front | Medium | |
| | | Stem Ramp | Middle | Fast | |

2. Test: Control jack feed - standard long action

Ammo: Rem. 117 gr. SP

| <u>Gun No.</u> | <u>Rds. Cycled</u> | <u>Malf.</u> | <u>Position</u> | <u>Rate</u> | <u>Malf. Rate</u> |
|----------------|------------------------|--------------|-----------------|-------------|-----------------------|
| B6367620 | 30 | | | | 0% |
| B6365151 | 30 | | | | 0% |
| B6365048 | 30 | | | | 0% |
| B6365144 | 30 | Stem Left | Front | Medium | 3.3% |
| B6365130 | 30 | | | | 0% |
| B6365168 | 30 | | | | 0% |
| B6367483 | 30 | | | | 0% |
| B6365190 | 30 | | | | 0% |
| B6365155 | 30 | | | | 0% |
| B6365158 | 30 | | | | 0% |
| Totals | 300 | | 1 | | 0.3% |

M700 Classic - .257 Roberts Feeding Evaluation Report No. 82 0502

TEST DATA
(Continued)

B. Design Changes

1. Test: Control jack feed - magazine spring test
 Ammo: Dummy rounds

| <u>Spring Thickness</u> | <u>Rounds Cycled</u> | <u>Malf.</u> | <u>Position</u> | <u>Rate</u> | <u>Malf. Rate</u> |
|-------------------------|----------------------|--------------|-----------------|-------------|-------------------|
| .021 in. | 80 (40/spg.) | Stem Box | Front | Medium | 5% |
| | | Stem Box | Front | Medium | |
| | | Stem Box | Front | Fast | |
| | | Stem Box | Varied | Varied | |
| .0185 in. | 80 (40/spg.) | Stem Box | Varied | Slow | 3.75% |
| | | Stem Box | Front | Medium | |
| | | Stem High | Front | Varied | |
| .0175 in. | 80 (40/spg.) | Stem Box | Front | Slow | 1.25% |

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