



JA
23-3

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY WEAPONS COMMAND
ROCK ISLAND ARSENAL
ROCK ISLAND, ILLINOIS 61201

IN REPLY REFER TO
AMSWE--QA

6 February 1969

SUBJECT: M16A1 Rifle Initial Production and Comparison Test Meeting at
USATECOM on 9 Jan 69

Commanding General
U. S. Army Test and Evaluation Command
ATTN: AMSTE-BC, Col C. J. Molloy Jr.
Aberdeen Proving Ground, Maryland 21005

1. Inclosed hereto are minutes of subject meeting.
2. In accordance with discussion and actions cited by representatives of respective Commands, it is assumed that actions cited in the minutes will be initiated in a prompt manner.
3. Conclusions cited in minutes are a reflection of the understanding of all personnel in attendance.

FOR THE COMMANDER:

1 Incl
as

C. A. MacLEOD
C. A. MacLEOD
Chairman, M16A1 Rifle Task Group
Quality Assurance Directorate

CF: w/incl
CG, U. S. Army Test & Evaluation Command
ATTN: AMSTE-BC, Mr. Crider
CO, Aberdeen Proving Ground ✓

ATTN: STEAP-MT-TI, Mr. Doilney
Mr. Michelson
Mr. Hankins
Mr. Wilson
Mr. Miller
Mr. Hendricks
Mr. Staley

CO, Rock Island Arsenal
ATTN: SWERI-QAT, Mr. Betts
Mr. Spears

Digitized by:

MINUTES OF MEETING - 9 January 1969

M16A1 RIFLE (INITIAL PRODUCTION TEST AND COMPARISON TEST)

1. Purpose. To discuss and review activities relating to the conduct of the M16A1 Rifle Initial Production Test, Comparison Test, and the Initial Production Test of the 30-Round Magazine.

2. Personnel in Attendance.

Mr. C. Crider	AMSTE--BC
Mr. S. Doilney	STEAP-MT-TI
Mr. I. Michelson	STEAP-MT-TI
Mr. A. R. Hankins	STEAP-MT-TI
Mr. A. Wilson	STEAP-MT-TI
Mr. F. Miller	STEAP-MT-TI
Mr. O. E. Hendricks	STEAP-MT-TI
Mr. L. E. Staley	STEAP-MT-TI
Mr. W. Betts	SWERI-QAT
Mr. D. Spears	SWERI-QAT
Mr. C. Pelcharsky	AMCFM-RS

3. Discussions. The agenda provided by AMSWE-QA letter dated 12 December 1968 to USATECOM was covered in detail with the following areas being of prime importance:

- a. A work schedule to be employed by Aberdeen Proving Ground is to be based on a 12-hour day, 5-day week with testing starting 15 January 1969.
- b. USATECOM reconfirmed release dates of 45 days for CONUS, 90 days for SEA and 120 days for completion to include test report.
- c. Test report was discussed regarding classification, and it was decided that if a coding system was used, classification was unnecessary.
- d. The possibility of contractor personnel witnessing the test was discussed, and it was agreed, that if possible, contractors should be discouraged, but if they request to witness the test, all three contractors should be scheduled to arrive at the same time for one or two days.
- e. Aberdeen Proving Ground stated that four test sites would be operating concurrently which will include the 30-Round Magazine Test.
- f. USATECOM's recommendations for change of the M16 Test Plans, both Initial Production and Comparison Test, were discussed with the following results:
 - (1) Targeting and accuracy testing would be changed from the first three weapons to the last seven weapons of each producer.
 - (2) Low Temperature Test would be changed in two areas; that is, the 600 round maintenance interval would be changed to the 1,000 round maintenance interval, and the rifle chamber conditions cited in TECOM proposal would be included.
 - (3) Dynamic Dust Test would be fired with the first three weapons of each producer.

(4) The Endurance Test would be conducted with the M3 Bipod attached for the first 2,000 rounds in accordance with SAPD. The 2,001 through 3,000 rounds would be fired with the M7 Bayonet attached in accordance with SAPD. The attitude firing would be fired from the 3,001 round through the 4,400 round. Balance of Endurance testing for 4,401 rounds through 10,000 rounds would be fired in accordance with the SAPD. The Accuracy, Velocity and Yaw requirements would be conducted on the first 50 rounds of each 2,000 round group; that is, the first 50 rounds after maintenance has been accomplished.

g. Question was raised regarding combat loading as to whether the first round fired should be a ball or tracer round. It was agreed that the first round would be a ball round; that is, four ball rounds would be fired prior to the first tracer round.

h. Aberdeen Proving Ground stated that ammunition for subject test was presently available on post in sufficient quantities.

i. Equipment Performance Reports (EPRs) were reviewed regarding the information to be placed on each form and the time frame by which EPRs are to be forwarded (72 hours), and the providing of photographs and sketches to accompany each EPR.

j. Test plans were reviewed for individual requirements with resulting agreement among everyone present that the plans were adequate for determining suitability for issue of the M16A1 Rifle. In addition, no further requirement was placed on USAWECOM for supplying additional equipment.

k. Twenty-Round Control Magazines for individual test in the 30-Round Magazine Initial Production Test were discussed, and agreement was delayed pending review by the Project Manager's office.

4. Conclusions.

a. Question regarding producers witnessing testing at Aberdeen Proving Ground will be resolved between the Project Manager and AMSWE-QA.

b. Headspace gages requested by Aberdeen Proving Ground in .001 increments will be checked for availability by USAWECOM. This information will be relayed to Aberdeen Proving Ground.

c. Test results from the three producers (coded) will be included in one final report with the exception of the 30-Round Magazine Initial Production Test which will be separate. Distribution of final report will be conducted by AMSWE-QA with the exception of the USATECOM distribution list which will be forwarded to AMSWE-QA by AMSTE-BC.

d. Mr. Allen Wilson, STEAP-MT-TI, will be the coordinator on Equipment Performance Reports and final test reports.


e. Hydra-matic Initial Production Test weapons and repair parts along with monthly endurance weapons are at Aberdeen Proving Ground.

f. It was agreed by all representatives present that AMSWE-QA would be the focal point for all test information.

g. AMSWE-QA would update the Initial Production Test and Comparison Test Plans of the M16A1 Rifle to conform with requirements of para 3f.

h. Project Manager's office and AMSWE-QA would inform Aberdeen Proving Ground on use of 20-Round Control Magazines in the 30-Round Initial Production Test.

i. It was determined that representatives in attendance were of common agreement on all aspects of the test program as a result of this meeting.



W. J. WALKER
Member, M16A1 Rifle Task Group
U. S. Army Weapons Command

2A
2B-4

7 January 1969
AMSWE-QA

M16A1 RIFLE - CONARC TEST

1. Test Objective: The purpose of this test is to determine the type of malfunctions and assignable causes encountered during troop firing new M16A1 Rifles from two new producers (H&R and GMC). The test is designed to develop data that AMC can use to evaluate the performance of the weapons produced by the new contractors when subjected to normal troop usage. It is not the intent of this test to compare one producer's weapons against the others, but to compare the weapons against a known standard. WECOM QA Representatives will participate as observers during this test program in order to promptly identify any existing or potential problem areas that require immediate corrective action. Feed back data resulting from this test will be utilized to supplement test results obtained during the Initial Production Tests as a basis for requesting conditional release to SEA.
2. Source of Data: Data will be observed and recorded at two (2) test sites to be selected by USCONARC.
3. Quantity of Weapons: Five hundred weapons will be available at each of the two test sites, as follows:
 - a. 250 - H&R
 - b. 250 - GMC
4. Round per Weapon: 1200 rounds per weapon using a ratio of 4 M193 Ball propellant to 1 M196 Tracer. (See Annex 2 for firing cycle)
5. Number of Firers: 100 firers will be required - each must have the capability of disassembly, reassembly and cleaning the weapon. Two orders of 50 men will be used.
6. Quantity of Ammunition:
 - a. 300 rds per weapon per day
 - b. 6000 rds M193 Ball will be required at each test site for Zeroing of Weapons.
 - c. 606,000 total rds (4 to 1 Ball/Tracer Mix) will be fired at each test site.
 - d. The following quantity and type of ammunition will be required at each test site:

486,000 rds M193 Ball Propellant
120,000 rds M196 Tracer
606,000 rds Total

e. All ammunition will be from the same lot and equally distributed between the two test sites.

7. CONARC Support: The following support will be required from CONARC at each test site:

a. Range facilities with a minimum of 50 firing points to be used to zero and test fire each weapon.

b. Range Support, Range Control and Safety personnel.

c. 100 firers - each with M16 experience. All firers must be available for duration of test. If practicable the same personnel should be available for the entire test.

d. Small Arms Ord Van with two (2) armorers.

e. Administrative support for range and troops (including mess at the range).

8. AMC Support: The following support will be provided by AMC at each of the test sites:

a. Ammunition
486,000 rds M193 ball propellant
120,000 rds M196 Tracer

b. 500 weapons - including BILLI

c. 150 extra sets of BILLI

d. Sufficient quantity of LSA, Borecleaner, patches, pipe cleaners, etc.

e. Serial numbers of weapons.

f. Shipping instructions for weapons upon completion of test.

g. Instructions for issuing and repackaging of weapons.

h. Data collectors, 4 plus team coordinator.

i. Spare parts.

9. Date of Test:

- a. 1st Test Site - 3-15 March 1969
- b. 2nd Test Site - 17-29 March 1969

NOTE: This time frame requires travel on Sunday by the AMC Team and firing on Saturday's.

10. Test Organization:

a. Weapons from each manufacturer will be kept separate. All weapons from one manufacturer will be test fired prior to issuing and testing weapons from the second manufacturer. Weapons will not be mixed during the test.

b. The 100 firers will be divided into two (2) firing orders and each individual will be issued two (2) weapons from each manufacturer.

c. Each weapon will be marked and assigned to the firers for the entire test. Weapons will be marked as follows: (on masking tape)

Firing Order	Weapon
1	A
1	B
2	C
2	D

NOTE: Each firer should print his name legibly on the tape.

d. Magazines furnished with each weapon will remain with weapon during the entire test and will be marked as follows:

A1	B1	C1	D1
A2	B2	C2	D2
A3	B3	C3	D3
A4	B4	C4	D4
A5	B5	C5	D5

- e. Weapons will be zeroed prior to firing.
- f. All firers will be under the control of the AMC Team.
- g. Weapons will be stored outside overnight at least once during the test.
- h. Weapons will be subjected to rough handling procedure (to be determined) and fired without cleaning.

i. Weapons will not be cleaned or disassembled after zeroing.

j. Armorers will maintain a record by Serial No of parts replaced. Parts broken or damaged will be tagged with weapon serial number for future evaluation.

k. Each weapon that malfunctions must be checked by a member of the AMC Team. The weapon will not be fired until the malfunction has been analyzed and its cause recorded. If it is necessary to replace broken or damaged parts or conduct an extensive inspection to determine assignable cause, any additional firing required on the weapon will be conducted at end of day.

l. Each magazine will be loaded with 20 rds in a ratio of 4:1.

11. Test Organization:

a. Weapons will be separated into two (2) groups (H&R and GMC).

b. H&R weapons will be tested 3-8 Mar 69 and 17-22 Mar 69.

c. GMC weapons will be tested 10-15 Mar 69 and 24-29 Mar 69.

d. The period 14-15 Mar will be utilized to thoroughly clean and repack weapons. (See Annex 1 for test schedule)

e. $\frac{1}{2}$ day will be utilized to zero weapon.

f. 100 firers - 2 orders - 50 each

g. Each firer will be issued 2 weapons from each manufacturer marked 1A, 1B and 2C, 2D.

12. Reporting:

a. AMC Team members will observe and record each malfunction and determine assignable cause.

b. Exact round on which malfunction occurred and type of firing will be recorded.

c. Indicate whether malfunction belongs in category I, II or III.

d. List parts failure.

e. Data will be recorded on AMSWE-Form 206 (see Annex 3).

f. Malfunction failure rate per 1000 rds will be determined.

ANNEX 1

TEST SCHEDULE

First Test Site:

- 3 March - Entrance interview and preparation for test.
- 4 March - AM - Preparation for test, brief firers.
PM - Zero H&R weapons, weapon will not be disassembled or cleaned.
- 5 March - Range Firing - Clean weapon at end of day's firing.
- 6 March - Range Firing - Weapon will be given rough handling w/o cleaning.
- 7 March - Range Firing - Clean weapon at end of day's firing.
- 8 March - Range Firing - Turn in for final cleaning and inspection, etc.
- 9 March - Sunday - No firing.
- 10 March - AM - Issue, inspect and zero GMC weapon (do not disassemble or clean after zeroing).
PM - Range Firing - Clean weapon at end of day's firing.
- 11 March - Range Firing - Weapons will be given rough handling w/o cleaning.
- 12 March - Range Firing - Clean weapon at end of day's firing.
- 13 March - Range Firing
- 14 March - AM - Range Firing
PM - Exit - Clean, inspect, repack weapons.
- 15 March - Continue cleaning, inspection and repacking.
- 16 March - Travel to second test site.
- 17-22 March - Repeat above schedule for 3-8 Mar.
- 24-28 March - Repeat above schedule for 10-14 Mar.
- 28-29 March - Clean, inspect and repack weapons.

ANNEX 2

RANGE PROCEDURE

1. A firing cycle will consist of 100 rounds from 5 magazines of 20 rds each. The firing sequence will be as follows:

Magazine No	Mode of Fire
1	Automatic (3-5 rd burst)
2	Automatic (1 burst 20 rds)
3	Semi-Autpmatic (1 rd every 4-6 seconds)
4	Automatic (3-5 rd burst)
5	Semi-Automatic (1 rd every 4-6 seconds)

2. Each firer will fire from the same point each day.

3. Each day's firing will consist of firing 300 rds. per weapon except the first day when 200 rounds will be fired per weapon. A normal day's firing will be as follows:

Order	Weapon	No of Cycles	Alotted Time
1	A	2 (100 rds ea)	1 hr
1	B	2 (100 rds ea)	1 hr
2	C	2 (100 rds ea)	1 hr
2	D	2 (100 rds ea)	1 hr
1	A	1 (100 rds ea)	30 min
1	B	1 (100 rds ea)	30 min
2	C	1 (100 rds ea)	30 min
2	D	1 (100 rds ea)	30 min

4. Remaining time will be allocated to cleaning up of range and preparation for next day's firing.

5. If possible, the above cycle may be accelerated.

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DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-BC

12 JUN 1969

SUBJECT: Report of Combined Initial Production and Inspection
Comparison Test of M16A1 Rifles, USATECOM Project
Nos. 8-9-0200-25 and 27

Commanding General, US Army Weapons Command, ATTN: AMSWE-QA,
Rock Island, Illinois 61201
Project Manager, Rifles, US Army Weapons Command, Rock Island,
Illinois 61201

1. References:

a. Letter, AMSTE-BC, dated 11 April 1969, subject: Initial
Production Retest of M16A1 Rifles Fabricated by Two New Producers,
USATECOM Project No. 8-9-0200-25.

b. Letter, AMSTE-BC, dated 24 April 1969, subject: Final Letter
Report on Initial Production Retest of M16A1 Rifles Fabricated by Two
New Producers, USATECOM Project No. 8-9-0200-25.

c. Message, AMSTE-BC, TEC 1344, dated 15 May 1969, subject:
Initial Production Test (IPT) of M16A1 Rifles Fabricated by Two New
Producers for Extreme Cold Temperature Subtest (minus 65°F).

2. Approval Statement: Subject report is approved.

3. Background of Test: An Initial Production Test of Rifles was
conducted using weapons fabricated by two new producers, General Motors
Corporation (GMC), Code A in report, and Harrington and Richardson
(H&R), Code B in report. Weapons fabricated by Colt (C) Firearms, Inc.,
Code C in report, were used for comparison purposes. Thirty-five
weapons were submitted for test from each producer. Due to problems
encountered, an additional 12 weapons from each producer were subjected
to a retest in the endurance phase only after resolution of certain
component inadequacies. References 1a and b forwarded comments of this
command concerning release of weapons based on the retest results but
excluding tests at low temperature extremes. To permit unrestricted
release, reference 1c forwarded a command position relative to
performance of subject weapons at minus 65°F.

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FOUO MARKING NO LONGER
APPLICABLE AFTER
9/2/00 (1969)

12 JUN 1969

AMSTE-BC

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4. Test Results:

a. Reference is made to attached Appendix I of Deficiencies and Shortcomings as encountered throughout the test:

(1) The deficiencies relating to chamber finish, incorrect chamber and bolt dimensions, from both H&R and Colt, a defective bolt catch casting from H&R, and dimensions of bolt catches from GM which caused excessive failures of bolts to remain rearward were referred to AMSTE-QA for corrective action. Similarly, excessive numbers of double-feed malfunctions with H&R and Colt weapons were encountered due to failure to meet bolt-lug dimensional requirements. Subsequent submission of 12 rifles from each producer as tested in the endurance phase retest, incorporated corrections to bolt lugs and catches and demonstrated acceptably improved performance.

(2) The deficiencies of bolt cracks at the cam-pin hole encountered with both H&R and GM weapons are considered as a fabrication inadequacy; Colt weapons were free of such defects. Although no effect on functioning resulted, low risk hazard potential is conceivable if actual separation occurs.

(3) The defective selector-lever castings in 11 of 35 of the original H&R rifles resulted in repetitive firing failures but this defect and its associated malfunctions were not evident in the second submission of rifles used in the endurance phase retest.

(4) The deficiency of improper staking of bolt-carrier key screws on 16 of 35 of the original weapons from H&R was not evident on the second group submission.

b. Shortcomings as noted in Appendix I were related to inadequate drawings and specifications or discrepancies in quality control and were distributed among all producers.

c. In the endurance phase retest at ambient temperature, weapons from the three producers demonstrated exceptionally low malfunction rates of less than one per thousand. Statistical analyses of the malfunction rates are contained in the report. At the temperature extreme of minus 65°F with weapons in initially clean condition, an average malfunction rate of 2.4 per thousand was obtained. If residue is allowed to freeze, malfunctions increase and weapons perform unacceptably; at these conditions, the average malfunction rates vary between 23.8 and 32.0 per thousand.

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AMSTE-BC

SUBJECT: Report of Combined Initial Production and Inspection
Comparison Test of M16A1 Rifles, USATECOM Project
Nos. 8-9-0200-25 and 27

5. Comments: Relative to performance at -65°F it is to be noted that the weapons used in this phase were from the originally received quantity of 35 from each producer. Notwithstanding, the malfunction rate from initially clean rifles was demonstrated as acceptably low and better than at higher temperatures. Several conjectures can be advanced as to why this was so:

a. Chance sampling variability.

b. Normal reduction of cyclic rates at -65°F which would be expected to make the weapon less susceptible, kinematically, to bolt-lug and bolt-catch caused malfunctions.

In either event, the corrective actions as incorporated in the endurance phase retest rifles are not conceived of as further degrading performance at -65°F since they primarily restore the weapons to expected quality. Conversely, it should not be presumed that malfunctions at -65°F will decrease with such corrected weapons, for the reasons stated above. (Additional data is being developed to fully explore the low temperature performance and kinematic sensitivity of the M16A1 Rifle as scheduled prior to this test, under the direction of PM, Rifles.)

6. Conclusion: All producers' weapons as finally tested were suitable for release to the field without temperature restrictions.

7. Recommendations:

a. Pertinent manuals reflect that the M16A1 Rifle is to be cleaned and lubricated immediately after firing at temperatures below plus 32°F . If combat conditions do not permit cleaning before freezing of residue occurs, a round is to be chambered and the bolt closed immediately after firing. Thereafter, three or more rounds should be fired before expecting reliable performance.

b. A production engineering study be initiated with respect to interrelation of dimensions and shape of bolt lugs and bolt catches, and the role of magazine springs and followers in causing both "failures of bolts to remain rearward" and "double feeds".

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12 JUN 1969


ANSTE-RC

SUBJECT: Report of Combined Initial Production and Inspection
Comparison Test of M16A1 Rifles, USATECOM Project
Nos. 8-9-0200-25 and 27

c. The findings of subject report with reference to various aspects of quality control and/or parts fabrication be the subject of prompt corrective action.

FOR THE COMMANDER:

1 Incl
Subj Rept (WECOM, 20 cys;
PM Rifles, 10 Cys)


WILLIAM H. HUBBARD
Colonel, GS
Deputy Chief of Staff

Copies furnished:

CG USAMC ATTN: AMCPMSO-RS (5 cys)
AMCQA (1 cy)
DA OORD ATTN: CRDPES (1 cy)
USACDC LO, USATECOM (12 cys)
USMC LO, USATECOM (1 cy)
CO APG ATTN: STEAP-MT-TI
(w/o incl)

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APPENDIX I

1. Deficiencies

Deficiencies keyed to report paragraphs were as follows:

a. Following initial inspection at APG, and a subsequent inspection at Rock Island Arsenal, the withdrawal from test by AMSWE-QA of two H&R rifles and six Colt rifles due to improper chamber finish and incorrect chamber and bolt dimensions was rated as a separate deficiency in each instance (ref par. 2.2.5a).

b. The improper staking of bolt-carrier key screws on one H&R rifle was rated as a deficiency as the weapon was rendered inoperable during firing and required repair at the direct- and general-support level. It was also observed that bolt-carrier screws on 15 other H&R rifles were improperly staked and did not meet the inspection requirements of item 47 of SAPD-253F, reference 13 (ref pars. 2.2.4.2 and 2.6.4).

c. A defective bolt-catch casting found in one GM rifle was rated as a deficiency as requested by AMSTE-BC in Reference 4 (ref par. 2.2.5a).

d. Due to excessive numbers of failures of the bolt to remain to the rear in the initial endurance test, 39 occurrences within the first 6000 rounds on four GM rifles, these repetitive failures were classed as a production deficiency^e (ref par. 2.4.4).

e. Due to excessive numbers of double-feed malfunctions in the initial endurance test, 42 and 67 occurrences within the first 6000 rounds with four H&R and four Colt rifles respectively, these repetitive failures were classed as production deficiencies^e against both producers (ref par. 2.4.4).

f. In six instances, rifle bolts were found to be cracked at the cam pin-hole position after 6000 rounds or less of firing, three with the GM rifle bolts, and three with H&R bolts. As complete bolt separation is considered potentially hazardous and has occurred in tests at Rock Island Arsenal, these failures were classed as production deficiencies against both producers (ref pars. 2.4.5.2, 2.6.4, 2.7.4.1, and 2.9.5.4).

g. Defective selector-level castings were found in 11 of the original 35 H&R rifles. The defective selectors resulted in repetitive firing failures and the problem was classed as a producer deficiency as requested by AMSWE-QA in Reference 5 (ref par. 2.4.5.2).

^eSubsequent production rifles were tested in an endurance retest (par. 2.9) and demonstrated much improved performance for all producers; however, it is not known to what extent corrective action has been taken on the large numbers of earlier production rifles.

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h. The over-all performance of all M16A1 rifles at low temperature (-65^o) was unsatisfactory as evidenced by the following malfunction rates (malfunctions per 1000 rounds fired):

- (1) GM, 31.3
- (2) H&R, 23.8
- (3) Colt, 32.0

This level of performance is classed as an inherent deficiency of the present rifle-ammunition system and appears to be independent of variables which might be attributable to different production techniques or production sources. It should be emphasized, however, that exposure to these environmental conditions alone does not significantly degrade initial (clean) weapon performance. With weapons cleaned and lubricated prior to a minimum of six hours of low-temperature exposure, a malfunction rate of 2.4 per 1000 rounds fired was obtained during 49 initial 100-round cycles. The malfunction rate increased progressively and drastically as repeated cycles of firing were attempted without maintenance and with 2 hour conditioning periods between cycles. Such a schedule results in freezing of mechanism fouling which has accumulated on the cycling components and firing is often reinitiated only with great difficulty (ref par. 2.7.4).

2. Shortcomings

Shortcomings were as follows:

- a. Automatic sear-assembly pins in GM rifles failed to meet, or only marginally met, requirements for proper depth of taper which resulted, in some instances, in damage to the automatic sear assembly^a (ref par. 2.2.4.1).
- b. Improper swedging of bolt cam-pin holes on two H&R rifles is a shortcoming as this failure permits inadvertent reversed assembly (ref par. 2.2.4.2).
- c. Defective and damaged extractor springs were received from the H&R contractor; this was rated as a shortcoming as many of the springs could not be used as spare parts (ref par. 2.2.4.2).
- d. Failure of a rivet on the magazine floor-plate retaining clip and a defective magazine spring were encountered with two Colt magazines respectively in less than the minimum-life requirement of 250 rounds (ref pars. 2.4.4.3 and 2.9.5.4).

^aIt is understood that drawing specifications were to be changed to reduce the possibility of recurrence of this problem.

^bIt is the opinion of the test agency that certain targeting requirements of SAPD-253F are unrealistically stringent (ref par. 2.3.5c).

e. Excessive trigger pull (above 8.5 lbs) was noted with one GM, three H&R and one Colt rifle (ref par. 2.2.4).

f. One GM and two Colt rifles exceeded the initial cyclic rate requirement of 900 rounds per minute, however, no cyclic rate failures were recorded in either the endurance test or the endurance retest (ref par. 2.2.4).

g. The targeting requirements of SAPD-253F (reference 13) were not met by two GM and one Colt rifle, however, dispersion results with all rifles were judged to be acceptable (ref par. 2.3.4).

h. Three GM extractor springs failed the minimum-life requirement of 2000 rounds. In addition, 19 other GM extractor springs broke beyond the minimum-life period, demonstrating much less durability than H&R or Colt springs. It appeared that the end coils were ground too "thin" as the end coils often split prior to actual spring breakage (ref pars. 2.4.5.2 and 2.9.5.4).

i. Bolt-lug cracks were detected by magnaglow inspection prior to 6000 rounds with the majority of the rifle bolts examined. While this failure, as observed in this test, is judged not to be hazardous, the problem appears to be due to improper machining of bolt-lug fillets and the practice should be corrected (ref pars. 2.4.5.2, 2.7.4, and 2.9.4).

j. In many instances, inspection and measurement of the configuration of bolt lugs and bolt catches revealed that drawing requirements were not met. These are extremely serious shortcomings as the proper configuration of both of these components is critical if reliable functioning is to be obtained (ref par. 2.9.4).

k. Broken bolt rings occurred in three Colt rifles in less than 3000 rounds. Although the effect on functioning of a broken bolt ring, or rings, has not been fully evaluated, this component is considered a critical one and failure prior to 6000 rounds is not permitted in SAPD-253F (ref par. 2.9.5.4).

l. One defective trigger and trigger spring were found in one GM rifle, which resulted in trigger return failures during firing (ref par. 2.9.5.4).