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GUN TESTING MANUAL

Ilion Research Division  
Remington Arms Company, Inc.,  
Ilion, New York

PLAINTIFF'S  
EXHIBIT

3120

AL 0023826

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Prepared by: C. J. Kirchen  
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Gun Test #1  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## PROOF FIRING TEST

### INTRODUCTION:

With the exception of .22 Cal. rifles, every gun should be proof tested before any other ammunition is fired. This is to insure the safety of the arm. As the name implies, a "proof" load is purposely higher pressure than any standard load of the same caliber. (See S.A.A.M.I. manual for specifications.) If the gun and case withstands this higher pressure, the gun is assumed to be safe for normal shooting.

*Test Range*  
(In the Ilion plant all proof firing is done in the plant gallery where proper safeguards are taken to avoid injury should the arm fail.) Take the gun to the foreman of ~~Commercial Gallery~~ and verbally request the number of proof rounds to be fired. If desired, this proof firing will be done in the presence of the person making the request provided the requestor is equipped with suitable ear plugs. Ammunition will be supplied by the foreman or from the Technical Division supply maintained in the gallery for that purpose. After proof firing, the gun will be stamped with a proof mark by gallery personnel. The mark used on a particular gun should be recorded in the test notebook.

### CONDITIONS OF TEST:

The steps by which a proof test is made are:

1. Check barrel of each gun for possible obstruction.
2. Check caliber or gage of each gun.
3. Place gun in proof fixture with muzzle in port hole, weight on the muzzle and stock in jack.
4. Put safe "on".
5. Load gun with proof shell.
6. Close action with loading port away from the face when gun is in fixture with safe still on.
7. Attach hook to trigger.
8. Throw "safe" off.
9. Pull down boiler plate cover.
10. Move to outside of proof booth, pulling safety door outward.
11. Pull lanyard to fire.
12. Empty case must be out of gun before gun is removed from fixture.
13. Check for live ammunition - Chamber must be empty and follower visible.
14. Check barrel for possible obstructions.
15. Stamp barrel with proof stamp and mark bolt indicating proofing.

STANDARD TEST QUANTITY: One.

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For Special .001" Increment Head Space Gages (continued)

3. Place smallest head space gage in chamber with clearance flats in proper position.
4. Close bolt carefully.
5. Continue testing with larger head space gages until one is found which will permit the bolt to close but which will cause a slight feel. NOTE: Do not force bolt closed.
6. Record dimension of gage found in Step 5.

For S.A.A.M.I. "Go" - "No Go" Head space Gages:

1. CAUTION: Handle all head space gages with care.
2. Clean and wipe dry: chamber, bolt face, and breeching system surfaces.
3. Place "Go" head space gage in chamber with clearance flats in proper position.
4. Close bolt carefully. NOTE: The bolt must close on the "Go" head space gage.
5. Remove "Go" head space gage from gun.
6. Place "No Go" head space gage in chamber with clearance flats in proper position.
7. Close bolt carefully. NOTE: The bolt must not close on the "No Go" head space gage.

Accuracy may be affected by the following items:

1. Ammunition
2. Shooter
3. Gun
4. Range Conditions

A quantitative test of accuracy should consider each one of these variables and steps should be taken to evaluate the effect of each. This test is qualitative only, hence only a few of the above variables are considered.

CONDITIONS OF TEST

1. Use a 10 power telescope equipped with fine cross hairs.
2. Fire all shots from a bench rest.
3. Clean barrel.
4. Fire three fouling shots.
5. Fire five ten-shot groups.
6. Rate of fire should approximate one per minute.
7. Fire Mann barrel accuracy in same manner except for 1 and 2. In order to reduce the effect of ammunition variables, Mann barrel accuracy is obtained on each lot of ammunition used for accuracy testing.
8. Record bullet weight, type and lot number of ammunition.
9. Measure and record extreme vertical spread.
10. Measure and record extreme horizontal spread.
11. Determine mean radius for each target.
12. Calculate:

$$\frac{\text{Mean Radius (Mann)}}{\text{Mean Radius (Test)}} \times 100 = \% \text{ Mann Barrel Accuracy}$$

13. The following ammunition is to be used in the calibers noted:

- |                            |                              |
|----------------------------|------------------------------|
| (a) .300 Savage            | 180 grain Soft Point         |
| (b) .30 Remington          | 170 grain Soft Point         |
| (c) .270 Winchester        | 150 grain Soft Point         |
| (d) .35 Remington          | 200 grain Soft Point         |
| (e) .30/40                 | 180 grain Soft Point         |
| (f) .300 H&H Magnum        | 220 grain Soft Point         |
| (g) .32/20                 | 100 grain Soft Point         |
| (h) .22 Hornet             | 45 grain Soft Point          |
| (i) .32 Winchester Spec.   | 170 grain Soft Point         |
| (j) .257 Remington Roberts | 117 grain Soft Point         |
| (k) .30/06                 | 220 grain Soft Point         |
| (l) .243                   | 100 grain Soft Point         |
| (m) 7mm Remington          | 175 grain Pointed Soft Point |
| (n) .222 Remington         | 50 grain Soft Point          |
| (o) 6mm Remington          | 100 grain Pointed Soft Point |
| (p) 22-250 Remington       | 55 grain Pointed Soft Point  |
| (q) 30-30 Winchester       | 170 grain Soft Point         |
| (r) .308 Winchester        | 180 grain Pointed Soft Point |
| (s) 44 Remington Mag.      | 240 grain Soft Point         |
| (t) .223 Remington         | 55 grain Soft Point          |

Accuracy Test (Qualitative) Continued

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(u) .350 Remington Mag. 200 grain Pointed Soft Point  
(v) 6.5 Remington Mag. 120 grain Pointed Soft Point  
(w) .300 Winchester Mag. 180 grain Soft Point  
(x) .264 Winchester Mag. 140 grain Soft Point  
(y) 7.62 NATO 168 grain Soft Point  
(z) .280 Remington 165 grain Soft Point  
(aa) .221 Remington Fireball 50 grain Soft Point  
(bb) .22 L. Rifle 40 grain Soft Point

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Prepared by: H.C. Moss  
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Gun Test #5  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

### STABILITY OF CENTER OF IMPACT

Stability of center of impact is important in a sporting arm because it is extremely desirable to have a gun which will place different weight bullets in approximately the same location on a target. This test is designed to determine the difference in center of impact between the ammunition selected for accuracy shooting and ammunition of a different bullet weight.

### CONDITIONS OF TEST

All firing is done according to Accuracy Test (Qualitative) except as noted below:

1. Fire 5 shots without sighting on target to warm gun.
2. Fire 5 shots at one target with ammunition noted in Accuracy Test.
3. Mark holes in target to designate bullet weight.
4. Fire 5 shots at same target with different weight of bullet.
5. Mark holes.
6. Locate center of impact of each group.
7. Determine distance between the two centers of impact and record.

### STANDARD TEST QUANTITY

15 Rounds	5 warm up
	5 accuracy cartridges
	5 cartridges of different bullet weight

This test may be repeated as many times as necessary to cover each bullet weight normally manufactured in the caliber being tested.

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Gun Test #6  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## TRIGGER PULL TEST

### INTRODUCTION

Trigger pull is important because of the part it plays in firing the gun and the effect this may have on accuracy. The trigger mechanism should be of such design and construction that the trigger pull will remain substantially constant.

To perform the test it is necessary to place gun in a holder to keep the gun stationary in a horizontal position. The reading is measured with a special trigger pull scale. The maximum reading is marked on the trigger pull scale with a slider device. The trigger pull scale should be in such a position as to have line or pull pass the comb of the stock. See original sketch. Trigger pull is defined as the average of ten (10) tests.

### CONDITIONS OF TEST

1. Clear and check for ammunition.
2. Place gun in holder.
3. Close and cock gun.
4. Release safety device.
5. Move slider to zero position on trigger pull scale.
6. Insert trigger pull scale on trigger and pull on scale slowly till firing pin is released.
7. Read scale value as marked by slider device.
8. Perform this test a total of ten (10) times.
9. Calculate and record average.

### STANDARD TEST QUANTITY

One determination.

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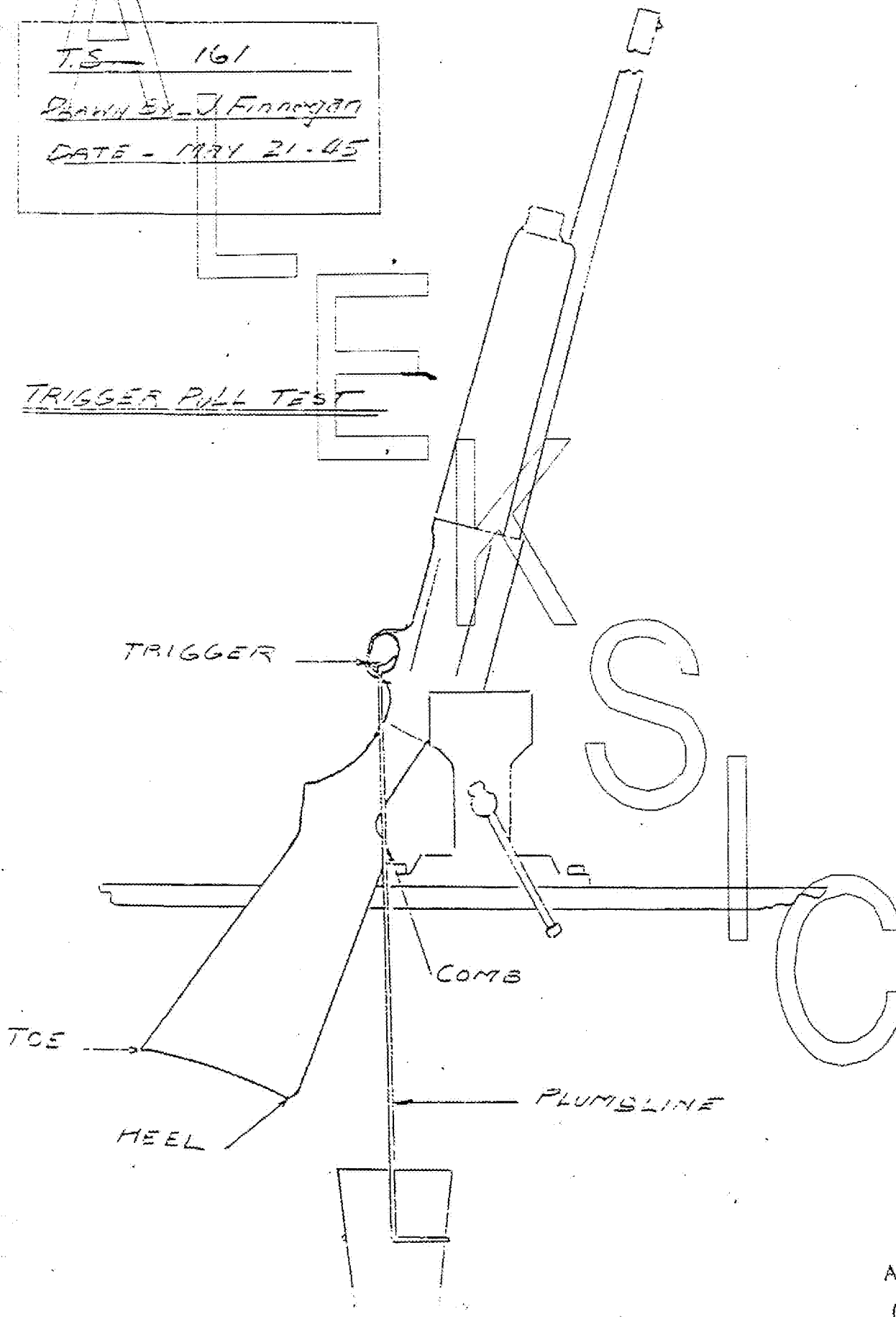


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DRAWN BY - J. Finnegan

DATE - MAY 21-45

TRIGGER PULL TEST



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Gun Test #7  
Uses: 1. Bolt Action High  
Power Rifle  
2. .22 Cal. Autoloading  
Rifle

## INTERCHANGEABILITY TEST

### INTRODUCTION:

Interchangeability of parts is important and desirable for a number of reasons:

- a. Reduction of assembly costs.
- b. Simplification of service.

The optimum condition is that all parts of each model be interchangeable with a corresponding part of the same model.

For .22 Cal. Autoloading Rifles, only certain parts are subject to interchangeability, and the criterion of success or failure is the Standard Live Fire Test only.

### CONDITIONS OF TEST:

For high power rifle:

1. Perform following tests on all guns selected for interchange.
  - a. Headspace
  - b. Trigger Pull
  - c. Bolt Lift
  - d. Firing Pin Protrusion and Indentation
  - e. Safety Mechanism
  - f. Accuracy
  - g. Standard Live Firing
2. Disassemble each gun with the exception of barrel-receiver assembly. Serial numbers on the receiver will be used for reference.
3. Place all like components in one container.
4. Mix thoroughly.
5. Reassemble by random selection of parts.

6. Record any difficulty encountered in assembling the guns. Since the object of this test is to accumulate data having considerable relation to the fundamental design and manufacture of guns, it is imperative that each minute detail as to why a component is not interchangeable be recorded.
7. After the guns are reassembled, repeat tests made in 1.

For .22 Cal. Autoloading Rifles

1. This test involves parts to be specified by the Design Unit.
2. Subject each gun to Standard Live Fire Test.
3. Disassemble guns insofar as is necessary to obtain parts to be used in the test. Serial numbers on the receiver will be used for reference.
4. For each single gun, keep all components not used in the interchange in a single container numbered to correspond with receiver serial number.
5. Place all like components to be interchanged in one container.
6. Mix thoroughly.
7. Reassemble guns by random selection of parts.
8. Record any difficulty encountered in assembling the guns. Since the object of this test is to accumulate data having considerable relation to the fundamental design and manufacture of guns, it is imperative that each minute detail as to why a component is not interchangeable be recorded.
9. After the guns are reassembled, subject each gun to Standard Live Fire Test.
10. Compare results of Standard Live Fire Test before and after interchange.

STANDARD TEST QUANTITY: Ten guns.

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Gun Test #7A

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

INTERCHANGEABILITY TEST

INTRODUCTION

This test is performed for the same reasons as Gun Test #7. It differs from #7 in that only certain parts are subject to interchangeability and the criterion of success or failure is Standard Live Fire Test only.

CONDITIONS OF TEST

1. This test involves parts to be specified by the Design Unit.
2. Subject each gun to Standard Live Fire Test.
3. Disassemble guns insofar as is necessary to obtain parts to be used in the test. Serial numbers on the receiver will be used for reference.
4. For each single gun, keep all components not used in the interchange in a single container numbered to correspond with receiver serial number.
5. Place all like components to be interchanged in one container.
6. Mix thoroughly.
7. Reassemble guns by random selection of parts.
8. Record any difficulty encountered in assembling the guns. Since the object of this test is to accumulate data having considerable relation to the fundamental design and manufacture of guns, it is imperative that each minute detail as to why a component is not interchanged be recorded.
9. After the guns are reassembled, subject each gun to Standard Live Fire Test.
10. Compare results of Standard Live Fire Test before and after interchange.

STANDARD TEST QUANTITY: Ten guns.

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Gun Test #8  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## FIRING PIN PROTRUSION & INDENTATION TEST

### INTRODUCTION

Firing pin protrusion and indentation are important in attaining and maintaining accuracy in center fire rifles. This is due primarily to the manner in which ignition of the primer is produced.

Protrusion is the distance the firing pin protrudes beyond the face of the bolt when the firing pin is in the forward position.

Indentation is the depth of an impression made by the firing pin in a standard copper crusher cylinder when the pin is released normally. Indentation is a measure of the work performed on the primer by the firing pin. To perform the test, an adapter is required to hold the crusher cylinder in the particular caliber being tested. The head of the crusher cylinder is somewhat deformed by the test as it tends to become basin-like when done with the M/121. Care must be taken in establishing a reference point on the head for comparison with the indentation.

### CONDITIONS OF TEST

#### 1. Protrusion

- a. Remove bolt from gun.
- b. Release or push firing pin to forward position.
- c. Measure distance from face of bolt to tip of firing pin with depth callipers reading to .001".
- d. Perform this test five times and record average.

#### 2. Indentation

- a. Place standard copper crusher cylinder (see SAAMI for Specifications) in adapter for particular caliber being tested; .22 cal. cylinders need no adapter.
- b. Place adapter in chamber.
- c. Hold muzzle of gun down.
- d. Close bolt (breech block in M/121, taking care action is completely closed by holding muzzle against a clean, solid surface and pushing the slide action forward).

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2. Indentation (Continued)

- e. Pull trigger.
- f. Remove crusher.
- g. Measure depth of impression with dial gage equipped with pointer and reading to .001". Reference point is the center of the flanged head of the crusher cylinder.
- h. Perform this test five times and record average.

STANDARD TEST QUANTITY

One determination; i.e., average of five tests.

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Gun Test #9

Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

SAFETY MECHANISM SHOCK TEST

INTRODUCTION

A common source of accidents with firearms is accidental discharge. A safety mechanism is provided to insure against accidental discharge. This test is intended to determine how much shock, if any, will cause the safety mechanism to fail to function properly and allow the gun to be discharged.

CONDITIONS OF TEST:

This test is made by allowing the gun to fall freely a distance of 10 inches upon a solid wood surface with the safety "on". The following positions are used:

1. Butt down
2. Muzzle down
3. Top side down
4. Bottom side down

The trigger shall be tried after each of the above tests to determine whether the safety has released any mechanism which may allow firing.

This test is always made using dummy cartridges and should be conducted very carefully.

STANDARD TEST QUANTITY:

One determination.

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Gun Test #10

Uses: 1. Bolt Action Center  
Fire Rifles  
2. Bolt Action Shotguns  
3. Bolt Action Rim Fire  
Rifles

BOLT OPENING TEST

INTRODUCTION

This test is made at intervals during live fire testing to determine the force required to open the bolt. The force is applied at center of the bolt handle knob. The average of fifty tests at any stage of testing is defined as bolt lift.

CONDITIONS OF TEST

- a. Place gun in spring actuated recoil fixture.
- b. Place one cartridge in chamber.
- c. Fire.
- d. Support the right hand as it pulls on the spring scale to lift the bolt, with the left fore-arm, the left elbow resting near the comb of the stock.
- e. Perform this test 50 times; record average and standard deviation of the 50 trials.

DEVELOPMENT

Fixture, Spring Scale with special attachment to fit the handle ball.

STANDARD TEST QUANTITY

One determination.

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Gun Test #10A

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

BOLT OPENING TEST

INTRODUCTION

It is the purpose of this test to determine the force necessary to open the bolt. Bolt opening force is significant because it is necessary to open manually the bolt of each gun at least once in clearing the gun of ammunition. This force must be sufficiently large to avoid accidental opening of the bolt, but not so large as to make this a competitive disadvantage of the gun. Bolt opening is defined as the average of ten (10) tests made in manner described below.

CONDITIONS OF TEST

1. Check and clear gun of all ammunition.
2. Place the gun in the fixture designed for this test.
3. Cock the gun and close the bolt.
4. Measure force required to open bolt of the gun.
5. Perform this test ten (10) times.
6. Calculate and record the average.
7. Repeat the test ten (10) times with the firing pin in a released position; calculate and record average.

STANDARD TEST QUANTITY

One determination.

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Gun Test #11  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## TAKEDOWN INSPECTION TEST

### INTRODUCTION

There occur at times throughout a test, defects in the mechanism which may or may not be serious and are not readily detected from operation or firing but are of considerable importance in making a logical evaluation of the arm.

Some defects of this type may be:

1. Loosening of action in stock unnoticeable by feel but quite obvious from a measurement of guard screw tightness.
2. Improper bedding in stock.
3. Movement or binding in magazine.
4. Loose pins and screws.
5. Broken parts.
6. Excessively worn parts.

### CONDITIONS OF TEST

1. Test pins, screws, and fasteners during disassembly for tightness.
2. Test guard screws with a scale screw driver.
3. Clean, inspect and record any and all details no matter how trivial.

Prepared by: H.C. Mose  
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Gun Test #12

- Uses: 1. Manual Action Center  
Fire Rifles  
2. Manual Action Shotguns  
3. Manual Action Rim Fire  
Rifles

STANDARD LIVE FIRING TEST

INTRODUCTION:

Live ammunition is fired in guns under test to observe the function of both the gun and ammunition and to evaluate certain characteristics of the gun. The characteristics of components, new or unused in design, material, method of production, heat treatment and assembly procedures are obviously pertinent.

CONDITIONS OF TEST:

1. Normal lubrication. All parts shall be thoroughly oiled with Remington Oil, the excess removed by wiping with a clean soft cloth.
2. Only a single type of ammunition, by one manufacturer and as uniform as commercially practicable, shall be used.
3. The shooting to be done by or under close observation of a single individual.
4. Shooting shall be done with gun in a horizontal position, muzzle in shooting port, stock in spring-loaded rest.
5. Rate of firing - one shot each ten seconds until magazine is empty. After thirty consecutive shots at this rate, the barrel shall be cooled before further firing.
6. Method of cooling - remove gun from shooting port and pour water, or air cool, using hose provided for this purpose until barrel is cool.
7. The magazine shall be filled and all shots fired after being fed from the magazine. Before beginning each magazineful, the safety shall be placed in "on" position, trigger tried, safety released and gun fired.
8. The function of both gun and ammunition shall be recorded with particular attention being given to such malfunctions as:
  - a. Failure to extract

- b. Failure to eject  
c. Failure to fire  
d. Extraction difficulties apparent in stiff bolt opening.  
e. Failure to feed from magazine  
f. Difficult loading of magazine  
g. Changes in trigger pull  
h. Changes in bolt operation  
i. Changes in feel in closing bolt  
j. Changes in safety operation  
k. Blown primers  
l. Sticking or sluggish firing pin  
m. Any function which may be specified or particularly important

The occurrence of any malfunction, that is, at the round it was noticed shall be recorded, since this test is performed to determine the number of rounds which may be fired without malfunction. Any unusual occurrence is of interest and must be recorded or the person conducting the test notified verbally. The cause of a malfunction shall be ascertained and recorded.

STANDARD TEST QUANTITY: 200

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Gun Test #12A

- Uses: 1. Autoloading Center  
Fire Rifles  
2. Autoloading Shotguns  
3. Autoloading Rim Fire  
Rifles

STANDARD LIVE FIRING TEST

INTRODUCTION:

This test is performed for the same reasons as Test #12. It differs from Test #12 in that it covers autoloading firearms. The functional characteristics of which differ considerably from manual action firearms.

CONDITIONS OF TEST:

1. Light lubrication. In assembling gun, wash parts in a mixture of one part Rem Oil and one part Varnolene or equivalent.
2. Only a single type of ammunition, by one manufacturer, and as uniform as commercially practicable, shall be used.
3. The shooting to be done by, or under close observation of a single individual.
4. Shooting shall be done with gun in a horizontal position, muzzle in shooting port, stock in spring loaded rest.
5. If the gun is equipped with a deflector and unless otherwise specified, all shooting is to be done with deflector in place.
6. The magazine shall be filled, and all shots fired after being fed from magazine. The gun shall be cocked at the start of each magazineful by pulling the bolt handle back with the grooved composition bar available for this purpose in the shooting pit. Before beginning each magazineful, the safety shall be placed in "on" position, trigger tried, safety released and gun fired.
7. The function of both gun and ammunition shall be recorded, with particular attention being given to such malfunctions as:
  - a. Failure to feed up
  - b. Failure of the bolt to close
  - c. Gun misfire
  - d. Cartridge misfire

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- e. Hangfire
- f. Failure to cock
- g. Failure of the trigger to disengage the sear
- h. Failure to feed back
- i. Failure to feed into the chamber
- j. Failure to eject
- k. Split cartridge heads
- l. Difficult loading of magazine
- m. Changes in trigger pull
- n. Changes in bolt operation
- o. Changes in safety operation
- p. Sticking or sluggish firing pin
- q. Any function which may be specified or particularly important

Any unusual occurrence is of interest and must be recorded or the person conducting the test notified verbally. The cause of a malfunction shall be ascertained and recorded.

Eleven malfunctions are described in detail below in order that consistency in identifying malfunctions will result when shooting is done by various individuals. Seven of these malfunctions occur under identical conditions. Hence, extreme care should be exercised in order that correct identification of the malfunctions which exist can be made. The seven are as follows.

1. Failure to feed up
2. Failure of bolt to close
3. Gun misfire
4. Cartridge misfire
5. Cartridge hangfire
6. Failure to cock
7. Failure of trigger to disengage sear

Caution: When one of these malfunctions occurs, it is necessary to wait two minutes before opening the bolt. This will insure against injury in case the malfunction is a cartridge hangfire.

1. Failure to feed up

Definition - No cartridge gets into the chamber during a normal sequence of trigger and firing pin actions.

Failure to feed up (continued)

Decription - On pulling the trigger, the firing pin is released but the gun does not fire. The bolt is seated against the chamber. When the bolt is open, no cartridge is ejected nor is there one in the chamber. Later examination shows at least one cartridge in the magazine.

Procedure - Push the bolt forward; if no motion is felt, open the bolt. If no cartridge is in the chamber and at least one is in the magazine, the malfunction is failure to feed up. If none feeds, remove the deflector and see if the magazine follower can be seen. A cartridge must come from the magazine to resume shooting. Attach the deflector before resuming shooting.

2. Failure of the bolt to close

Definition - The bolt does not seat against the chamber.

Description - On pulling the trigger, the gun does not fire even if the firing pin is released. The bolt may be apparently seated against the chamber but actually is not.

Procedure - Push the bolt forward; if the bolt moves, the malfunction is failure of the bolt to close. To continue firing, pull the trigger.

3. Gun Misfire

Definition - The indentation in the cartridge head is not sufficient to fire a cartridge of normal primer sensitivity.

Description - On pulling the trigger, the gun does not fire even though the firing pin is released. The bolt is seated against the chamber.

Procedure - Push the bolt forward; if it does not move, open the bolt. If a cartridge is ejected, measure the depth of the indentation on the rim relative to the center of the head. If the indentation is .010" or less, the malfunction is a gun misfire. To continue firing, pull back the bolt and release it.

4. Cartridge Misfire

Definition - The indentation in the cartridge head is sufficient to fire a cartridge of normal primer sensitivity.

Description - On pulling the trigger, the gun does not fire even though the firing pin is released. The bolt is seated against the chamber.

Procedure - Push the bolt forward; if it does not move, open the bolt. If a cartridge is ejected, measure the depth of indentation on the rim relative to the center of the head. If it is more than .010", the malfunction is a cartridge misfire.

5. Cartridge Hangfire

Definition - Firing occurs only after a lapse of time from pulling the trigger.

Description - On pulling the trigger, the gun does not fire even though the firing pin is released. The bolt is seated against the chamber.

Procedure - If the gun fires without pulling the trigger again (and before the bolt is opened), the malfunction is a hangfire. To continue firing, pull the trigger.

6. Failure to Cock

Definition - The bolt does not go back far enough to cock the trigger.

Description - Full movement of the trigger does not fire the gun.

Procedure - Push the bolt forward; if it does not move and full trigger action does not fire the gun, open the bolt manually and close it to resume firing. If the gun fails to cock because of a weak cartridge explosion, the malfunction is not chargeable to the gun.



7. Failure of trigger to disengage sear

Definition - The trigger does not slip off the sear so that the firing pin is released.

Description - The trigger can be pulled slightly but it does not result in complete action as it does not slip off the sear.

Procedure - Push the bolt forward; if it does not move, and the trigger does not have complete action, attempt to fire the gun by repeatedly pulling the trigger to cause it to slip off the sear. If the malfunction persists, carefully open the bolt and remove the cartridge from the chamber. The gun is a safety hazard and should be carefully checked.

8. Failure to Feed Back

Definition - The cartridge from the magazine fails to travel back as far as is necessary to be lifted into the loading position.

Description - The nose of the carrier is held down by the cartridge and the bolt is jammed in a rearward position. A spent cartridge may or may not be in front of the bolt. The bolt will not move forward or backward. A live cartridge is jammed against the insert by pressure of the carrier.

Procedure - If a live cartridge is jammed against the insert, it is necessary to force the live cartridge rearward with a screwdriver until the bolt releases. If another malfunction occurs with this same cartridge, do not charge it against the gun.

9. Failure to Feed into Chamber

Definition - The cartridge head does not seat against the chamber.

Description - The bolt jams in its forward movement, but can be moved rearward. The cartridge is tilted so that it is not aligned with the chamber, preventing its feeding completely into the chamber.

Failure to Feed into Chamber (continued)

Procedure - If a live cartridge has not seated properly in the chamber, move the bolt rearward. With a screwdriver, adjust the cartridge so that it is in alignment with the chamber. To continue firing, close the bolt. If the cartridge can't be aligned, remove it and feed another cartridge into the chamber.

10. Failure to Eject

Definition - The bolt is partially open and a spent cartridge is between the bolt and the chamber.

Description - The gun is cocked but fails to function on pulling the trigger. The bolt is free to move rearward. A new cartridge may be part way into the chamber. The spent cartridge may be jammed between the bolt and the chamber for one of the following reasons:

- a. Failure to eject - gun malfunction
- b. Weak cartridge explosion not driving the bolt far back enough - cartridge malfunction.
- c. Very loud cartridge explosion causing a blown cartridge head - cartridge malfunction.

Procedure - If a cartridge case has not been ejected, move the bolt rearward about 1/4", tilt to allow the fired case to fall out, then close the bolt.

11. Split Cartridge Head

Definition - A crack in the metal occurs as a consequence of firing.

Description - Noticeably louder cartridge explosions are heard. Examination of the spent cartridge reveals a split in the head. If several of these show splits at different points relative to the firing pin indentation, the malfunction is chargeable to the ammunition. If the splits do not vary in their position relative to the firing pin indentation, careful examination of the bolt should be made to determine whether the malfunction is chargeable to the gun.

Split Cartridge Head (continued)

Procedure -

Continue firing, bearing in mind that variations in the strength of explosions are indications of variation in cartridge quality and hence are valuable clues in the identification of malfunctions. Excessively loud explosions may result in failure to eject, as covered in (10) above, chargeable to the ammunition.

STANDARD TEST QUANTITY: 200

Prepared by: H.C. Moss  
Compiled: 10/10/44 - 2 Pages  
Revised: 5/22/45 - 1 Page  
Revised: 1/9/69 - 2 Pages

Gun Test #13  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## STANDARD DRY FIRING TEST WITH DUMMY AMMUNITION

### INTRODUCTION:

Dry firing is done to determine the useful life of some component parts of the gun, without incurring the cost of firing live ammunition. The results, if viewed with caution, may permit satisfactory evaluation of certain characteristics peculiar to the gun.

Dry firing should produce wear on all parts except the barrel comparable with live firing and is primarily useful in determining the durability of the gun mechanism.

### CONDITIONS OF TEST:

1. Lubrication is normal.
2. Place gun in fixture to support gun during testing.
3. Load magazine to capacity with dummy rounds.
4. Move bolt through a normal cycle to load chamber, pull trigger, open bolt to extract and eject round.
5. Place safety on, try trigger, move safety to off position and reload magazine for another cycle.

It is desirable to have this test run by as many individuals as practicable in that each has a different technique, thereby offering greater possibility for disclosing a peculiarity of the gun, since one person operating the gun is likely to acquire a certain "know how" and fail to notice some defects.

In time, dummy ammunition wears and is unfit for further service. Care should be exercised in reporting malfunctions without first determining definitely whether the gun or dummies are at fault.

The rate of operation is relatively unimportant and may be done as fast as desirable, however, a complete cycle in 1.5 seconds is suggested.

AL 0023856

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Prepared by: H.C. Moss  
Compiled: 10/10/44 - 2 Pages  
Revised: 2/15/45 - 1 Page  
Revised: 11/19/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #15

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

WET AND DUST TEST

INTRODUCTION:

This test, with live ammunition and with dummies, is for the purpose of determining the action of the gun under severe field usage.

The dusting and wetting appear extreme, but since the test must, of necessity, be accelerated it seems desirable to approach the most extreme condition conceivable.

CONDITIONS OF TEST:

With the exception noted below, this test is conducted in a manner identical with that described under Standard Live Firing Test and Standard Dry Firing Test with Dummies.

1. Fill magazine only with ammunition.  
Caution: Do not load chamber.
2. Spray water over gun. Wet all parts.
3. Place gun in dust chamber immediately.
4. Dust for 15 minutes with bolt closed. Use two pounds of mixture of 50% "Silocel" powder and 50% of 100 mesh fire clay each time gun is tested.
5. Remove gun and clean inside of barrel thoroughly.
6. Rub off excess dust with hand.
7. Gun is ready for testing.

STANDARD TEST QUANTITY: 50

AL 0023859

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Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
Revised: 2/15/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #16

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

NO LUBRICATION TEST

INTRODUCTION:

This test is performed with (1) live ammunition (2) dummy ammunition (3) no ammunition, for the purpose of properly evaluating the operating characteristics of a gun which is improperly lubricated.

A large number of guns used are improperly lubricated, either through negligence or ignorance of the operator, and it is desirable to have information concerning the amount of abuse the gun may take and still function satisfactory.

Rougher or stiffer operation than that of a properly lubrication arm is anticipated; but on the other hand the gun is expected to function properly. It is possible, but not probable, excessive wear will occur on some areas of the mechanism. Therefore, areas of wear or binding should be located and reported. It is conceivable that the gun may fail entirely and not function at all, in which case the purpose of this test has been fulfilled.

With the previously mentioned points in view, the test shall be conducted in a manner identical to that prescribed under the following tests, with the exceptions noted below: (1) Standard Live Firing (2) Standard Dry Firing with Dummies (3) Standard Dry Firing without Dummies.

CONDITIONS OF TEST:

1. Disassemble arm.
2. Wash parts thoroughly in clean Varnolene
3. Reassemble the arm

STANDARD TEST QUANTITY:

1. Live Fire - 200
2. Dry Fire with Dummies - 1,000
3. Dry Fire without Dummies - 3,000

AL 0023860

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Prepared by: H.C. Moss  
Compiled: 10/10/44 - 2 Pages  
Revised: 2/14/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #17  
Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## COLD TEST

### INTRODUCTION:

This test is performed with live ammunition for the purpose of determining the gun's functional characteristics at low temperatures. A temperature of  $-20^{\circ}\text{F}$  is possible with existing equipment and this temperature appears satisfactory for this test. It is felt that this temperature approaches conditions encountered in actual service.

At times, failures to fire will be observed and in this case, close scrutiny is necessary to determine whether the failure may be attributed to the ammunition or to a defect inherent in the gun. It is very desirable to make this determination accurately. No cooling will be necessary in this test as the rate of fire is reduced to approximately one per minute with longer intervals for reloading.

### CONDITIONS OF TEST:

With the exception of lubrication, this test will be conducted in a manner identical with that prescribed in Standard Live Firing Tests and the same observations made and recorded.

1. The gun mechanism is lubricated with Hoppes in the following manner:
  - a. Disassemble gun
  - b. Clean all parts with Varnolene or equivalent
  - c. Oil very lightly with Hoppes Oil
  - d. Reassemble after lubricating gun
2. Cool gun and ammunition to  $-20^{\circ}\text{F}$
3. Fire from cooling chamber to avoid condensation accumulating and freezing or temperature changes

STANDARD TEST QUANTITY: 200

Prepared by: A.A. Hugick  
Compiled: 1/9/69 - 1 Page

Gun Test #17A

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

### COLD TEST

#### INTRODUCTION:

This test is performed with live ammunition for the purpose of determining the gun's functional characteristics at low temperature with the gun in an iced condition. A temperature of  $-20^{\circ}\text{F}$  is possible with existing equipment and this temperature appears satisfactory for this test. It is felt that this temperature approaches conditions encountered in actual service.

At times, failures to fire will be observed and in this case, close scrutiny is necessary to determine whether the failure may be attributed to the ammunition or to a defect inherent in the gun. It is very desirable to make this determination accurately. No cooling will be necessary in this test as the rate of fire is reduced to approximately one per minute with longer intervals for reloading.

#### CONDITIONS OF TEST:

With the exception of lubrication, this test will be conducted in a manner identical with that prescribed in Standard Live Firing Tests and the same observations made and recorded.

1. The gun mechanism is lubricated with Hoppes in the following manner:
  - a. Disassemble gun.
  - b. Clean all parts with Varmolene or equivalent.
  - c. Oil very lightly with Hoppes Oil.
  - d. Reassemble after lubricating gun.
2. Cool gun and ammunition to  $-20^{\circ}\text{F}$ .
3. Spray gun with hose to produce the gun to become covered with ice.
4. Fire in iced condition.

STANDARD TEST QUANTITY: 200

AL 0023862

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Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
Revised: 2/15/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #18

Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## FIELD TEST

### INTRODUCTION:

This test is conducted with live ammunition to determine to what extent the arm will function under conditions encountered in the field. Sawdust is used to contaminate the gun, it being a fair substitute for weed seeds and miscellaneous debris which accumulate within a gun's mechanism over a period of time.

### CONDITIONS OF TEST:

1. The sawdust shall be graded to pass 60 mesh and be retained on 150 mesh standard screen size.
2. Spray the gun thoroughly with water.
3. Place the assembled gun, magazine only loaded, action closed, in the dust chamber.

Caution: Do not move the cartridge from magazine to chamber until muzzle of gun is through shooting port.

4. Dust with the graded sawdust for 15 minutes using approximately 1 lb. of sawdust.
5. Allow the gun in this condition to stand for 30 minutes.
6. Clean inside of barrel thoroughly.
7. Firing shall be done in the manner specified under Standard Live Firing Test.

Any and all malfunctions or unusual functional characteristics shall be recorded.

STANDARD TEST QUANTITY: 200

AL 0023863

330f 54

Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
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Revised: 12/29/45 - 1 Page

Gun Test #19

Uses: 1. Bolt Action High  
Power Rifles  
2. Shotguns

### OILED CASE TEST

#### INTRODUCTION:

This test is to determine the effect of excessive oil in the chamber. When a round is fired with oil on the case, the pressure on the bolt face is increased because sidewall friction is reduced.

#### CONDITIONS OF TEST:

Consider all rounds fired as though they were proof charges and conduct the firing in manner described under Proof Firing Test.

1. Dip standard or proof ammunition in Rem Oil to within one-half inch of rim. For shotguns, Nitro Express is standard.
2. Wipe off excess oil with bare hand.
3. Round is ready to fire.
4. On firing, note effect as indicated by excessive pressures, blown primers, etc.

#### STANDARD TEST QUANTITY:

Standard ammunition - 10 rounds.

Proof ammunition - 1 round.

AL 0023864

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Prepared by: C.J. Kirchen  
Compiled: 10/10/44 - 1 Page  
Revised: 2/15/45 - 1 Page  
Revised: 1/2/46 - 2 Pages  
Revised: 1/9/69 - 2 Pages

Gun Test #20

Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## DEFECTIVE AMMUNITION TEST

### INTRODUCTION:

This test is designed to determine the effect on the gun of defective ammunition such as burst heads, punctured primers, and split cases or bodies. Although the test described for defective primers makes use of a defective firing pin, this test is meant to show the effect of defective primers or excessive pressure. It is desirable to have some indication of the path, or direction escaping gases may take in the event of case or body, or primer casualties.

Defective ammunition is prepared as follows:

#### A. Center Fire Rifles

1. Burst Head
  - (a) Select factory primed case
  - (b) Saw, with fine tooth saw through a section of the head in a direction parallel to the long axis of the case, being careful not to saw into the primer.
  - (c) Hand load to factory specification
2. Split Case
  - (a) Select factory primed case
  - (b) Saw a slot through the case shoulder about 1/2" long in a direction of approximately 30° with the longitudinal axis, being careful not to saw through the neck.
  - (c) Hand load to factory specification
3. A punctured primer is accomplished by using a firing pin, .010" smaller in diameter than specified and .020" longer on the end which strikes the primer.

#### B. Shotguns

1. Burst Head: File, with fine triangular file, through the cylindrical section of the head in a direction parallel to the long axis of the shell so that the underlying paper is exposed.

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B. Shotgun (Continued)

2. Split body: Split the body on one side with a knife for distance of 1/2" from the mouth of the shell.

3. Punctured primer: Same procedure as for the rifles.

C. Rim Fire Rifles

1. Burst Head

(a) Select factory primed case.

(b) File the case rim O.D. of head sufficiently to weaken the base head at the rim.

(c) Hand load to factory specifications.

2. Split Body

(a) Select a factory loaded round.

(b) File the case body O.D. on one side of case sufficiently to produce splitting on firing.

CONDITIONS OF TEST:

1. Consider all firing as proof testing. See Proof Firing Test for details.
2. Place defective ammunition in chamber and carefully close bolt.
3. Completely surround the action with white paper in order that the port from which gas escapes may be located and the intensity of gas escape may be determined.
4. Fire the gun.
5. Remove the paper carefully. Be sure to note location of paper on gun.
6. Record the place and intensity of gas escape.
7. Record any signs of erosion on bolt or receiver.
8. Inspect extractor after recording extraction and ejection action.
9. There will, in all probability, be some peculiar circumstance which is not mentioned here. Therefore, it is necessary to examine the arm thoroughly both before opening the bolt and afterward:

STANDARD TEST QUANTITY: 10 rounds for each type of defect.

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Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
Revised: 2/15/45 - 1 Page  
Revised: 12/19/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #21

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

COMPETITIVE AMMUNITION TEST

This test with live ammunition is to determine the functional characteristics of competitive ammunition in the test gun. As many different makes should be tested as possible. To yield the most information, accuracy and endurance should be tested. The tests are performed in the manner described under:

1. Accuracy Test (Qualitative); for rifles only
2. Standard Live Firing Test

STANDARD TEST QUANTITY:

Accuracy - 53  
Standard Live Fire - 200

Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
Revised: 5/22/45 - 1 Page

Gun Test #22  
Uses: 1. Bolt Action High  
Power Rifle  
2. Shotguns

## SAFETY MECHANISM FUNCTION TEST

### INTRODUCTION:

This test is to determine if the gun will fire when the trigger is held back with the safety "on" when the bolt is closed sharply.

### CONDITIONS OF TEST:

1. Insert primed round in chamber.
2. Move Safety to "on" position.
3. Hold trigger down.
4. Close bolt sharply.

STANDARD TEST QUANTITY: 10 determinations.

Prepared by: H.C. Moss  
Compiled: 10/10/44 - 1 Page  
Revised: 5/1/45 - 1 Page

Gun Test #23  
Uses: 1. Bolt Action High  
Power Rifles

## BOLT LUG SHEAR TEST

### INTRODUCTION:

This test is to determine what will happen to the gun and to the shooter if for any reason the bolt locking lugs shear in service. Most bolt action rifles are designed so that if lug failure occurs, a second locking area absorbs the pressure and protects the shooter. This test is meant to measure the effectiveness of this secondary locking means.

### CONDITIONS OF TEST:

Consider all rounds fired as though they were proof charges and conduct firing in manner described under Proof Firing Test.

1. Soft, low strength lugs.
  - A. Make bolt head of X-1112 steel and do not heat treat.
  - B. Fire proof ammunition.
  - C. Fire service ammunition.
  - D. Note effect of secondary locking area in stopping or diverting bolt.
2. Hard, brittle lugs.
  - A. Make bolt head of 4140 steel and heat treat as follows:
    - a. Cyanide Harden, 1600°F, 30 minutes.
    - b. Oil Quench
    - c. Do not temper
    - d. Record Rockwell C
  - B. Fire proof ammunition.
  - C. Fire service ammunition.
  - D. Note effect of secondary locking area in stopping or diverting bolt.

STANDARD TEST QUANTITY: Three bolt heads of each material.  
Proof ammunition - 1 round.  
Service ammunition - 1 to 10 rounds.

AL 0023869

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Prepared by: C.J. Kirchen  
Compiled: 4/30/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #24  
Uses: 1. Shotguns Only

## OUTDOORS LIVE FIRING TEST

### INTRODUCTION:

This test is performed for the same reasons as Test #12 and #12A. It differs in that firing is done other than horizontally, the only permissible way with plant facilities. It is apparent that consumers will find frequent reasons to fire below and above horizontal position.

### CONDITIONS OF TEST:

These are the same as those for Test #12A except for Condition 4. Replace it by the following:

Shooting shall be done  $20^{\circ}$  -  $30^{\circ}$  below horizontal and  $60^{\circ}$  -  $80^{\circ}$  above horizontal, the standard test quantity specified in Test #12 to be used in each case.

Caution: As the shooting is out-of-doors, every safety precaution should be taken.

Note: No rifle slug ammunition will be fired in this test.

AL 0023870

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Prepared by: C.J. Kirchen  
Compiled: 6/12/45 - 1 Page  
Revised: 7/19/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #25

Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## SAFETY SEAR MECHANISM TEST

### INTRODUCTION:

The ~~safety sear~~ mechanism is designed to prevent the gun from being discharged by pulling the trigger if the bolt is displaced from the normal firing position. A gun which will discharge under this condition is a safety hazard.

It is the purpose of this test to determine how much displacement of the bolt from the normal firing position is necessary before the safety sear mechanism will prevent the trigger from being pulled. The test is performed with an adjustable head space gage, a two-inch micrometer, and a screwdriver for "setting" the gage.

### CONDITIONS OF TEST:

1. With the screwdriver, adjust the head space gage so that the movable portion is flush with, or recessed from the head of the gage.
2. Measure the length of the head space with a micrometer.
3. Adjust the movable section of the gage so that it protrudes beyond the head of the gage.
4. Measure the overall length of the gage to the end of the movable section.
5. Determine the amount of protrusion from: (4) - (2).
6. Insert the gage in the chamber of the gun.
7. Close the bolt. Caution: Release the bolt carefully to avoid chipping the hardened surface of the work gage.
8. Pull the trigger. If it releases, take the gage out of the chamber and increase the protrusion of the center section. Repeat steps 5 - 8 until the trigger does not release. Record (1) the protrusion which prevents the trigger from releasing, and (2) the protrusion .001" less than that of (1) such that the trigger does release.

STANDARD TEST QUANTITY: One determination.

AL 0023871

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Prepared by: R.H. Grace  
Compiled: 8/29/45 - 1 Page

Gun Test #26  
Uses: 1. M/500 Series  
.22 Cal. Rifles

## TAKE DOWN SCREW SHOCK TEST

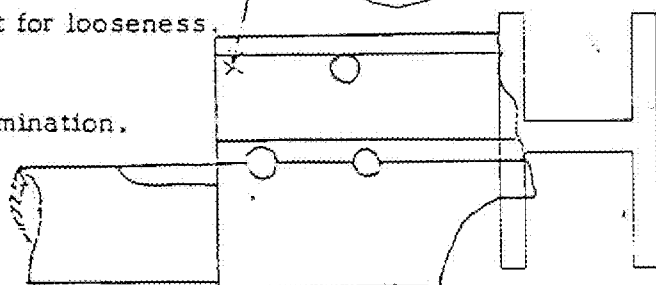
### INTRODUCTION:

This test is meant to simulate the conditions in which a gun is temporarily leaning against a chair, table, or in a corner and accidentally falls, striking against some other object. It applies particularly to guns having a single take down screw. It was developed for the 500 series open bottom receiver to test the reliability of the construction to maintain a tight joint between barrel and receiver.

### CONDITIONS OF TEST:

1. Measure and record width of receiver at area adjacent to take down screw hole. Micrometers. See sketch.
2. Check barrel and receiver joint for looseness.
3. Pivoting the gun on the toe of the stock, raise the muzzle one foot above a solid wood block. Allow the gun to fall freely so that the muzzle strikes the wood block. Perform a total of five times.
4. Measure and record width of receiver.
5. Check barrel and receiver joint for looseness.
6. Pivoting the gun on the heel of the stock, raise the front end of the receiver one foot above a solid wood block. Allow the gun to fall freely so that the receiver strikes the wood block. Perform a total of five times.
7. Measure and record width of receiver.
8. Check barrel and receiver joint for looseness.

STANDARD TEST QUANTITY: One determination.



Prepared by: C.J. Kirchen  
Compiled: 11/12/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #27

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

JAR OFF TEST

INTRODUCTION:

A common source of accidents with firearms is accidental discharge. A safety mechanism is provided to insure against accidental discharge. This test is designed to determine how much shock, if any, will cause the gun to be discharged when the safety mechanism is "off".

CONDITIONS OF TEST:

This test is made by allowing the gun to fall freely a distance of 10 inches upon a solid wood surface with the safety "off". The following positions are used:

1. Butt down
2. Muzzle down
3. Top side down
4. Bottom side down

The trigger shall be tried after each of the above tests to determine whether the safety has released any mechanism which may allow firing.

This test is always made using dummy cartridges and should be conducted very carefully.

STANDARD TEST QUANTITY: One determination.

Prepared by: C.J. Kirchen  
Compiled: 11/13/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #28

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

FOLLOW DOWN TEST

INTRODUCTION:

This test is to determine if the gun will fire when the trigger is held back and the action is allowed to close.

CONDITIONS OF TEST:

1. Insert live round in chamber and dummy round in magazine.
2. Close bolt.
3. Fire gun. Hold trigger back through complete reloading cycle. (On pump type, close action sharply.)
4. Check to see that barrel is not plugged.
5. Record number of blanks which fire in reloading cycles.

STANDARD TEST QUANTITY:

- |    |              |
|----|--------------|
| 10 | Live Rounds  |
| 10 | Dummy Rounds |

Prepared by: C.J. Kirchen  
Compiled: 11/14/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #29

- Uses: 1. Bolt Action Center  
Fire Rifles  
2. Bolt Action Rim Fire  
Rifles

## BOLT STOP RELEASE TEST

### INTRODUCTION:

This test is designed to determine the efficiency of the bolt stop release during any concurrent firing test of a gun equipped with this device. The test is unique in that it is performed at specified points of some firing test being conducted at the time.

### CONDITIONS OF TEST:

1. A firing test is to be made.
2. Shoot a magazineful of cartridges according to the conditions prescribed for the firing test being made.
3. Determine whether the bolt can be removed without operating the bolt stop release.
4. Position the bolt so it does not engage the bolt stop; operate the bolt stop release with the left hand and remove the bolt with the right hand.
5. Remove finger from the bolt stop release, and replace the bolt.
6. Check to see that the bolt can engage the bolt stop.
7. Record the number of times:
  - a. The bolt could be removed without operating the bolt stop release.
  - b. The bolt could not be removed when operating the bolt stop release.
  - c. The bolt was removed when operating the bolt stop release.

STANDARD TEST QUANTITY: One determination.

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AL 0023875

A

ACCEPTANCE TABLES  
HOW MUCH SHOOTING

42-38861-7

We frequently run into the problem of the amount of shooting necessary in gallery inspection of firearms or in their development to determine whether a design change improves gun function. An answer to this is presented in the "Acceptance Tables" on the following pages.

The "Acceptance Tables" are based on data obtained in testing programs of the M/121\*, M/241\*\*, and the M/550\*\*\*. The pertinent data from these tests for an acceptance table for any model are:

- a. The overall percentage of malfunctions for all guns tested of a given model.
- b. The malfunction record of the poorest gun tested of the given model.

In addition, it is necessary to choose risks of rejecting a good gun and of accepting a poor gun. These have been chosen as one in twenty in each case. It must be kept in mind that the "Acceptance Tables" depend on items a and b above and on the one in twenty risks. If it becomes known that these have or should be changed, a review of the tables must be made before they are used for acceptance or rejection purposes.

An acceptance table is given in two parts:

- a. The maximum number of malfunctions which may occur in a certain number of rounds fired, to result in acceptance.
- b. The minimum number of malfunctions which may occur in a certain number of rounds fired to result in rejection.

Prepared by: C.J. Kirchen  
Compiled: 11/20/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #30

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## EMERGENCY POSITION LIVE FIRING TEST

### INTRODUCTION:

This test is performed for the same reasons as Test #12 and #12A. It differs in that firing is done with the gun in other than normal position. While these positions may be considered extreme, it is desired to know whether mere position is an important factor in gun operation.

### CONDITIONS OF TEST:

These are the same as those for Test #12, except for Condition 4. Replace it by the following:

Change the position of the spring loaded rest so that when the stock is in position, the trigger guard is:

1. In Normal position.
2. On the right ( $90^{\circ}$  from normal).
3. On the upper side ( $180^{\circ}$  from normal).
4. On the left ( $270^{\circ}$  from normal).

### STANDARD TEST QUANTITY:

200 Rounds (50 in each position)

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Prepared by: C.J. Kirchen  
Compiled: 11/30/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #31

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

## SAFETY OPERATION TEST

### INTRODUCTION:

The importance of the safety in the avoidance of accidents with firearms needs no emphasis, but assurance that the safety will function perfectly when "on" is absolutely mandatory. This test is designed to provide a routine which will test the safety mechanism.

### CONDITIONS OF TEST:

1. Insert dummy round in chamber.
2. Put safety mechanism in "on" position.
3. Pull trigger, with greater than normal trigger pull force.
4. Move the safety to the "off" position.
5. Pull trigger.
6. Record if firing pin was released in Step No. 3.
7. Reload if firing pin was released in Step No. 4.

### STANDARD TEST QUANTITY:

200 Cycles.

AL 0023882

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Prepared by: C.J. Kirchen  
Compiled: 12/4/45 - 1 Page  
Revised: 1/9/69 - 1 Page

Gun Test #32

- Uses: 1. Center Fire Rifles  
2. Shotguns  
3. Rim Fire Rifles

FOLLOW UP TEST

INTRODUCTION:

This test is designed to determine whether a live round in the chamber of a cocked gun can be removed without firing the gun. For reasons of safety, primed cases are specified, and they serve the purpose of live rounds.

CONDITIONS OF TEST:

1. Place the muzzle of the firearm in the port of the shooting pit, with the stock in the spring loaded rest.
2. Feed a primed case into the chamber.
3. Cock the gun if this was not done in Step #2 above.
4. Remove the case. Note whether or not the case was fired in removing.

STANDARD TEST QUANTITY:

50 Cycles.

AL 0023883

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Prepared by: H.C. Moss  
Compiled: 1/14/46 - 3 Pages

Gun Test #33  
Uses: 1. Rifles  
2. Shotguns

## GUN FURNITURE TEST

### INTRODUCTION:

Considerable care is taken to process gun furniture in a manner which will insure maximum dimensional stability as well as a pleasing appearance. Relatively small dimensional changes may effect materially both the appearance and function of certain guns, the effect on proper function being more pronounced in autoloading and slide-action guns.

Since the effect of dimensional instability of gun furniture is very well known, it then is desirable to know the magnitude and location of dimensional change which may be reasonably expected and tolerated. Therefore, these tests are primarily concerned with the amount of dimensional change to be expected under certain severe climatic conditions and the effect of such changes on gun function.

The tests are designed to determine generally, the practicability of moulded plywood gun furniture and specifically the assembled M/760 fore-end shell and tip. It has been assumed that no perceptible dimensional change will be found in the moulded plastic fore-end tip, but some warpage is expected of the plywood shell when the assembly is subjected to extreme climatic conditions. The fore-end shall be in a condition identical with that which is normally used on the finished gun and shall include regular production type sanding, filling, touch up, lacquer, checkering, if any, and inspection.

Items of particular interest and those which shall be recorded are:

1. Dimensional changes - in determining dimensional changes, it is, of course, necessary to measure carefully certain parts of the fore-end before and after each test. The locations of of these measurements should be recorded so that measurements can be made in same places before and after testing.
  - a. Thickness variation of shell material. This shall determine any swelling or shrinkage of the plywood.
  - b. Deviation of sides from a longitudinal axis. This shall determine warp, bending or buckling of local areas or the whole part. This is determined with a surface plate and a square.

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2. General Appearance

- a. Splitting of the laminated layer.
- b. Buckling of some areas.
- c. Local discoloration.
- d. Loosening of plywood where it joins the plastic tip.

- 3. For purposes of comparison, the fore-ends for the M/121, M/31, M/11 and Sportsman, and M/141 shall be subjected to tests A, B, C, D and E at the same time and in the same manner as for the plywood fore-end.
- 4. Satisfactory performance shall be determined for the model under consideration.

CONDITIONS OF TEST:

A. Extremes of Humidity

- 1. Dip fore-end in tap water at room temperature for 3 minutes.
- 2. Withough drying, place fore-end in an atmosphere of 30 to 40 percent humidity at 110 to 135°F temperature for one (1) hour.
- 3. Measure and record dimensional change at once.
- 4. Repeat 1, 2, and 3 once.
- 5. After fore-end has come to room condition, repeat 3.

B. Extremes of Temperature

- 1. Dip fore-end in tap water for three (3) minutes.
- 2. With all the water which will adhere to the piece, subject to 0 - 30°F temperature for one (1) hour.
- 3. Measure and record dimensional change.
- 4. Repeat 1, 2 and 3 once.
- 5. Allow fore-end to come to room condition, repeat 3.

C. Localized Heat (To simulate a place near a stove)

- 1. Subject fore-end to 0- 30°F temperature for one (1) hour.
- 2. Apply dry heat (250°F) to one side only.
- 3. Measure and record dimensions, paying particular attention to warpage and appearance.
- 4. Allow fore-end to come to room condition, repeat 3.

D. Extreme Wear Test

1. Scrub the outside surface of the fore-end with fine sand (thru 65 mesh screen) and water in order to wear thru the lacquer in spots and also to wet thoroughly the worn areas.
2. With the fore-end wet, subject to 0 - 30°F temperature for one (1) hour.
3. Remove from freezing atmosphere and place in oven at 110°F,  $\pm 10^\circ\text{F}$  for one (1) hour.
4. Measure and record dimensional changes.
5. Allow fore-end to come to room condition, repeat 4.

E. Simulating lengthy storage then use.

1. Place in oven at 130 - 135°F at 30 - 40 percent humidity for seven (7) days.
2. Expose fore-end to saturated steam for one (1) hour.
3. Record dimensional changes.
4. Allow fore-end to come to room condition, repeat 3.

STANDARD TEST QUANTITY:

Ten (10) pieces, two for each test.

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Compiled: 2/18/46 - 1 Page

Gun Test #34  
Uses: 1. 12 Ga. Pump  
Shotgun

### HEAVY FORE END TEST

#### INTRODUCTION:

This test employs a heavy fore-end in the form of a metal block to replace the standard one. Use of this heavy fore-end accelerates breakdown on the Action Bar Assembly so that the endurance of the assembly can be determined with fewer rounds than when the standard fore-end is in use.

- Equipment:
1. 8 lb. 2 oz. metal block, described in TS-271
  2. Nitro Express shot/shell, 12 Ga. 2 3/4" long; powder charge: 3 3/4 drams equivalent; shot charge: 7.5 chill, 1 1/4 oz.

#### CONDITIONS OF TEST:

1. Take pump shotgun and heavy fore-end to the foreman of shotgun assembly to have standard fore-end replaced by the heavy fore-end.
2. Follow Standard Live Firing Test #12, except for Standard Test Quantity.

#### STANDARD TEST QUANTITY:

Sufficient rounds to cause binding or breakdown or action bar and/or Action Bar Assembly.

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