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315 WEST RING ROAD  
ELIZABETHTOWN, KY 42701

# **M/710 Trial & Pilot**

## **Test Plan**

### **Model 710, New Centerfire Rifle**

(Caliber - .270)

## **Revision # 2**

02/05/01

**TLW 0407**

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## **M/710 CENTERFIRE RIFLE TRIAL & PILOT TEST PLAN**

### **Introduction:**

This test is designed with the assumption that a production run of at least 150 rifles will be produced by the Mayfield plant using all available production processes intended for use in manufacturing this model. Thirty (30) rifles will be selected at random from the sample lot of 150 for use as Trial & Pilot evaluation samples.

The sample of 30 rifles will be divided into 3 groups of 10 rifles each; A1-A10, A11-A20 and A21 to A30. All rifles, A1-A30, will be used initially for visual and packaging evaluation, which will be done on site. Rifles A11-A20 will be used for measurements and A21-A30 will be used for initial accuracy using a high quality 36X scope to establish the baseline accuracy of the rifle.

All 30 rifles will be shot, 10 rounds each, as a safety precaution with a lanyard prior to the continuation of any live fire testing if Mayfield does the initial headspace and proof testing. After completion of the 10 round lanyard test, each rifle will be shot using 100 rounds of Remington ammunition, (5 types of 20 rounds each type), using the Remington jack (heavy configuration) to establish the basic product malfunction rate.

Rifles A1-A10 will then be shot, in the jack, an additional 400 rounds each using a variety of Remington and major competitor's ammunition to evaluate malfunction rates, magazine box endurance and reliability and other wear and breakage characteristics.

Rifles A11-A20 will be used as samples for Environmental Testing and Abuse Testing.

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## **Initial Tests, Measurements and Inspections:**

### **VISUAL EXAMINATION, PACKAGING AUDIT AND PACKAGING TEST - TLW0407A THROUGH TLW0407C:**

#### **TLW0407A / TLW0407B – Visual Examination & Packing Material Audit**

A visual examination will be made of all 30 sample rifles prior to the start of any additional testing, measurement or inspection. After the visual examination permanent labels will be affixed to each test sample using the designations A1-A30.

The following will be specifically noted:

- ISS Key – present
- Serial Numbers
- Cosmetic Marks
- Bolt Stop Release freedom
- Trigger Position will be noted
- Presence of Bent Triggers
- Proof and Magnaflux Stamps present

Packaging will be audited, as the firearms are unpacked. Each shipping box will be examined for:

- Match of Serial Number on Rifle to that on the box end label and owner's manual package.
- Check the inventory of all required paperwork, owner's manuals, etc.
- Box examination for presence of tears in the cardboard, crushing, stains, box inserts, etc.

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**TLW0407C – Packaging Test**

This section of the test will be an intentional abuse of the product while in the shipping carton. The sample firearm will be packaged according to ship level criteria and dropped from a height of four feet onto a tile floor. The external packaging material will be examined for damage and then the packaging will be opened. Interior packing material integrity will be examined and assessed for damage. The firearm will be removed from the packaging and examined for damage, nicks, or other cosmetic degradation. This sequence will be repeated six times using new packaging material for each sequence and each time the product is dropped it will be on a different side so during the course of the test each of the six sides will be tested. The firearm product itself may be repaired or replaced as necessary to permit the test to continue. This portion of the test will be considered informational only as the test attempts to simulate the effects of the product being pushed from the back of a tractor-trailer and allowed to fall to the ground. This would be considered a worst-case packaging drop abuse.

**HEADSPACE AND PROOF - TLW0407E THROUGH TLW0407G:**

**TLW0407E – Measure Headspace**

All test samples will be measured for headspace before being tested in either the jack or shot from the shoulder. The chamber, bolt face & locking lugs will be inspected for the presence of dirt or debris. If dirt or debris that could affect headspace measurement is present then these areas of the firearm will be cleaned before using the gauges.

**Method:**

The graduated headspace gauges based on Remington chamber dimensions (Ref.: Remington Gauge Drawing # 41560 ...A, ...B, ...C, & ...D) will be used and the headspace measurements will be recorded to the

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nearest .001" increment as indicated by the gauge. The .270 Remington chamber drawing LB-154 will be used for chamber dimensions.

The headspace measurements will be recorded to the nearest .001" increment as indicated by the gauge.

If the measurement is taken at the start of the test then headspace should be less than Min. + .005".

As the test progresses, headspace will be taken at each "Safety Inspection" scheduled in the plan and, in addition, at each "Clean & Inspect" activity scheduled by the plan.

The readings for each firearm will be recorded on the "Daily Test Data Sheet" to be kept with each firearm in the accompanying data packet.

For any firearms where the headspace is changing at each inspection point the firearm will be withdrawn from test and examined for the cause.

In no case will any firearm in the test program be allowed to continue test if the headspace exceeds Min. + .009".

Data Required:

Rifle serial number

Headspace measurements for each sample

**TLW0407F – Proof Test**

All firearms in the 150-rifle sample as supplied by Mayfield should be proof tested prior to delivery to R&D for T&P testing. Each rifle in the selected 30-rifle sample will be examined for the presence of the Remington proof stamp. **If the rifles are not proof tested and properly stamped by Mayfield the following procedure will be used by R&D to proof test and stamp the rifles prior to any other live fire testing.**

All test sample firearms will be subjected to a standard .270 Factory Proof Load, shot in the blow-up room using a lanyard. This procedure will be completed before the firearm can be used for any additional firing tests.

Before proof testing the firearm should be inspected for:

- Barrel Obstructions

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- Bore and chamber are free of grease or oil and other debris.

For fully assembled firearms, one definitive proof cartridge should be fired in each firearm. Definitive proof ammunition is to be used in accordance with the "Handling of Ammunition" procedure defined in the SAAMI Technical Committee Manual, Volume III, Section II, Page 2410 as follows.

- "Cartridges to be tested should be placed in a vertical position with primer end down in a recessed holding block."
- ".... a cartridge should be lifted vertically from the block. It should be rotated slowly, end over end, in a vertical plane through 360° pausing momentarily when the powder is at the bullet end and again when the powder is at the primer end."
- "The cartridge is then rotated slowly, a minimum amount to enter chamber, keeping primer end in lowest possible position until inserted gently and carefully into the chamber."
- "The cartridge should be seated in the chamber as far as practicable with the fingers. The bolt or breech mechanism should be closed gently in order not to disturb the position of the powder in the cartridge case. The object of this method of handling cartridges is to position the propellant powder at the primer end of the cartridge case by permitting it to fall gently against the primer and while rotating the case."

Note that these procedures for proof testing were developed to consistently position the propellant thereby providing greater consistency of proof pressures. Failure to follow this procedure during the definitive proof testing of each chamber of the firearm could result in pressure levels significantly below the minimum proof pressure specification as determined for the cartridge.

Any firearms components, such as bolts, bolt heads, receivers including chambers, etc. which were previously subjected to proof testing and, which subsequently, have any proof sensitive components changed, altered, or substituted, should be re-proofed.

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Method:

- Record headspace before proof testing (*see previous procedure "TLW0407L Measure Headspace."*)
- After firing the proof round, the firearm will be carefully examined to determine if any damage to the product has occurred due to exposure to the proof pressure. This inspection includes:
- Visual inspection for damage,
  - damaged receiver or bolt, especially the locking lugs on the bolt or the receiver
  - bulged chamber or bore; split, cracked or otherwise damaged barrel,
  - broken stock,
  - any other part subjected to the proofing stress, which can be visually examined for damage.
  - Any "suspicious" areas should be submitted to magna-flux inspection before proceeding.
- The fired proof cartridge should be examined to determine that no firearm fault has introduced cartridge failure, such as:
  - Expanded cartridge head.
  - Excessive roughness, rings, or bulging, which would affect extraction.
  - Beginning separation or material stretching in front of the case head indicating excessive headspace or excessive pressure as stated above.
  - Any cartridge case failure indicating a firearm fault.
- In addition, the spent proof round should be examined for the presence of unusual deformation, split case or split head, and for any evidence of a pierced primer. Any of these conditions may be indicative that high-pressure gases may have vented into the action where other damage to components may have occurred.
- Take note of any indication of significant gas leakage, if present, it may indicate that the firearm was not subjected to full proof pressures and the proof test would then be invalid and would require re-proofing.
- A firearm is only properly proofed when the cartridge has been fired without evidence of significant gas leakage.

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- Save the spent proof case in a Zip-Lock plastic bag and label and place in the data packet for further reference. If any parts were broken or otherwise damaged, place these parts in the same bag as the proof case and label. Place a label on the firearm and withdraw the firearm from the test.
- Each sample firearms' headspace (*see following procedure "TLW0407G Re-Measure Headspace after Proof"*) must remain in range from min. to min. + .007" after proofing, with no individual firearm's headspace to grow more than .002" after firing one proof round. After successful proofing, the right lug on the bolt head will be marked in the center (i.e. center of top to bottom and center or front to rear) of the lug with a center punch to indicate that it has been proofed.
- After proof, if the firearm passes the inspection and headspace has been measured (*see next section of test plan*), stamp the firearm on the barrel with an authorized Remington proof stamp. Locate the proof mark on the right rear of the barrel in the specified location for the Remington proof stamp. **DO NOT STAMP** if the headspace exceeds Min + .009".
- Because of the higher pressures involved in shooting proof cartridges, adequate precautions, both mechanical and procedural, should be taken to protect personnel performing the firearms proof testing. To this end, the firearm should be securely mounted, completely shielded from the operator and firing accomplished by a remote control method.

Data Required:

- Rifle serial number
- Record and note any headspace growth and the corresponding round level.
- Record significant gas leakage and/or firearm damage.
- Record any case damage or other ammunition related malfunctions.
- Record any damage to the firearm resulting from the proof test. Document with Photographs as necessary.

**TLW0407G – Re-Measure Headspace after Proof**

All test samples will be re-measured for headspace after proof and before being tested in either the jack or shot from the shoulder. The chamber, bolt face & locking block/locking notch will be inspected for the

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presence of dirt or debris. If dirt or debris that could affect headspace measurement is present then these areas of the firearm will be thoroughly cleaned before using the gauges.

**Method:**

- The graduated headspace gauges based on Remington chamber dimensions (Ref.: Remington Gauge Drawing # 41560 ...A (min.), ...B (+ .005), ...C (+ .007), & ...D (+ .009)) will again be used and the headspace measurements will be recorded to the nearest .001" increment as indicated by the gauge. The .270 Remington chamber drawing LB-154 will be used for chamber.
- The headspace measurement taken prior to the proof test should be less than min. + .005". If, after proof, the growth of the headspace is more than + .002" from the pre-proof condition, then stop and review the results with the test manager before continuing to the next phase of the test.
- In no case should the measurement for headspace after initial proof test be greater than min. +.007" for a new firearm.
- If at any time during the test program the headspace exceeds a maximum of Min. + .009" do not continue to fire the rifle, tag the gun with a label reading "Do Not Shoot This Firearm – Exceeds Maximum Allowable Headspace" and return the firearm to the Test Manager for disposition.

**Data Required:**

- Rifle serial number
- Record and note any headspace growth and round level.

**FORCES – TLW0407H THROUGH TLW0407Q AND TLW0407T:**

**TLW0407H - Measure Firing Pin Indent:**

The firing pin indent will be measured for each of the sample rifles using SAAMI qualified copper crushers. The average of three trials per sample rifle will be calculated. The Average of three indents must be equal to or greater than 0.017".

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Method:

- Using copper crushers, "burnish" both ends of the crusher slug by gently rubbing both ends on the granite base of the dial indicator stand (use outside edge of the plate.)
- Place the copper crusher in a .270 / .270-crusher holder, place the crusher holder on the base of the dial indicator and zero the dial indicator with the point of the indicator in the approximate center of the crusher.
- Carefully, with the gun held so that the muzzle is pointed down toward the floor, gently insert the crusher holder into the chamber, being sure that the extractor clearance cut on the crusher is properly oriented relative to the extractor position.
- While maintaining a firm hold on the bolt handle, gently, and slowly ease the bolt forward to the full forward position and then rotate down being sure that the action locks fully.
- Holding the firearm in a horizontal and level position, and pointing the firearm in a safe direction, pull the trigger until the firing pin releases.
- Carefully open the action and remove the crusher holder, being careful not to drop the copper crusher.
- Leave the crusher in the holder and place under the dial indicator.
- Move the crusher holder so that the point of the dial indicator finds the deepest portion of the firing pin indent.
- Record the dial indicator reading to the nearest .001".
- Repeat procedure two more times and record the dial indicator readings using a new copper crusher for each trial.
- Each firearm sample should have three readings that will be averaged.
- Record all three readings for the data file.

Data Required:

- Rifle serial number
- Each of the three trial indents

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- The calculated average indent by rifle.

**TLW04071 - Measure Sear/Trigger Engagement and Sear Lift:**

The Sear/Trigger Engagement will be measured. The amount of engagement must be measured between .020" and .025" measured with the bolt in the fully closed and locked position.

**Method for measuring Sear/Trigger Engagement:**

- The 30" Optical comparator will be used to measure the engagement at 50X magnification.
- With the barreled action held firmly in position, the barreled action will be aligned such that the action is held perpendicular to the lens in both the horizontal and vertical planes.
- With action closed and locked, the safety in the "fire" position, measure the amount of overlap between the sear and the trigger.

**Method for measuring Sear Lift:**

- Remove the bolt from the action.
- Place the Safety in the "Off-Safe" (i.e. "Fire") position.
- With the action held firmly in a horizontal position pre-load the sear in the downward position using a small screwdriver and with a dial indicator zeroed on the top of the sear, gently rotate the Safety to the "On-Safe" position.
- Record the amount of vertical movement of the sear.
- Minimum sear lift is 0.006"

**Data Required:**

- Rifle Serial number
- Record Sear/Trigger Engagement
- Record Sear Lift

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**TLW0407J - Measure Trigger Pull Forces:**

Trigger pull force.

**Method:**

- Trigger pull is to be performed to the SAAMI standard; horizontal pull at the center of the finger radius of the trigger using the Test Lab apparatus designed for taking this measurement.
- Use the 1-10 lb. Chatillion Force digital force gauge or the Spring Scale – either type is acceptable.
- Force is measured parallel to the bore with the stock assembled to the action.
- Three pulls are to be taken on each sample rifle and the results averaged.
- The average force for the three trials must be between 4.0 lb. and 5.5 lb.

**Data Required:**

- Rifle Serial number
- All three data points for each trial rifle
- The average of the three measurements for each sample rifle.

**TLW0407K - Measure Safe On/Off Forces:**

Using the Chatillion Digital force gauge and the wooden holding fixture used to take trigger pull readings, push the Safe from the “Safe On” to the “Safe Off” position on each test sample. Complete three trials. Record all three readings for each firearm. A minimum of 1 lb. force in “Safe On” to “Safe Off” direction will be assumed as the reference criteria.

**Method:**

- Use trigger pull apparatus to hold the rifle for this test.
- Use the Chatillion Digital Force gauge (0-10 lb. range) with the disc point or the “v” shaped point. Use the same tip on all subsequent trials.

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- Make three trials in specified direction for each sample.
- Average the results of each of the three trials.

Data Required:

- Rifle serial number
- Each of the three readings on each sample
- The average of each of the three sets of readings

**TLW0407M - Measure Magazine Spring Force:**

The force produced by the compression of the Magazine Spring in the box with the follower attached will be measured. These measurements will be taken for information only. There is no specification currently defined for this characteristic.

Method:

- Use the Chatillion TCD200 Spring Testing Machine with the Chatillion Digital Force Gauge (0-10 lb. range). Use the disc probe ( $\frac{1}{2}$ " dia.) with the gauge.
- Place the magazine box, bottom side down, on the staging table.
- Zero the force gauge with no load applied.
- Lower the gauge until it just touches the magazine follower, approximately in the middle location both side to side and front to rear.
- Zero force gauge again if necessary.
- Lower the gauge 0.200" and take the spring force measurements.
- Lower the gauge another 1.0".
- Take the force measurement at this depressed location of the spring.
- Repeat procedure two additional trials for each box.

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- Average the 3 trials for each box and at each measurement location.

Data Required:

- Force Measurements taken on each trial per box at each of the measurement locations.
- The Average Force measurement per box.
- The serial number of the Chatillon Digital Force Gauge used for the procedure.

**TLW0407N – Measure Firing Pin Head / Sear Engagement:**

The vertical engagement of the contact between the firing pin head and sear will be measured. The minimum vertical engagement to be .049”.

Method:

- Use digital height gauge and one-tenth dial indicator attachment.
- Visually check to ensure the firearm is unloaded.
- Clamp firearm in portable vise and set on top of granite table.
- Remove the bolt assembly.
- Place the safety in the “Fire” position.
- Use a small bubble level to level the top of the receiver relative to the granite table.
- Zero indicator on the receiver insert just rearward of the sear.
- Lightly depress the sear until contact with the trigger is felt and hold in place.
- Indicate to the top of the rear portion of the sear and record the measurement.
- Reinstall the bolt assembly and close over an empty chamber.
- Use pin gauges to measure the gap between the receiver insert and the bottom of the firing pin head, record the gap width.
- Subtract the gap width from the indicated measurement and record as the firing pin to sear engagement.

Data Required:

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- Firearm Serial Number
- Indicated measurement
- Pin gauge gap width measurement
- Firing pin head to sear engagement.

**TLW0407O – Bolt Stop Function Check**

The bolt stop will be checked for proper function. The bolt stop must prevent the bolt from being unintentionally withdrawn from the receiver when in the “locked” position and must permit the bolt to be withdrawn when in the “un-locked” position. Measure the amount of force required to move the bolt stop from the locked position to the un-locked position and record. Determine if the bolt stop can be operated by a bare hand and then a gloved hand without the aid of a tool. The bolt stop must properly “detent” in the “locked” position.

**Data required:**

- Rifle serial number
- Measurements of force required to move bolt stop from the locked position to the unlocked position.
- Record check of bolt stop function relative to bolt retention.
- Record whether bolt stop can be operated with bare hands and gloved hands.

**TLW0407P – Function Check of ISS System:**

To check the ISS systems for proper function follow the four-step procedure that follows. If the system fails during any of these procedures stop the test for that gun and continue with the next sample. To be considered a proper functioning ISS system each sample must pass all four of the procedures as outlined below.

1. Make sure the chamber and magazine box are completely empty of live ammunition. This test will involve the use of a primed case, use appropriate safety procedures. This test should be performed

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with the muzzle of the gun inserted into a shooting port or other approved device. With the bolt in the open and un-locked position and safety "On", using the ISS tool, lock the ISS System in the secure mode (no red dot visible) and remove tool. Attempt to close and lockup the bolt after placing a primed case into the chamber. You should not be able to close and lock the bolt easily, without applying excessive force. If the bolt cannot be closed the test sample passes the test. (Note: If the bolt can be closed, place the safety in the "Fire" position and then pull the trigger. The firing pin must not fall and set off the primed case. If the primed case fires then the test sample fails the test. If the primed case does not fire, attempt to unlock the ISS with the tool. Be careful, only apply enough force to see if you can unlock the ISS, without bending the tool. If the primed case is fired at any time during this procedure the test sample fails the test. If the primed case does not fire the test sample passes the test.) Record outcome of all steps taken and Pass/Fail results.

2. If the test sample passes the above test in either of the two possible ways (bolt cannot be closed or primed case does not fire) then perform the following test. Open the bolt and move partially to the rearward position (do not open bolt far enough to eject the primed case), unlock the ISS System (red dot visible) using the ISS tool. Move the safety to the "On Safe" position if it is not already there. **Remember that there is still a primed case in the chamber.** Push the bolt forward slowly, re-chambering the primed case, and fully lock the bolt. Make sure the muzzle of the rifle is in the port of the shooting station (or other approved device). Place the Safety in the "Off Safe" position and pull the trigger, the firing pin must fall and set off the primed case. If the primed case is not fired then the test sample fails. Record results.
3. If the system passes both tests above then perform this procedure. Make sure the gun is completely unloaded of live ammo or primed cases. Open the bolt to the rearward position and put the safety in the "On Safe" position. Rotate the ISS to the locked position (no red dot visible) using the ISS tool and then attempt to unlock the ISS first using your fingers and then using a small screwdriver. You must not be able to unlock the ISS System. (Be careful, do not use excessive force when using the

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screwdriver, you just want to determine that the system will not unlock without the use of the proper tool.) Record results.

4. For the final check unlock the ISS system using the ISS tool and make sure the safety is in the "On Safe" position. Close and lockup the bolt on an empty chamber. Using the ISS tool attempt to lock the ISS system. Be careful, do not use excessive force or the ISS tool will be damaged. You should not be able to lock the ISS system with the bolt closed on a M710. Record results.

Data required:

- Rifle serial number
- Record results for all four phases of the ISS System function check.

**TLW0407AT – Perform Bore Sighting Using Bushnell Scope:**

Prior to the start of any live fire or accuracy testing a sample of the rifles will be inspected to determine if Mayfield has performed a bore sight check/adjustment after mounting the Bushnell Scopes. Use rifles A21-A30. Use standard Bore sighting procedures in the Long Range sighted in at 100 yards. One 5 shot group will be fired through each rifle to establish POI relative to POA. Note: Do not make any adjustment to the scope. They should be fired as received unless alignment of the scope to the bore is off considerably.

Data Required:

- Rifle serial number
- POI relative to POA for each rifle
- Review Results prior to further live fire testing of the test lot.

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**FIREARMS MEASUREMENTS – TLW0407T THROUGH TLW0010X:**

**TLW0407T - Chamber cast:**

Use the .270-chamber drawing LB-154 for reference.

**Method:**

- Make chamber cast using standard procedure
- Use the 30" optical comparator
- Measure the following dimensions:
  - .4708/.4728
  - .4425/.4440
  - 34° 30" Angle
  - .3088/.3108
  - .2775/.2785

**Data Required:**

- Rifle serial numbers
- Record dimensions requested above.

**TLW0407U - Bore Diameter:**

Measure Bore Diameter using standard procedures.

**Method:**

- Measure .270 caliber
- Dimension equals .270/.271

**Data Required:**

- Rifle serial numbers
- Measurements of each bore by serial number

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**TLW0407V - Groove Diameter:**

Measure Groove Diameter using standard procedures.

**Method:**

- Measure .270 caliber
- Dimension equals .277/.278

**Data Required:**

- Rifle serial numbers
- Measurements of each bore by serial number

**TLW0407W - Twist Rate (.270)**

Measure Twist Rate using standard procedures

**Method:**

- Measure .270 caliber
- 1 turn in 10"  $\pm$  .25", RH

**Data Required:**

- Rifle serial numbers
- Measurements of each bore by serial number

**TLW0407X - Magazine Capacity Test:**

Fully loaded magazine boxes must be able to be inserted into the firearm with the bolt closed and in the locked position. For the Model 710 this means that a magazine loaded with 4 rounds should be able to be inserted into the rifle and latched properly when the bolt is fully closed and locked up.

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Method:

- Check rifle for live ammunition
- With muzzle pointed in a safe direction, close the bolt and lock over an empty chamber
- Remove the magazine from the gun and load 4 dummy rounds into the magazine
- Insert magazine into the rifle, it must lock securely in place
- Cycle the 4 dummy rounds through the chamber and eject each round
- Remove the magazine box and repeat test two additional times per sample rifle.

Data Required:

- Rifle serial number
- Record any failures to load and cycle properly by box and rifle.

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## **FUNCTION & ENDURANCE TESTING:**

### **FUNCTION AND ENDURANCE TESTING – TLW0407Y THROUGH TLW0407AB**

#### **TLW0407Y – Ten (10) Round Safety Function Test with Lanyard:**

As an additional safety precaution, each of the 30 sample rifles will be placed in the standard Remington test jack located in the Blow-Up Room and shot with ten rounds of standard load ammunition. Each shot will be fired with a lanyard with the shooter located outside of the room when the rifle is fired. At the completion of the ten rounds the rifle and spent cases will be examined for any signs of damage or abnormal conditions.

#### **TLW0407Z - Basic Jack Function Test (100 Rounds w/Rem. Ammo):**

To get a picture of the product's functional capability, a 100 round per rifle jack function test will be conducted. Five bullet types will be used, 20 rounds (all Remington) of each in each rifle to evaluate the potential for feeding problems. The test will be conducted in the Remington test jacks (heavy configuration) with the "belly-protectors" in place and fully closed for each shot. All malfunctions and any unusual behavior will be noted on the data forms. The overall average of all sample rifles should be at or below 2-% malfunction rate. Up to two rifles from the sample of 30 are permitted to be removed from the averaging process if they have excessive malfunction rates relative to the remaining group of 28 samples. No major mechanical failures are allowed in the test sample. Major mechanical failures are defined as those failures that cannot easily be repaired with simple tools and/or readily available replacement parts. At the conclusion of this test the firearms will be carefully examined for signs of excessive wear, especially with respect to the plastic components.

#### **Method:**

- Check each rifle for the presence of the proof stamp(s) – do not shoot unless the stamp(s) are present.
- Check each rifle for headspace
- Draw ammunition from stores – See test lab manager for ammo types to be used for this test.

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- Each tester to have five rifles for test at any given time.
- The muzzle of each rifle will be inserted into the shooting port and the rifle placed securely in the test jack before the rifle is loaded.
- Load four rounds into the rifle by loading four in the magazine and inserting the magazine into the gun. Do not shoot single shot by hand-feeding single rounds into the chamber.
- Push the safe to the "fire" position, be sure that the barrel is far enough within the port hole so that the muzzle will stay in the port when the rifle recoils. If there is any question, re-adjust the jack into a better position.
- With the lid on the belly protector closed, fire the first round in the chamber, listen for any off-sounds, and be alert for any other unusual behavior.
- Open the bolt; eject the spent round, note any extraction or ejection problems.
- Close the bolt to load the next round from the magazine into the chamber, note any feeding or stemming problems.
- Continue to fire the remaining rounds in the magazine until the last round is fired and the spent case is ejected.
- Push the Safety to "On Safe" position, the safety will be pushed to the fire position at the start of every five round trial and will be pushed to the On Safe position at the end of every five round trial. Repetitive action of the safety lever on the trigger assembly side-plate needs to be determined.
- After firing twenty rounds (1 box of ammo) the rifle will be checked carefully for the presence of any live ammunition and if empty will be removed from the test jack and placed in the cooling rack. The safety will be in the "On Safe" position and the bolt will be unlocked and fully open at all times. Compressed air may be used, if necessary to cool the inside of the chamber area if the rifle is excessively hot from firing.
- All malfunctions will be recorded on the data sheets.

Data Required:

- Rifle serial number
- Tester's name

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- Date of test firing
- The TLW#
- The ammunition used for the test with the ammo lot code number of the rounds actually used.
- Any malfunctions noted or other unusual items of note

**TLW0407AA - Extended Function & Endurance (400 Rounds w/Rem. & Competitive Ammo):**

This Extended Function & Endurance Test will be shot to determine an estimate of the product's expected malfunction rate over an extended period of shooting. For purposes of definition, a component failure will be one that prevents (or could prevent) the firearm from functioning as intended. These are failures that can be fixed relatively easily by the simple replacement of a part such as could be done by the gun owner using only simple household tools. System failures are defined as failures of a major nature, the extent of which would require specialized tooling or methods to repair not normally available to the average gun owner. Such a repair would be most likely made by a qualified gunsmith or by return to the factory.

This Extended Function & Endurance Test will be shot in the Remington test jacks (heavy configuration). The covers on the "belly-protectors" will be down and in-place for each test shot. Careful monitoring of each test gun is essential to evaluate the malfunction rate for each firearm.

Each of ten rifles will be shot using a variety of Centerfire ammunition comprised of light, medium and heavy bullets. In addition, ammunition from the three major manufacturers (Remington, Winchester and Federal) of Centerfire ammunition shall be included in the mix.

Each rifle will be shot no more than 20 rounds before being put aside for cooling. Compressed air applied to the inside of the chamber will be an acceptable method to assist in the cool-down process.

The test will be performed according to Remington's standard endurance test procedures for centerfire rifle. Rounds for this test will be ten rifles to 400 rounds each.

Records all instances of malfunctions and failures, and replace parts when they become unserviceable noting the round level when they were replaced.

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After every 100 rounds one live round will be extracted and ejected from the chamber to check on live round ejection. The ejected round will then be re-inserted into the chamber and fired to help keep the endurance round count accurate.

Method:

- Disassemble, thoroughly clean, lubricate per the design team's instructions, and re-assemble. Record headspace for each.
- Fire each test firearm in accordance with the firing procedure (number of rounds, firing cycle) specified by engineering and the test plan.
- Ammunition will be used that comprises at least five types of bullets, change ammunition type every 100 rounds.
- Before commencing design acceptance testing, calibrate, adjust, or re-build the shooting jacks, if necessary.
- Allow the firearm to completely recover in the shooting jack between each shot and do not lean or "stiff arm" the firearm while shooting the gun.
- All ammunition is to be functioned through the magazine - no "single shot" hand feeding permitted.
- Allow the rifle to cool between cycles. One cycle is 20 rounds fired. The use of forced air to accelerate cooling of the barrels between firing trials is permitted. The air should be directed from the chamber toward the muzzle to prevent it from washing the lubricant from the firearm's action.
- Cycle the safety from fire to safe every 5 rounds, from Safe to Fire at the start of the five round cycle and from Fire to Safe at the end of the 5 round cycle.
- After 400 rounds, disassemble, inspect, clean and lubricate the entire mechanism and take all required measurements.
- The Standard Remington Jacks (using the heavy configuration) are to be used for this test.

Data Required:

- Rifle serial number
- Tester's name
- The Test Jack Identification

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- TLW#
- Date of actual testing
- Headspace after the 400 round interval.
- Malfunctions per ammo type, breakage, and replacement parts used.
- Any failure that requires the gun to be removed from testing completely.
- Notify management of any unusual events or malfunctions immediately.
- Any firing of the firearm without the trigger being pulled
- Record ammunition lot code information as it is used throughout the test.
- Bullet type used for each 20 rounds of the test.

**TLW0407AB - Clean Rifles and Inspect:**

After 400 rounds of Extended Function & Endurance, unless other wise specified, each rifle will be disassembled, cleaned and thoroughly inspected.

A list of inspection points will be provided in the gun packet for check-off and sign-off by the inspector. The inspector will be looking for any signs of unusual wear, especially on critical components and surfaces as well as for anything such as cracks or deformed material that might present a safety concern. Photographs will be taken to document unusual wear, damage or other notable characteristics. Use the following checklist for inspection:

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## Clean & Inspect Checklist

Model: \_\_\_\_\_ 710 \_\_\_\_\_

Project: \_\_\_\_\_ 241095 \_\_\_\_\_

Rifle: \_\_\_\_\_

TLW #: \_\_\_\_\_ TLW0407 \_\_\_\_\_

Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Inspector: \_\_\_\_\_

Round Level: \_\_\_\_\_

- ☐ Measure Headspace \_\_\_\_\_.
- ☐ Firing Pin Indent 1<sup>st</sup>. \_\_\_\_\_ 2<sup>nd</sup>. \_\_\_\_\_ 3<sup>rd</sup>. \_\_\_\_\_ Ave. \_\_\_\_\_
- ☐ Sear Engagement: \_\_\_\_\_.
- ☐ Trigger Pull: 1<sup>st</sup>. \_\_\_\_\_ 2<sup>nd</sup>. \_\_\_\_\_ 3<sup>rd</sup>. \_\_\_\_\_ Ave. \_\_\_\_\_
- ☐ Measure Feed Lip on Mag. Box at front: \_\_\_\_\_ & rear: \_\_\_\_\_.

Check the following areas for signs of unusual wear or breakage:

- ☐ Receiver insert
- ☐ Rear surface of Bolt Lugs
- ☐ Check for "galling" on rear of Bolt Lugs
- ☐ Bolt Plug
- ☐ Bolt Plug Insert "ears" on firing pin assembly
- ☐ Check for loose or missing pins – make note and re-stake if necessary
- ☐ Check plastic inserts for cracks or other damage.

Take digital photographs, if appropriate, to record unusual wear, damage or other noteworthy observations. List the digital file name for reference along with any comments below.

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## **ACCURACY TESTING:**

### **ACCURACY AND POI TESTING – TLW0407AC THROUGH TLW0407AF**

#### **TLW0407AC – POI & Group Size – Initial Test with High Quality 36X Scope @ “zero” rounds**

The point of impact test involves the verification of the firearms sighting system adjustment and the potential to hit the point of aim. Random variation and/or extreme difference in shot to shot point of impact (as well as group size) typically indicate improper barrel processing and is used as a final inspection flag in production. Shoot three, 5-shot groups from each test rifle. Use the same code of ammunition for all point of impact test shots. Sample rifles A-21 to A-30 (ten rifles) will be used for this accuracy test.

#### **Method:**

- Pick the point of aim on the target
- Adjust point of aim to the bulls-eye at 100 yards
- Shoot five “warmer” shots
- Shoot three, 5-shot groups
- Cycle the safety from fire to safe every 5 rounds

#### **Data Required:**

- Measure POI vs. POA for each shot in terms of “x” and “y” position
- Measure group sizes center to center
- Record takedown screw torque
- Record make and identifier of scope
- Record ammunition type used
- Record ammunition lot numbers used during the test
- Record and label any fail-to-fire ammunition.
- Record any malfunctions that occur during the test.

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## **ENVIRONMENTAL TESTING:**

### **TEMPERATURE & HUMIDITY – TLW0407AG THROUGH TLW0407AI**

#### **TLW0407AG - Hot Function Test:**

This test evaluates the effect of extreme high temperatures on the functioning performance of firearms.

##### **Method:**

- Condition test firearm and 100 rounds of ammunition in a climatic chamber for at least 6 hours at a temperature of 120 degrees F. (or as close to 120 degrees F. as the equipment can be maintained.)
- Test each firearm after removing from the chamber as follows:
  - Fire 20 rounds of ammunition. Replace the rifle in the chamber. Wait 2 hours and repeat procedure until all 100 rounds have been fired.
  - Do not perform maintenance during the 100 round cycle.
  - Cycle the safety from fire to safe every 5 rounds.
  - The tester should wear gloves to protect his hands from the hot metal.
- After 100 rounds have been fired through each firearm, disassemble, thoroughly inspect, clean and lubricate.

##### **Data Required:**

- Record temperature and exposure times
- Record all malfunctions
- Record damage noted during inspection

#### **TLW0407AH - Cold Function Test:**

This test evaluates the effect of extreme low temperatures on the functioning performance of the firearms. Shoot the firearm after removing from the environmental test cabinet.

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Method:

- Condition the firearm and 100 rounds of ammunition of climatic chamber for at least 6 hours at a temperature of -20 degrees F.
- Test each firearm after removing from the chamber as follows:
- Fire 20 rounds of ammunition. Return the firearm to the chamber. Wait 2 hours and repeat procedure until all 100 rounds have been fired.
- Do not perform maintenance during the 100 round cycle.
- Cycle the safety from fire to safe every 5 rounds.
- After 100 rounds have been fired through the firearm, disassemble, thoroughly inspect, clean and lubricate.

Data Required:

- Record temperature and exposure times
- Record all malfunctions.
- Record damage noted during inspection

**TLW0407AI - Heat & Humidity Function Test:**

Method:

- Shoot the firearm after removing from the environmental test cabinet in the long range.
- Store the gun and ammunition for a minimum of six hours at a temperature of +100°F and 80-90% Relative Humidity.
- Test each firearm after removing from the chamber as follows:
- Fire 20 rounds of ammunition. Return the firearm to the chamber. Wait 2 hours and repeat procedure until all 100 rounds have been fired.
- Do not perform maintenance during the 100 round cycle.
- Cycle the safety from fire to safe every 5 rounds.
- After 100 rounds have been fired through the firearm, disassemble, thoroughly inspect, clean and lubricate.

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Data Required:

- Record temperature and exposure times
- Record all malfunctions.
- Record damage noted during inspection

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