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315 WEST RING ROAD
ELIZABETHTOWN, KY 42701

TLW 1012

**M/504, Bolt Action Rimfire Rifle
.22 Long Rifle
Design Acceptance Test (DAT #1)
Test Plan**

Revision # 1.3

03/21/03

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M/504 RIMFIRE RIFLE DESIGN ACCEPTANCE TEST PLAN - DAT #1

Introduction:

A test sample for the Design Acceptance Test (DAT) consisting of 29 rifles is scheduled for delivery in November 2002.

After completing basic measurements and inspections on the rifles in the sample, a 200 round per gun jack-function test is planned for all 29 rifles in the sample to determine the probable malfunction rate and determine if the expenditure of additional ammunition for testing is justified. This test will be followed by a 100-round live fire test shot in the long range from the shoulder in a standing position.

After completing the shoulder-fired function test, a random selection of 10 rifles will be shot for Group Size using Remington-Eley 22 Match ammunition. An additional accuracy test will compare the group size capability of multiple ammunition types for information. This will be followed by an extended function and endurance test on a selected number of test rifles.

A selection of sample rifles will also be tested under various environmental conditions.

Finally, a sample of rifles will be tested under various conditions of intentional abuse.

Initial Inspections, Measurements and Tests:

TLW1012A -Incoming Parts Inspection:

Component parts for the Model 504 will be measured for critical dimensions prior to assembly of the DAT sample rifles. Records of the measurement results will be made available for inclusion in the DAT report. The parts used to fabricate the DAT sample rifles must meet the model drawing for dimension and/or for specified characteristic or the drawings will be changed accordingly prior to transmittal to production. Design will provide a list of part drawings and associated dimensions/characteristics to be inspected.

TLW1012B -Measure Headspace:

All test sample rifles will be measured for headspace before being tested in either the jack or shot from the shoulder. The barrel, bolt, and the receiver will be inspected for the presence of dirt or debris. Special attention will be paid to the chamber, bolt face, & locking lugs areas. Headspace measurements can be affected by the presence of dirt and debris. If dirt or debris is found clean the rifle before using the gauges.

Note that excessive headspace can result in blown case heads and/or split cases which can allow high pressure gases to escape in the chamber area potentially throwing debris in the shooters direction. Headspace that is below minimum specifications may result in accidental firing of the rifle due to crushing of the rim as the bolt is closed. A firearm with the headspace out of specification can also result in other functional problems such as hard closing, misfires, poor extraction, etc. (See S.A.A.M.I. Technical Committee Manual Volume 1, Rimfire Rifle, 6-80 (6) rev. 3/18/93 & 6-80 (2) rev. 1/12/94.) Min. Headspace for .22 Long Rifles is established at 0.043", Max. Headspace (after use) for .22 Long Rifles is established at 0.051" (See S.A.A.M.I. Technical Committee Manual Volume 1, Rimfire, 1185, issued 10/4/79)

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Method:

- Graduated headspace gauges will be used and the headspace measurements will be recorded to the nearest .001" increment as indicated by the gauge. The .22 LR chamber for the model 504 will be found on drawing E-300849 and will be used for the referenced chamber dimensions. (Note that: If graduated headspace gauges are not available then, as a minimum, use Min/Max headspace gauges to assure that the rifles are at least within headspace specifications.)
- 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 or equal to Min. + .005" (i.e. less than or equal to Rimfire headspace gauge labeled 0.048")
- As the test progresses, headspace will be taken as designated by any specific test in the plan and in addition, at each scheduled "Safety Inspection" as well as at each "Clean & Inspect" activity scheduled by the test plan.
- The headspace readings for each firearm at each inspection 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 appears to be increasing at each inspection point the firearm will be withdrawn from test and examined for the probable cause.
- In no case will any rifle in the test program be allowed to continue in the test if the headspace exceeds Min. + .008" (i.e. greater than Rimfire headspace gauge 0.051").

Data Required:

- Rifle serial number
- Headspace measurements for each sample
- Testers' Names
- TLW Number

TLW1012C -Proof Test:

Normally, Rimfire rifles are not subjected to a proof test procedure at the completion of production. However, note that for all newly designed Rimfire Rifles the Proof Test procedure will be completed before the firearm can be used for any additional firing tests by test lab personnel as a safety precaution.

All test sample firearms will be subjected to a standard .22 LR, Definitive Proof load shot in the blow-up room using a lanyard.

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:

- a. "Cartridges to be tested should be placed in a vertical position with primer end down in a recessed holding block."
- b. "... 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."
- c. "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."
- d. "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."

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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.

Method:

- Record headspace before proof testing (*see previous procedure "TLW 1012B - Measure Headspace."*)
- Before proof testing the firearm should be inspected for:
 - Barrel Obstructions
 - Bore and chamber are free of grease or oil and other debris.
- 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 magnifying 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.
- Save the spent proof case in a Zip-Lock plastic bag and label and place in the data packet for possible future reference. If any parts were broken or otherwise damaged, place these parts in the same bag as the proof case and label. Place a warning label on the firearm and withdraw the firearm from the test.
- Each sample firearms' headspace (*see following procedure "TLW1012D -Re-Measure Headspace after Proof"*) must remain in range from min. to min. + .007" (i.e. Rimfire headspace gauge 0.050") (this is to allow for normal growth due to wear) after proofing, with no individual firearm's headspace to grow more than .002" after firing one proof round.
- After successful proofing and the headspace is within allowed specifications, stamp the underside of the bolt handle with a prick punch mark. If a prick punch mark is present indicating that the bolt was previously proofed do not re-mark with prick punch mark. In addition to stamping the bolt on the underside of the handle, 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 + .008" (i.e. Rimfire headspace gauge 0.051").** If this is a barrel that has previously been proofed and already has a Remington proof mark, do not re-stamp.
- Because of the higher pressures involved in shooting proof cartridges, adequate precautions, both mechanical and procedural, must 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 such as firing by use of a lanyard.

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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 if necessary.
- TLW Number
- Testers' Names

TLW1012D -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 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 thoroughly cleaned before using the gauges.

Method:

- Graduated headspace gauges (if available) will be used and the headspace measurements will be recorded to the nearest .001" increment as indicated by the gauge. The .22 L.R. chamber drawing E-300849 will be used for referenced chamber dimensions.
- The headspace measurement taken prior to the proof test should be less than or equal to 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. + .008" 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
- TLW Number
- Testers' Names

TLW1012E -Extended Proof Test - 100 Rounds

To determine if the lock-up system will resist changes to headspace under load sample rifles will be subjected to a hundred round test using proof ammunition. Headspace will be monitored and recorded at various round levels throughout the test to ensure that headspace does not change significantly. Two rifles will be selected for use with this test.

Method:

- Fire proof rounds through rifle in the blow-up room using a lanyard.
- For the first 10 rounds, measure the headspace after each round.
- For rounds 11 to 25, measure the headspace after every 5 rounds.
- For rounds 26 to 100 measure the headspace after the 50th, 75th & 100th round.
- In no case can the headspace on a given rifle exceed Min. + .008"
- Examine all rifles visually for signs of damage before proceeding to the jack fired test following.

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Data Required:

- Rifle serial numbers
- Headspace measurements per the schedule outlined above (see "Method.")
- Any notes and/or photographs made to document the visual examine.
- TLW Number
- Testers' Names

TLW1012F -Measure Trigger Pull Forces:

Trigger pull (force required to manually operate the trigger) will be measured and recorded using the following procedure.

Method:

- Secure the action into the Dvorak Trigger Scan measuring device.
- Take 3 readings and record the maximum trigger pull. Average the three readings. The trigger pull should be at 2.8 to 3.2 pounds.
- If the trigger pull does not fall in this range notify Engineering.

Data Required:

- Rifle Serial numbers tested
- All three trigger pull force data points for each sample rifle
- The average of the three measurements for each sample rifle.
- A force/distance curve from the Dvorak system (use the third trial) for each rifle tested.
- TLW Number
- Testers' Names

TLW1012G -Measure Bolt Lift / Bolt Closing Forces (for information):

The force required opening the bolt and closing the bolt will be measured for each sample. Both of these forces will be taken with the chamber empty and then repeated, this time with a new dummy round in the chamber. There is not a specification for these forces and the readings will be taken for information only.

Method:

- Lock the firearm in a horizontal position, (i.e. shooting position) before taking the measurements.
- Locate the rifle in vise and/or other fixture and securely locking in place, (it may be necessary to clamp the fixture and/or holding device to the bench if not already securely fixed in place.)
- Check to be sure the rifle contains no live ammunition in either the chamber or in the magazine box.
- With the chamber empty and the bolt closed, use the Chatillon gauge (0-50 lb. range), locate the hook of the force gauge at the point on the bolt handle just behind the ball. Pull the gauge straight up and perpendicular to the bore, measure the force required to open the bolt.
- Take three readings for each gun in the sample.
- Record all readings.
- Repeat the above procedure only this time pull the gauge straight down and perpendicular to the bore, measure the force required to close the bolt. Note that it may be necessary to start the bolt closed by hand.
- Repeat the above procedures this time with a new, unused dummy round in the chamber.

Data Required:

- Rifle serial numbers used for this test.

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- Each of the three readings taken for each of the 4 states (i.e. opening force and closing force and with and without a dummy in the chamber) for each test sample.
- The average of each set of three measurements per each of the 4 states.
- TLW Number
- Testers' Names

TLW1012H -Measure Magazine Spring Force (for information only):

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 Chatillon TCD200 Spring Testing Machine with the Chatillon Digital Force Gauge (0-10 lb. range). Use the disc probe (1/4" dia. or less if necessary to clear the box lips) on the gauge.
- Place the magazine box, bottom side down, on the staging table. It may be necessary to gently clamp the box to hold it in an upright position.
- 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.
- 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.
- TLW Number
- Testers' Names

TLW1012I -Function Check of ISS:

To check the ISS System for proper function perform the four-step procedure that follows. If the system fails during any of the four steps 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 steps outlined below.

Method:

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 must be performed with the muzzle of the gun inserted into a shooting port or other approved device.*
 - With the bolt in the open position and safety "On", using the ISS key, lock the ISS System in the secure mode (White dot visible on the top -See Pictures) and then remove the key.
 - Load a primed case into the chamber by inserting with your hand.

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- Attempt to close and lock-up the bolt. You should not be able to completely rotate the bolt to the fully locked up position (Bolt Handle down). If the bolt cannot be closed the test sample passes the test. Record results and proceed to Step 2.
 - If the bolt can be closed completely proceed as follows. **Remember that there is a primed case in the chamber. The muzzle of the gun will still be kept in the shooting port.**
 - Place the safety in the "Fire" position and pull the trigger. The firing pin must not fall completely and set off the primed case. If the primed case fires then the test sample fails the test. Note that the firing pin should move forward some (but not enough to make contact with the primer.)
 - If the primed case does not fire, attempt to unlock the ISS with the ISS key quickly by rotating the ISS plunger counterclockwise. Be careful; only apply enough force to see if you can unlock the ISS, without bending the tool. You may hear a click and the firing pin head may move a small amount but should not fall fully. This is considered normal. If the ISS cannot be fully unlocked then the gun passes this test, proceed to Step 2.
 - If the ISS can be fully unlocked after pulling the trigger and/or the primed case is fired at any time during this procedure the test sample fails the test. Record results and stop any further testing of this rifle. If the ISS cannot be fully unlocked and a primed case is not fired the test sample passes the test.
 - Record outcome of all steps taken.
2. If the test sample passes the above test then perform the following procedure.
- Move the safety to the "On Safe" position if it is not already there.
 - 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 on the top - See Pictures) using the ISS key. **Remember that there is still a primed case in the rifle.**
 - Push the bolt forward slowly, re-chambering the primed case, and fully lock the bolt by rotating the Operating Handle down.
 - Make sure the muzzle of the rifle is in the shooting port.
 - 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.
 - Open the action and eject the primed case.
 - Put the Safety in the "On" position.
 - 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 (*White* dot visible on the top - See Pictures) using the ISS key.
 - 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 with anything except the ISS key. (Be careful, do not use excessive force when using the screwdriver, you just want to determine that the system will not unlock without the use of the key.)
 - Record results.
4. For the final check unlock the ISS system (*Red* dot visible on the top - See Pictures) using the ISS key and make sure the Safety is in the "On Safe" position. ***This test will involve the use of a primed case, use appropriate safety procedures. This test should be performed with the muzzle of the gun inserted into a shooting port or other approved device.***
- Load a primed case into the chamber by inserting with your hand.
 - Close and lockup the bolt.
 - Using the ISS key attempt to lock the ISS system (*White* dot visible on the top - See Pictures). Be careful; do not use excessive force or the ISS key will be damaged. You should not be able to **completely** lock the ISS system (See Pictures) with the bolt closed on a M/504.
 - Record results.
 - If the ISS can be rotated to an intermediate position, white dot visible but not on the top (See Pictures), then perform the following procedure.

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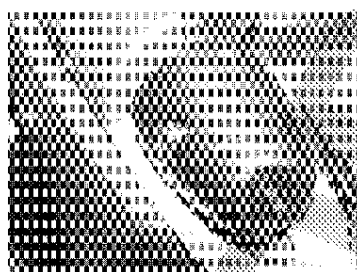
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- Remember that there is a primed case in the chamber. The muzzle of the gun should still be in a shooting port.
 - Place the safety in the "Fire" position and then pull the trigger. The firing pin must not fall completely and set off the primed case. If the primed case fires then the test sample fails the test. Note that the firing pin should move forward some (but not enough to make contact with the primer.)
 - If the primed case does not fire, attempt to unlock the ISS with the ISS key quickly by rotating the ISS plunger counterclockwise. Be careful; only apply enough force to see if you can unlock the ISS, without bending the tool. You may hear a click and the firing pin head may move a small amount but should not fall fully. This is considered normal. If the ISS cannot be fully unlocked (*Red* dot visible to the rear-See Pictures) then the gun passes this test, proceed to Step 2.
 - If the ISS can be fully unlocked after pulling the trigger and/or the primed case is fired at any time during this procedure the test sample fails the test. Record results and stop any further testing of this rifle. If the ISS cannot be fully unlocked and a primed case is not fired the test sample passes the test.
 - Record outcome of all steps taken.

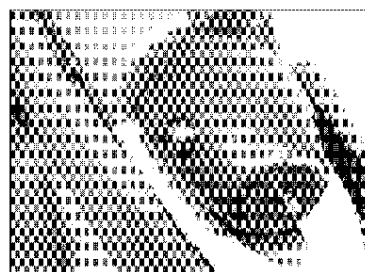
Data required:

- Rifle serial number
- Record results for all four phases of the ISS System function check.
- Record Testers' Names
- Record TLW Number.

ISS "ON" or "LOCKED"



ISS "OFF" or "UNLOCKED"



TLW1012J -Measure Firing Pin Indent:

The firing pin indent will be measured for each of the sample rifles using SAAMI qualified copper indent crushers. The average of three trials per sample rifle will be calculated. The Average of (three indents must be equal to or greater than 0.014" (see S.A.A.M.I. Technical Committee Manual Volume VI, Rimfire Rifle, 6-50.05, 10/1/93, Revised 10/25/78)

Method:

- Using copper indent crushers (see S.A.A.M.I. Technical Committee Manual Volume VI, Rimfire Rifle, 6-50.04, 10/1/93, for proper crusher indent specification to use for this test). "burish" 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, not the top working surface.)
- Place the copper Rimfire indent crusher in a .22 Long Rifle crusher holder (for crusher holder specification see S.A.A.M.I. Technical Committee Manual Volume VI, Rimfire Rifle, 6-50.05, 10/1/93). 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. Remove the crusher from the crusher holder.

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- Carefully, with the gun held so that the muzzle is pointed down toward the floor, gently insert the f. p. indent crusher into the chamber.
- While maintaining a firm hold on the bolt handle, gently, and slowly ease (do not release) the bolt forward until it is firmly seated in the full forward position. Note that allowing the bolt to "slam" home on the indent crusher could result in deforming the soft copper material around the crusher rim and thereby change the "zero" reference point.
- 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 indent, being careful not to drop the copper crusher, which might potentially nick the edge.
- Return the crusher in the holder and place under the dial indicator. *(For specifications for the dial indicator, dial indicator point and measurement position specifications see S.A.A.M.I. Technical Committee Manual Volume II, Rimfire Rifle, 6-50.02, rev. 3/185/93 & 6-50.03, rev. 10/25/78)*
- 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.

Data Required:

- Rifle serial number
- Each of the three trial indents
- The calculated average indent by rifle
- Record all three readings for the data file.
- TLW #
- Testers' Names

TLW1012K -Magazine Capacity Test:

The purpose of this test is to assure that each magazine, when fully loaded to a magazine's designed capacity, can be fully inserted and locked into position into the rifle with the bolt in the closed and locked position. The model 504, .22 Long Rifle must be able to accept 6 rounds in the magazine and still be inserted and locked into a rifle. Note that 7 rounds should not fit in the magazine.

This test will be performed using dummy rounds.

Method:

- Check rifle for live ammunition.
- Place the test rifle in the short range shooting jack with muzzle located in a shooting port and the rifle located securely in a shooting jack, close the bolt over an empty chamber.
- Load 6 rounds into the magazine.
- Insert magazine into the rifle, it must lock securely in place.
- Cycle the 6 dummy rounds through the chamber and eject each round manually, do not fire the rounds.
- Remove the empty magazine box and repeat test two additional times per sample.
- Collect the live rounds from the catcher and count the rounds recovered (there should be 18) so that live rounds don't end up in the scrap brass barrels.
- Proceed to the next test rifle and repeat the test procedure.

Data Required:

- Rifle serial number.
- Record any failures to load and cycle properly by box and by rifle.
- TLW Number
- Testers' Names

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TLW1012L -Safety Operation (SAAMI Test):

This S.A.A.M.I. required test measures the operation of the manual safety to determine if the force required to move the safety from the "safe" to the "fire" position is less than 1 lb.. In addition, an examination of the safety is made to determine if the "fire" and "safe" position of the safety are clearly discernible to the user. Finally, a 40 lb. load is applied to the trigger from several directions with the safety in the "on" or "safe" position to determine that the mechanical operation of the safety is not impaired.

Method:

- Inspect and verify the rifle is not loaded and the safe is in the "On-Safe" position.
- Close the action.
- With the rifle's safety in the "On-Safe" position, use the Chatillon 10 lb. gauge with a "V" notch attached and carefully push the safety to the "fire" position and measure the force required to move the safety. Perform 3 trials for each rifle and record all three force measurements. These will be averaged to determine the final force measurement for each rifle.
- Make a specific observation as to the location of the "on-safe" and the "fire" positions and determine if there is a discernible "detent" detectable when the safety is moved between the two positions. Record the observation that there either is or that there isn't a discernable "detent" for each sample rifle.
- Finally, lock the rifle securely in a holding device and proceed to apply a 40-lb. load to the trigger. Place the Chatillon 50 lb. gauge v-notch in each of four locations from the front (or as close as you can get from the front.) Then from the rear of the trigger (or as close as you can get from the rear.) Finish by applying the 40 lb. load to the trigger, first from the left side and then from the right side) in turn and apply a 40-lb. load. In each application of the 40-lb. load, placement of the load should be at about the center of the finger curve of the trigger. After each application of the load test the fire control mechanism by attempting to pull the trigger with the safe in the "on-safe" position and the rifle pointed in a safe direction. Gun must not fire. Push the safety to the "fire" position. Gun must not fire when the safety is moved to the "fire" position. Finally, with the rifle still pointed in a safe direction, pull the trigger, the firing pin must release to the fired position.

Data required:

- Rifle serial number
- Measurements of Trigger pull, engagement, over-travel and trigger/trigger guard clearance before and after loading.
- Note that the rifle "fired" or did not fire when the safety was pushed to the "Fire" position.
- Note that the rifle did "fire" when the trigger was pulled.
- TLW Number
- Testers' Names

TLW1012M - 40 lb. Trigger Pull Test (Remington Test):

This test is conducted to determine if the safety mechanism will release the trigger mechanism and cause the firearm to discharge if the shooter pulls the trigger intentionally or accidentally with the safety in the "On-Safe" position. In addition, sufficient force is applied to the trigger with the safe in the "On-Safe" position to assure that the trigger dimensions will not change thereby affecting trigger/sear engagement. Prior to start of test verify that trigger pull, engagement and over-travel are within recommended specifications on the sample rifles.

Method:

- Inspect and verify the rifle is not loaded and the safe is in the "On-Safe" position.
- Close the bolt.
- Locate the firearm in a horizontal position with the muzzle pointed in a safe direction.
- Using the set of plug gauges determine the amount of minimum clearance between the rear of the trigger and the inside rear of the trigger guard. This dimension will be used as a reference to determine if the loading in the next steps has deformed the trigger.
- With the safe in the "On-Safe" position, "load" the trigger with the equivalent of a 40-lb. weight using the Chatillon 0-50 lb. digital force gauge.
- Remove the load from the trigger.

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- Move the Safety to the "Fire" position; the rifle must not discharge.
- Return the Safety to the "On-Safe" position.
- Carefully remove the rifle from the holding device and with the muzzle pointed in a safe direction, put safety in the "Off-Safe" position, pull the trigger, the firing pin must fall.
- Re-cock the firing pin.
- Using the plug gauges measure the minimum clearance between the rear of the trigger and the inside rear of the trigger guard with the firing pin fully cocked.
- Measure the trigger pull, engagement and over-travel to insure that they have not changed from the beginning of the test.

Data required:

- Rifle serial number
- Measurements of Trigger pull, engagement, over-travel and trigger/trigger guard clearance before and after loading.
- Note that the rifle "fired" or did not fire when the safety was pushed to the "Fire" position.
- Note that the rifle did "fire" when the trigger was pulled.
- TLW Number
- Testers' Names

TLW1012N -Measure Sear / Firing Pin Head Engagement & Trigger / Sear Engagement:

(See additional procedures for setting engagements in Appendix 1)

The Sear/Trigger Engagement will be measured. The amount of engagement must be measured between .018" and .020" measured with the bolt in the fully closed and locked position.

The vertical engagement of the contact between the firing pin head and sear will be measured. The minimum vertical engagement is to be 0.020". (Note: Nominal is 0.030")

Method for measuring Sear/Trigger Engagement:

- The 30" Optical comparator will be used to measure the engagement at 50X magnification.
- Take the action out of the stock
- 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.
 1. Set the comparator to 50X.
 2. With the action secured in the fixture on the comparator, position the action so that the thumbscrew can be used to move the trigger.
 3. Close the bolt in the receiver and put the safety in the "Off Safe" position.
 4. Put the crosshairs on the top back (left hand) edge of the trigger and set the horizontal reading on the comparator to zero.
 5. Move the crosshairs to the right (move the part to the left) 0.018".
 6. With the thumbscrew on the fixture move the trigger out of engagement with the sear. The sear should break when the trigger is at the crosshairs plus or minus 0.001".
 7. If engagement does not fall in this range notify Engineering.

Method for Measuring the Sear/Firing Pin Head Engagement:

- 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.
- Use a small bubble level to level the top of the receiver relative to the granite table.

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- Zero the indicator dial on the receiver 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 and the bottom of the firing pin, record the gap width.
- Subtract the gap width from the indicated measurement and record as the firing pin to sear engagement.

Data Required:

- Firearm serial number
- Measurements for Sear / Trigger engagement
- Measurements for Sear / Firing Pin Head engagement
- Record Testers' Names
- Record TLW Number

TLW1012O -Trigger Movement, Safety On, (10 lb. Pull):

(See Procedures in Appendix I)

This test is designed to determine the amount of relative travel between the sear and the trigger that might occur if the shooter has the safe in the on safe or "SAFE" position and tries to pull the trigger with the trigger block in position. Movement of the trigger relative to the sear, if any, cannot exceed 0.005" with a 10-lb. weight applied to the trigger with the safe in the on safe or "SAFE" position. For this test the trigger pull should be set at 3 - 5 lb.

Method:

- Check the firearm to be sure that no live ammunition is present in the chamber.
- Remove the action from the stock.
- Locate the action on the 30" comparator in the "10 lb. trigger pull fixture".
- Close and lock the bolt over an empty chamber and put the safety in the on safe or "SAFE" position.
- At 50-1 magnification align the rear and top of the trigger with the horizontal and vertical centerlines respectively on the screen.
- Measure the horizontal distance from the rear of the trigger to the front vertical surface of the sear and record measurement.
- Using the pulley, cord and a ten-lb. weight apply a load to the trigger with the safe on.
- Measure the distance again of the horizontal distance from the rear of the trigger to the front vertical surface of the sear and record the measurement. This difference in position before and after applying the ten lb. weight, if any, must not exceed 0.005"

Data Required:

- Serial number of sample
- The horizontal distance from the rear of the trigger to the front vertical surface of the sear before applying the 10 lb. load.
- The horizontal distance from the rear of the trigger to the front vertical surface of the sear after applying the load.
- TLW Number
- Testers' Names

TLW1012P -Regain:

(See Procedures in Appendix I)

The purpose of this test is to determine that if the trigger is partially pulled then released will it return to its fully engaged position under the sear. For this test the trigger will be moved rearward 60% of its full trigger/sear engagement and the trigger must return to its original position under the sear (± 0.001 " from its original position) after the load is removed.

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Method:

- Check rifle for presence of live ammunition.
- Remove action from stock.
- Locate action in fixture on 30" Optical Comparator.
- Close and lock bolt over an empty chamber.
- Place safety in the off safe or ("OFF") position.
- At 50-1 magnification align the rear and top of the trigger with the horizontal and vertical centerlines respectively on the screen.
- Measure the horizontal distance from the rear of the trigger to the front vertical surface of the scar and record measurement without a load being applied to the trigger.
- Using the thumbscrew device located on the fixture, slowly apply a load to the trigger while noting the distance that the trigger moves until the scar falls. Make a note of this total travel. Calculate 60% of the total travel – this calculation will be used in the next step.
- Re-cock the rifle and slowly turn the thumbscrew moving the trigger toward the release point while monitoring the distance on the comparator screen until 60% of the total distance to the release point is reached. At this point, reverse direction of the thumbscrew and release the load on the trigger. The trigger must return to its start position (within $\pm 0.001"$).

Data Required:

- Start point
- Total distance to release point
- Calculated 60% distance.
- Final End point.
- TLW Number
- Testers' Names

TLW1012Q -Live Round Extraction:

This test will ensure that the rifle, as designed, will successfully extract live rounds from the chamber. This test uses a selection of Remington and competitor's .22 Long Rifle ammunition. Each ammunition type used will be cycled at least two cycles for each type through the firearm each cycle consisting of a full six round load of rounds in the magazine box. All rounds will be fed from the magazine.

CAUTION! -

- This test will involve the use of live ammunition.
- Use Safe Gun handling Safety Procedures.
- Do not leave live rounds in the belly protectors after completion of the test procedure!
- This test must be done with the muzzle in the shooting port.

Method:

- Clean all spent brass from the belly-protector that will be used to conduct this test. All rounds will be collected after live round extraction and returned to inventory unless damaged by the test procedure.
- Place the test rifle in the shooting port with the butt located in the saddle of the test jack.
- Make sure that the safety is in the on safe or ("SAFE") position throughout this test.
- Select 12 rounds of the first type of ammunition.
- Load 6 of the rounds into the magazine.
- Load the first round into the chamber by closing the bolt slowly. Close the action and lock the bolt in position. Do not fire the rifle.
- Lift the bolt slowly and draw the bolt slowly to the rear. The round must be extracted from the chamber and ejected from the receiver.
- Repeat slow load and slow extraction with the second round.

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- For rounds 3 and 4 close, lock and open the bolt at a "medium" speed.
- For rounds 5 and 6 close, lock and open the bolt "smartly & quickly".
- Repeat 6-round cycle with the next 6 rounds of this type of ammunition.
- Collect and account for all extracted rounds from the bottom of the belly protector.
- Repeat process of slow, medium, and fast loading and extraction for each of the other ammunition types.

Data Required:

- Types of ammunition used for the test
- Test Jack used for test.
- Results of each trial by round number, ammunition type and feed/extraction rate (i.e. "slow", "medium", or "fast")
- Rifle serial number
- TLW Number
- Testers' Names

Ammunition Schedule for Live Round Extraction Test

A	Remington/Eley 22 Match EPS	RE22EPS
B	Remington Viper, .22 Long Rifle	1922
C	Winchester .22 LR Target	XT22LR
D	Federal .22 LR Gold Medal Match	900
E	CCI .22 LR Green Tag	00033
F	PMC .22 LR Scoremaster	22SM

TLW1012R -Chamber cast:

Use the .22 LR - Remington chamber drawing for reference (Ref: Remington Chamber Drawing E-EXP8261, rev. J Barrel.)

Method:

- Make chamber cast using standard procedure as listed in the procedure below.
- Use the 30" optical comparator to make the specified measurements.
- Measure the following dimensions:
 - Mouth, .2280" / .2275" & 0.010R fillet @ edge.
 - Chamber length, .6555" / .6455"
 - Chamber diameter @ length, .2260" / .2250".
 - Taper @ chamber length, 5°

Data Required:

- Rifle serial numbers
- Measurements of each dimension or characteristic as listed above by gun serial number
- Testers' Names
- TLW Number

Test Procedure for making chamber casts:

Note that Cerrosafe™ has some unique features that make it suitable for making chamber casts. During the first 30 minutes of cooling Cerrosafe™ shrinks making removal from a rifle chamber easier. After about an hour the cast is exactly the size of the chamber in which it was cast.

Be sure to be use all caution when making chamber casts. Although the material melts at a relatively low temperature, the temperature is still hot enough to cause severe burns if spilled on bare flesh. Use protective gloves, clothing and safety

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glasses with side-shields.

Chamber cast procedure:

- Use Cerrosafe™ chamber casting alloy. As long as it is kept clean, the material can be reused multiple times.
- Clean chamber of the rifle thoroughly and apply a very thin film of oil or graphite.
- Plug the bore of the rifle immediately ahead of the throat with a small rag – but not so tightly it cannot be driven out.
- Melt the Cerrosafe™ in a clean iron ladle. It will melt between 158° and 190°F.
- The source of heat should be removed as soon as the alloy is completely melted, at which time it is ready to pour.
- If practical, pour the molten Cerrosafe™ through a small tube into the bottom of the cast, gradually removing the tube as the chamber fills. A funnel with a heat resistant tube securely attached should work.
- If the barrel is cold, warm it to room temperature or slightly above room temperature before making the cast.
- Make note of the time of the pour.
- The solidified casting should be removed from the chamber before or when it cools to room temperature (about 30 minutes.) If allowed to remain in the chamber for over an hour, it will grip the chamber walls and will be difficult to remove.
- After approximately 30 minutes of cooling time remove the cast from the chamber using a rod or dowel inserted from the muzzle end of the barrel.
- At one hour past the time of pour, the casting will be exactly the size of the chamber. (At the end of 200 hours (a little over a week) it will have expanded approximately .0025% (1/4th of 1%)

TLW1012S -Measure Bore Diameter:

Measure Bore Diameter using standard procedures.

Method:

- Measure bore dimension (Ref: Remington Chamber Drawing E-EXP8261, rev. J - Barrel)
- Dimension equals: 0.2165" (+0.000", -0.0005")

Data Required:

- Rifle serial numbers
- Measurements of each bore by serial number
- Testers' Names
- TLW Number

TLW1012T -Measure Groove Diameter:

Measure Groove Diameter using standard procedures.

Method:

- Measure groove dimensions (Ref: Remington Chamber Drawing E-EXP8261, rev. H - Barrel)
- Dimension equals: 0.2215" (+0.000", -0.0005")
- Number of Grooves equals: 5

Data Required:

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- Rifle serial numbers
- Measurements of each barrel's groove listed by serial number
- Testers' Names
- TLW Number

TLW1012U -Measure Twist Rate:

Measure Twist Rate, 1 turn in 14.5". (Ref: Remington Chamber Drawing E-EXP8261, rev. H Barrel.

Method:

- Measure Twist Rate using standard procedures.

Data Required:

- Rifle serial numbers
- Measurements of each barrel's twist rate listed by serial number
- Testers' Names
- TLW Number

TLW1012V -Measure Weight of Rifle:

The overall weight of the rifle will be taken and recorded. The average weight of the 29 rifle sample and the weight's standard deviation for the 29 rifle sample will be calculated and recorded.

Method:

- The rifles will be weighed with the chamber empty and the magazine empty.
- Remove any scope bases/mounts or other accessories before weighing.
- Use the digital scale located in the Metrology Lab - Mettler Toledo SM34-K DeltaRange®, Ser. Num. 2115047651
- If not already on, turn digital scale on. (Note: if scale needs to be turned on, allow scale electronics to warm up approximately 15 minutes before use); zero-out the scale.
- Carefully place rifle on scale and round the readout to the nearest 0.01 lb.

Data Required:

- Rifle serial numbers
- Measurements of each rifle's weight (in lb.) listed by serial number
- The calculated average weight and the calculated standard deviation for the 29 rifle sample.
- Testers' Names
- TLW Number

TLW1012W -Inspect for Barrel Free-float:

All rifles in the sample will be checked for Barrel Free-float.

Method:

- Use a dollar bill, one that is fairly new and not wrinkled or torn.
- Loop the bill around the circumference of the barrel between the barrel and the stock.

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- Pass the bill along the length of the barrel. The bill should pass freely from the tip of the fore end to the point close to where the barrel attaches to the receiver.

Data Required:

- Rifle serial numbers
- Results of each free-float check by rifle
- Testers' Names
- TLW Number

FUNCTION & ENDURANCE TESTING:

TLW1012X -Basic Jack Function Test (to 200 Rounds (approximately)):

To get a picture of the product's functional capability, a 204 round per rifle jack function test will be conducted. All (29) rifles will be used for this test.

The test will be conducted in the test jacks 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 expected maximum average malfunction rate for new bolt-action rifles is 3% (see SAAMI Technical Committee Manual, Volume VI, Rimfire Rifle, 6-GD.01, issued 9-15-78). In no case should the average malfunction rate for this rifle type exceed 3%.

Up to six rifles from the sample of 29 (i.e. ~20% of the submitted sample) can be removed from the averaging process if they have excessive malfunction rates (i.e. more than 5% difference than the group average of the rifles that are within the 0%-3% malfunction rate limit) relative to the remaining group of 29 samples. These rifles will be investigated by engineering to determine the probable source of the problem and engineering will then provide written documentation for possible inclusion in the DAT report.

In addition to the 3% maximum average overall, the following limits (for the entire sample) are established: (see SAAMI Technical Committee Manual, Volume VI, Rimfire Rifle, 6-GD.01, issued 9-15-78).

Misfeed -- all types	3%
Extractor -- Ejection	1%

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 any of the plastic components that may be present, signs of damage or potential failure.

Method:

- Draw ammunition from stores.
- 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.
- Close the bolt over the empty chamber.
- Choose the first ammunition type per the Ammunition Schedule.
- Load six (6) rounds into the magazine and insert the magazine into the rifle.
- Cycle the bolt to feed the 1st round into the chamber.
- Push the safe to the "F" or Fire position; be sure that the barrel is far enough within the porthole 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.
- Note any extraction or ejection problems.
- Continue to fire the remaining rounds in the magazine until the last round is fired.
- Push the Safety to "S" or Safe position. Note that the safety will be pushed to the fire position at the start of every six (6) round trial and will be pushed to the On Safe position at the end of every eight (8) round trial.

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- After firing 102 rounds 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.
- After cooling, the second cycle of 102 rounds will be fired in the rifle to complete the test. Repeat the cycle according to the Ammunition Schedule.
- All malfunctions will be recorded on the data sheets.

Ammunition Schedule

Rounds	Manufacturer	Type	Code	Cumulative Rounds
1-12	Remington	Viper	1922	12
(1-12)	(Alternate) Remington	Yellow Jacket	1722	(12)
13-24	Remington	IVV Golden Bullet	1500	24
(13-24)	(Alternate) Remington	IVV Golden Bullet HP	1600	(24)
25-36	RWS Dynamit-Nobel	Rifle Match	2134225	36
37-48	CCI	Green Tag	00033	48
49-60	Winchester	Target	X122LR	60
61-72	Federal	Gold Medal Match	900	72
73-84	American Eagle	Copper Plated	AE22	84
85-96	Fley	Match FPS	RE22FPS	96
97-102	PMC	Revermaster	22SM	102
103-114	CCI	Slinger	50	114
115-126	Federal	Classic High Velocity	710	126

Data Required:

- Rifle serial number
- Any malfunctions noted or other unusual items of note
- The ammunition used for the test with the ammo lot code number of the rounds actually used.
- Jack Number used to test rifle.
- The TLW Number
- Tester's name

TLW1012Y -Basic Shoulder Function Test (to 100 rounds (approximately)):

To get an early picture of the product's functional capability from the perspective of the customer, a 102 round per rifle shoulder function test will be conducted to evaluate the potential for feeding problems. Use all 29 test rifles for this test.

These malfunctions may be different from those noted in the jack test due to shooter reactions to recoil potentially affecting round position in the magazine box. The test will be conducted in the long range (or the pistol range) shooting from a standing position.

Use the Ammunition Schedule as listed in TLW1012X above.

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 the 3% malfunction rate. (See the malfunction criteria as listed in TLW1012X - above for details.)

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.

Method:

- Draw ammunition from stores. Use the Ammunition Schedule as listed in TLW1012X above.
- Perform all range preparations required for shooting in the long range. Make sure the range ventilation is turned on.
- Wear safety glasses with side shields and double hearing protection.
- When ready to fire, the tester should stand in the doorway of the long range and when firing should be careful to keep the bullets in the center of the range to prevent damage to shields, lights, etc.

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- Load the six (6) rounds into the magazine insert into the rifle and close the bolt to feed the 1st round into the chamber.
- Push the safety to the "F" or Fire position
- Fire the first round in the chamber, listen for any off-sounds, and be alert for any other unusual behavior.
- Note any extraction or ejection problems.
- Continue to fire the remaining rounds in the magazine until the last round is fired.
- Push the Safety to "S" or Safe position, the safety will be pushed to the "F" or Fire position at the start of every six (6) round trial and will be pushed to the "S" or Safe position at the end of every six (6) round trial.
- After firing 100 rounds the rifle will be checked carefully for the presence of any live ammunition and if empty will be 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
- Date of test firing
- The TLW Number
- The ammunition used for the test with the ammo code number of the rounds actually used.
- Any malfunctions noted or other unusual items of note.

TLW1012Z -Extended Function & Endurance:

This Endurance Test will be shot to accomplish two purposes. The first purpose is to determine an estimate of the product's expected malfunction rate over an extended period of shooting. The second is to determine both the estimated life of individual components as well as the expected life (in rounds) of the product before system failure occurs. 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 Endurance Test will be shot in the test jacks. Only ten (10) rifles will be used for this test. The test will be performed according to Remington's standard endurance test procedures for Rimfire rifles. The test "pyramid" for this test will use the following test schedule.

EXTENDED FUNCTION & ENDURANCE TEST SCHEDULE

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
0-500	X	X	X	X	X	X	X	X	X	X
501-1,000	X	X	X	X	X	X				
1,001-2,500	X	X	X							
2,501-5,000	X	X								
5,001-10,000	X									

Use any manufacturers brands and 22 Long Rifle Types that are currently in inventory.

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. The standard Remington test jacks will be used for all jack-related testing.

Each rifle will be shot no more than 100 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.

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The S.A.A.M.I. recommendation for the minimum acceptable malfunction rate for a bolt-action rifle is a malfunction rate of $\leq 3\%$. In this case, if the overall malfunction rate average for the test samples is $> 3\%$, the DAT test will be stopped and the guns returned to Design for modification and improvement before being re-submitted for continuation of the endurance test. If the overall average malfunction rate is $\leq 3\%$ but one of the firearms is significantly greater than the 3% malfunction rate, the test may continue with the other nine test samples while Design attempts to fix the problem with malfunctioning gun. After repair, this gun will again be required to pass the 200 round jack function test at $\leq 3\%$ malfunction rate. If the gun passes these criteria it will then be re-introduced into the Endurance test. It is important that total endurance rounds on the gun include any rounds that are put through the gun for re-test purposes.

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

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 reassemble.
- Fire each test firearm in accordance with the firing procedure (number of rounds, firing cycle) specified by engineering and the test plan.
- 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 100 rounds. 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 the "F" or Fire to "S" or Safe position at the end of every 6 rounds, and from the "S" or Safe to the "F" or Fire position at the start of the next six (6) round cycle.
- After every 500 rounds, disassemble, inspect, clean and lubricate the entire mechanism and take all required measurements.
- The Standard Remington Jacks are to be used for this test. Either jack position is acceptable for this test.

Data Required:

- Rifle serial number
- Tester's name
- The Test Jack Identification
- TLW Number
- Date of actual testing
- 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.
- Record ammunition lot code information as it is used throughout the test.

TLW1012AA -Clean Rifles and Inspect:

After each 500 rounds of endurance, unless other wise specified, each rifle will be disassembled, cleaned and thoroughly inspected.

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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.

ACCURACY TESTING:

TLW1012AB - Group Size at 50 yards – (Remington/Eley 22 Match EPS)

The fifty-yard accuracy testing will be completed utilizing standard factory ammunition. All 29 rifles will be used for this test. The test will consist of three, 5-shot groups. Each firearm will be cleaned and then fired with five fouling shots prior to beginning the accuracy work-up. Guns will be cooled after every 5-shot group. High performance optics may be used to conduct this test.

Group sizes will be measured from actual targets and recorded. Average group size (for all rifles as a group) must be $\leq 0.800"$ at 50 yards. No individual rifle in the test sample may exceed a Max Group Size of 1.5".

Ammunition used for this test will be Remington-Eley 22 Match EPS (RE22EPS). The same code of ammunition and same type of ammunition will be used for all group size test shots.

Method:

Ammunition Certification:

- Prior to start of accuracy testing on the M/504 the Remington-Eley 22 Match EPS ammunition will be qualified out of a UR barrel (currently being made.)
- Certify the ammunition lot selected for muzzle velocity and pressure. At least ten rounds will be fired in the pressure barrel
- For Certification shoot the ammunition qualification test in the long range using the .22 LR Accuracy Barrel. Use 50 yards for the distance.
- Prior to beginning of the test, clean the bore and shoot 5 "fouling" shots to seat in the rifle.
- Fire three, 5-shot groups at 50 yards.

Group Size using the M/504 Test Samples:

- Prior to beginning of the test, clean the bore and shoot 5 "fouling" shots to seat in the rifle.
- Fire three, 5-shot groups at 50 yards, using a high quality scope through each of the 10 sample rifles.

Data Required:

- Provide documentation of the results of the Ammunition Certification procedure
- Measure group sizes center to center
- Record takedown screw torque. (Note: Torque specification for takedown screw not yet determined. Will be determined at time of assembly by Design.)
- Record torque for barrel clamp screw. Should be between 100-125-lb./in. of torque.
- Record torque for barrel set screw (in receiver). Should be ≥ 25 -lb./in. torque.
- Record make and identifier of scope
- Record ammunition lot numbers used during the test.
- Record any malfunctions that occur during the test.
- TLW Number

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- Testers' Names

TLW1012AC - Group Size at 50 yards – (Multiple Ammunition Types)

Multiple types of ammunition will be used to shoot 50-yard accuracy testing to provide a measure of accuracy on the test sample rifles using other than Remington/Eley 22 Match EPS ammunition. This test will be completed utilizing standard factory ammunition from the manufacturers listed in the chart below. Ten rifles will be selected from the same population that was used for the group size test using the Remington/Eley 22 Match EPS Ammunition. The ten rifles selected should represent the average performance as determined by the previous accuracy test.

To minimize the potential for changes in group size due to wear, the order of test for each ammunition type for each rifle in the test has been randomized. Group size for each ammunition type will be compiled at the end of the testing.

The test will consist of three, 5-shot groups for each of the ammunition types listed below in the attached schedule.

Guns will be cooled after every 5-shot group.

Each firearm will be cleaned and then fired with five fouling shots prior to beginning the accuracy work-up. The rifles will be cleaned after the completion of testing on a given type of ammunition. Group sizes will be measured from actual targets and recorded. The same code of ammunition and same type of ammunition will be used for all group size test shots. Average group sizes by rifle and ammunition type will be recorded for information only. Ammunition used for this test will be per the attached schedule below.

Method:

Ammunition Certification:

- Certify the ammunition lot selected for muzzle velocity and pressure.
- For Certification shoot the ammunition qualification test in the long range using the .22 LR Accuracy Barrel.
- Prior to beginning of the test and between each type of ammunition, clean the bore and shoot 5 "fouling" shots to seat in the rifle.
- Fire three, 5-shot groups at 50 yards.

Group Size using the M/504 Test Samples:

- Prior to beginning of the test, clean the bore and shoot 5 "fouling" shots to seat in the rifle.
- Fire three, 5-shot groups at 50 yards, using a high quality scope from test lab inventory through each of the 10 sample rifles.

Data Required:

- Provide documentation of the results of the Ammunition Certification procedure
- Measure group sizes center to center.
- Record takedown screw torque. (Note: Torque specification for takedown screw not yet determined. Will be determined at time of assembly by Design.)
- Record torque for barrel clamp screw. Should be between 100-125-lb./in. of torque.
- Record torque for barrel set screw (in receiver). Should be ≥ 25 -lb./in. torque.
- Record make and identifier of scope
- Record ammunition lot numbers used during the test.
- Record any malfunctions that occur during the test.
- TLW Number
- Testers' Names

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A	Remington HV Golden Bullet, .22 Long Rifle*	1500
B	Winchester .22 LR Target*	XT22
C	Federal .22 LR Gold Medal Match*	900
D	CCI .22 LR Green Tag*	00033
E	PMC .22 LR Scoremaster*	22SM

*Note: Above list is somewhat arbitrary and is used as a proposed "start point". Other types may be substituted and will be acceptable if agreed to by both Test and Marketing.

AMMUNITION SHOOTING ORDER FOR EACH TEST RIFLE FOR MULTIPLE AMMO GROUP SIZE TEST

Random Order to negate effects of "break-in" and barrel wear

Test Rifle	1 st Ammo Type 3, 5-shot Groups	2 nd Ammo Type - 3, 5-shot Groups	3 rd Ammo Type - 3, 5-shot Groups	4 th Ammo Type - 3, 5-shot Groups	5 th Ammo Type 3, 5-shot Groups
A1	C	E	B	A	D
A2	D	E	B	C	A
A3	C	B	E	A	D
A4	E	A	D	C	B
A5	E	D	C	A	B
A6	D	C	B	E	A
A7	E	D	C	A	B
A8	B	E	C	A	D
A9	B	E	C	D	A
A10	B	A	D	E	C

ENVIRONMENTAL TESTING:

TLW1012AD - Hot Function Test

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

Method:

- Use one rifle from the submitted sample.
- Condition test firearm and 126 total rounds of ammunition made up of each caliber in a climatic chamber for at least 6 hours at a temperature of 120 degrees F.
- Test each firearm as follows.
- Remove from chamber and move to Function and Casualty Range for testing.
- Use the ammunition schedule listed in TLW1012X.
- Fire 18 rounds of ammunition and return rifle and ammunition to chamber for 2 hours and repeat this procedure until all 126 rounds have been fired.
- Do not perform maintenance during the 126 round cycles.
- Cycle the safety from fire to safe every 6 rounds.
- The tester should wear gloves to protect his hands from the hot metal.
- After 126 rounds have been fired through each 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
- Record all necessary maintenance actions performed
- TLW Number
- Testers' Names

TLW1012AE - Cold Function Test:

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

Method:

- Use one rifle from the submitted sample.
- Condition the firearm and 126 rounds of ammunition in climatic chamber for at least 6 hours at a temperature of -20 degrees F.
- Use the ammunition schedule listed in TLW1012X.
- Test each firearm as follows:
- Remove from chamber and move to Function and Casualty Range for testing.
- Fire 18 rounds of ammunition. Return sample rifle to the chamber and recondition at -20 degrees F for 2 hours and repeat, shooting 18 rounds per test cycle, until all 126 rounds have been fired.
- Do not perform maintenance during the 126 round cycles.
- Cycle the safety from fire to safe every 6 rounds.
- After 126 rounds have been fired through the firearm, remove the firearm from the conditioning chamber, disassemble, thoroughly inspect, clean and lubricate.

Data Required:

- Record temperature and exposure times
- Record all malfunctions.
- Record damage noted during inspection
- Record all necessary maintenance actions performed
- TLW Number
- Testers' Names

TLW1012AF - Thermal Cycle Test:

This test evaluates the effects of large temperature changes due to expansion and contraction differentials of metallic and non-metallic components used in the test guns. The sample rifle will be alternately cycled between a temperature of 120°F and -20°F for at least 3 complete cycles (i.e. raised to 120° F and then lowered to -20° F will count as '1 cycle'), brought back to ambient temperature and test fired in the test jacks for 126 rounds to evaluate for possible changes in both function and safety related characteristics.

Method:

- Shoot sample rifle in test jack to establish the rifle's malfunction characteristics and rate. Shoot a total of 126 rounds to determine malfunction rate.
- Do not clean rifle

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- Place rifle in freezer that is pre-set to -20°F and leave undisturbed for at least 24 hours.
- At completion of 24+ hours, remove rifle and immediately place in the pre-heated test chamber at a temperature of +120°F.
- Leave rifle undisturbed for at least 24 hours.
- At completion of at least 24 hours, remove rifle and immediately place in the freezer.
- Repeat this cycle for a minimum of three complete hot and three complete cold cycles.
- At the completion of the final cycle (the heat cycle) remove the rifle from the chamber and allow cooling to ambient temperature – a minimum of six hours.
- Return the rifle to the test jack used at the start of the test and fire another 126 rounds recording malfunction types and rates using the ammunition schedule as listed in TLW1012X.
- Remove the action from the stock and examine the rifle for any obvious signs that the thermal cycling has affected the parts with special attention directed at the metallic and non-metallic interfaces. Look for cracked parts and for signs of material creep.

Data Required:

- Rifle serial number
- Cycle time for each test condition
- Temperature records throughout each cycle. Use the chart feature on the freezer and a temperature-recording device for the chamber.
- Malfunctions type and rates both pre- and post thermal cycles.
- Observations made on cracks, creep or other noteworthy items.
- TLW Number
- Testers' Names

TLW1012AG - Heat & Humidity Test:

This test evaluates the effects of high heat combined with high humidity such as might be found in some shooting environments. Of special interest for this test is the effect of heat and humidity on the wood stock.

Method:

- 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.
- Use ammunition schedule as listed in TLW1012X.
- Fire 18 rounds of ammunition. Return the firearm to the chamber. Wait 2 hours and repeat procedure until all 126 rounds have been fired.
- Do not perform maintenance during the 126 round cycles.
- Cycle the safety from fire to safe every 6 rounds.
- After 126 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
- Record Testers' Names
- Record TLW Number

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TLW1012AH - Field Debris Test:

This test determines the effect of "field debris" on firearm performance. The firing for this test is conducted after the firearm has field debris directly placed in the action. Use a field debris mixture as specified in Table No. 2, below.

Method:

- Gun Preparation:
- Clean and lubricate one test firearm per Owner's Manual or per Design Team instruction.
- Debris Gun
- Remove the bolt if applicable. Make sure the Safety is in the "SAFE" position and verify that the firearm is unloaded.
- Record the weight of one level tablespoon of field debris mixture per Table No. 2.
- Expose the firearm as follows:
 - Place the firearm in a shooting jack, turn bottom side up, and apply a tablespoon of debris in the fire control mechanism from the bottom. Tap the firearm three times in the middle of the receiver to jar the rifle and aid field debris getting into the mechanism. (Apply a light blow using a small plastic tipped hammer.)
 - Turn the firearm to its normal upright horizontal position and apply a tablespoon of field debris to the top of the fire control mechanism from the top. Tap the firearm three times as above.
 - Wipe away any debris that prevents the bolt from closing. Clean parts as much as possible by blowing sharply or wiping (use of a compressed air canister is permissible.)
- Insert the bolt back into the gun if applicable.

24 Round Live Fire Test:

- Load the magazine and chamber with live ammunition with 6 rounds. Put the Safety in the "FIRE" position and attempt to fire the loaded rounds. Record results for each round.
- If at any time the gun fires without the trigger being pulled, **STOP** the test immediately and notify Test Lab Supervision. **DO NOT OPERATE ANY OF THE FIREARM'S MECHANISMS DURING THIS TIME.**
- If repeated malfunctions make it impossible to fire the remaining ammunition, stop the test and notify Test Lab Supervision.
- Cycle the safety from "FIRE" to "SAFE" after every firing cycle
- At the end of every firing cycle:
 - Verify the firearm is not loaded.
 - Close the firearm on an empty chamber and put the Safety in the "SAFE" position
 - Apply a 10 lb. load to the trigger by using either a digital force gage or spring scale - Firearm must not fire. Record results.
 - With the finger off the trigger, move the Safety to the "FIRE" position - Firearm must not fire. Record results.
 - Put the Safety on "SAFE" and open the bolt or action.
- Repeat the firing sequence until either 24 rounds are fired or the test is stopped.
- At the conclusion of testing disassemble the firearm over a large piece of white paper and weigh the amount of debris present in the main mechanism after cleaning off all the parts.

Data Required:

- Record malfunctions.
- Record number of rounds fired.
- Record weight of debris in the gun at the conclusion of the test.
- Record Testers' Names
- Record TLW Number

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Table No. 2 - Field Debris Mixture (By Volume)	
Dried Grass Clippings	2 parts
Toothpicks (round, .25" long max.) to represent twigs	1 part
Bird Seed	1 part
Table Salt	1 part
Small Stones (.015" dia. to .125" dia.)	1 part
Crushed Dry Leaves	2 parts
Pine Needles	1 part
Hair Samples (no longer than 2 inch)	1 part

TLW1012AI - Dynamic Sand & Dust Test:

This test evaluates the effects of blowing sand and dust on firearm performance. In this test the test firing is conducted after the firearm is removed from the sand and dust environment. Use the sand and dust mixture as specified in Table No. 1. below.

Method:

Gun Preparation:

- Clean and lubricate one test firearm per Owner's Manual or per Design Team instructions and seal the muzzle with tape.

Debris Cabinet Preparation: (Place cabinet in the Abuse Room for this test.)

- Completely clean the inside of the cabinet of all loose substances.
- Obtain a 500 ml (approx. 16 fl. oz.) quantity of Sand & Dust mixture prepared as per recipe in Table No. 1.
- Pour the 500 ml of Sand & Dust mixture into the bottom of the cabinet.
- Connect the debris cabinet to a supply of compressed air capable of supplying a minimum of 60-psi pressure. **(Make sure air is off at this time.)**
- Record the actual line pressure used for this test. Anywhere between 60 and 90 psi is considered acceptable.
- Position the air hose inside the cabinet so that it blows the debris around uniformly when the air is turned on.

Debris Gun:

- Make sure the Bolt is open and the Safety is in the "SAFE" position. (ISS "Off")
- Mount the firearm in the center of the debris cabinet with the barrel in a horizontal position with the top of the receiver positioned upward.
- Load the firearm with a single primed case by inserting in the chamber and close the bolt. Follow procedures for use and handling of primed cases.
- With the firearm in the center of the box, fasten the box lid.
- Turn the air on.
- After 1 minute, stop the blowing air, open the lid, and turn the firearm upside down in the box. Replace the lid and turn the air back on for another minute.
- Turn the air off.
- Remove the gun from the box after first attempting to wipe the firearm clean with gloved hands. Clean parts as much as possible by either blowing the rifle with compressed air or shaking the firearm. Carefully remove the tape from the muzzle. **REMEMBER THAT THE RIFLE HAS A PRIMED CASE IN THE CHAMBER.**
- Take the rifle to a test booth in the short range and insert the muzzle into the port opening and then secure the stock into the jack.
- Turn on the snail and air ventilation system as per normal operating procedures.

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Primed Case Test:

- Place the Safety in the "FIRE" position.
- Attempt to fire the primed case by pulling the trigger. (Make one attempt only.)
- Record results.
- If the primed case did not fire determine if the firing pin or hammer has fallen by observing the position of the firing pin or hammer. Carefully open the action and remove the primed case. Inspect primer for evidence of firing pin contact. Document findings.
- Put the Safety in the "SAFE" position.
- If the primed case did not fire review results with Test Lab Supervision before proceeding to the Live Fire Test.

24 Round Live Fire Test:

- Load the magazine and chamber with live ammunition.
- Put the Safety in the "FIRE" position and attempt to fire the loaded rounds. Record results for each round.
- If at any time the gun fires without the trigger being pulled, **STOP** the test immediately and notify Test Lab Supervision. **DO NOT OPERATE ANY OF THE FIREARM'S MECHANISMS DURING THIS TIME.**
- If repeated malfunctions make it impossible to fire the remaining ammunition, stop the test and notify Test Lab Supervision.
- Cycle the safety from "FIRE" to "SAFE" after every firing cycle.
- At the end of every firing cycle:
- Verify the firearm is not loaded.
- Close the firearm on an empty chamber and put the safety in the "SAFE" position
- Apply a 10 lb. load to the trigger by using either a digital force gage or spring scale - Firearm must not fire. Record results.
- With the finger off the trigger, move the safety to the "FIRE" position - Firearm must not fire. Record results.
- Put the Safety on "SAFE" and open the bolt or action.
- Repeat the firing sequence until either 24 rounds are fired or the test is stopped.
- At the conclusion of testing disassemble the firearm over a large piece of white paper and weigh the amount of debris present in the main mechanism after cleaning off all the parts.

Data Required:

- Record malfunctions.
- Record number of rounds fired.
- Record weight of debris found in the gun.
- Record Testers' Names
- Record TLW Number.

TABLE No. 1 COMPOSITION OF SAND AND DUST MIXTURE (By percent particles, by weight, retained in sieves)		
Sieve Size (US gage sieve no.)	Percent of weight retained	Particle Size (microns)
20	3	842 to 1000
30	5	595 to 841
45	17	355 to 595
60	14	251 to 354
100	10	150 to 250
pass 100	less than 1	-----

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140-mesh silica flour		
140	1	105 to 149
200	4	74 to 105
325	7.5	44 to 74
pass 325	37.5	less than 44

ABUSIVE TESTING

(See Procedures in Appendix I)

TLW1012AJ - S.A.A.M.I. Jar-Off Test:

The objective of the jar-off test is to simulate the abusive impacting (bumping) of the firearm against a hard surface with the firearm in a condition of maximum readiness. With the firearm in the ready to fire condition, the firearm shall be capable of withstanding a jar-off shock equivalent to being dropped from a height of 12" inches onto a 1" thick 85 ± 5 Durometer (Shore A) rubber mat backed by concrete. Trigger Pull and Engagement will be checked for adjustment to minimum specifications. The test will be performed according to SAAMI Technical Committee procedures. Magazine will be loaded to maximum capacity with dummy rounds according to SAAMI procedures. A fresh primed case will be chambered prior to each drop. After each drop the primed case will be discharged to verify its validity. This test will be performed on a sample of six firearms.

Method:

- With the firearm cocked and the safety in the FIRE position the firearm shall be capable of withstanding jar-off shock equivalent to being dropped from a height of twelve inches onto an 85 ± 5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large enough so that when the gun is dropped it will fall within the perimeter of the mat striking the mat once. The twelve inches will be measured from the test surface to the lowest point on the firearm. As an alternate to free dropping, other methods may be substituted if they provide equivalent impact characteristics. The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.
- The firearm or firearms shall be dropped in such a way as to strike the rubber mat surface once in each of the following attitudes:
 - Barrel vertical, muzzle down.
 - Barrel vertical, muzzle up.
 - Barrel horizontal, bottom up.
 - Barrel horizontal, bottom down.
 - Barrel horizontal, left side up.
 - Barrel horizontal, right side up.
- Tests shall be conducted with the trigger pull force set at the minimum force specified by design, with trigger/scar engagement set to the minimum specified by design, and with the fire control lubricated per the owner's manual.
- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges and inserted in the firearm.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.

Data required:

- Record engagement and trigger pull.

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- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record the round level on the firearm.
- TLW Number
- Testers' Name

TLW1012AK - S.A.A.M.I. Rotation Test:

The test will be conducted according to SAAMI Technical Committee procedures. The firearm will be placed in the "Safe Carrying" condition and dropped from an upright position with its butt resting on the surface of a 1" thick 85±5 Durometer (Shore A) rubber mat backed by concrete. Trigger Pull and Engagement will be checked for adjustment to minimum specifications. Magazine capacity will as well be according to SAAMI procedures. The firearm shall be tested (dropped) on both the right and left sides. After each rotation, the primed case will be discharged to insure validity of test. This test will be performed on a sample of six firearms.

Method:

- With the firearm safety in the SAFE state, the firearm shall be capable of passing the below test criteria when allowed to fall freely from an upright position with its butt resting on the surface of an 85±5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large enough so that when the gun falls it will come to a rest without interference within the perimeter of the mat. The firearm shall be tested so as to fall once on its right-hand side and once on its left-hand side. The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.
- Tests shall be conducted with the trigger pull force set at the minimum force specified by design, with trigger/sear engagement set to the minimum specified by design, and with the fire control lubricated per the owner's manual.
- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges, inserted in the firearm.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.

Data required:

- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record round level on the firearm
- TLW Number
- Testers' Names

TLW1012AL - S.A.A.M.I. Drop Test:

This test will simulate abusive dropping of the firearm from a distance of 48 inches onto a 1" thick 85±5 Durometer (Shore A) rubber mat backed by concrete. Trigger Pull weight will be adjusted to the minimum specification. Trigger Pull and Engagement will be checked for adjustment to minimum specifications. Test will be performed according to SAAMI Technical Committee procedures. Magazine capacity will as well be according to SAAMI procedures. After each series of test, the primed case will be discharged to insure validity of test. This test will be performed on a sample of six firearms.

Method:

- With the firearm safety in the SAFE state, the firearm shall be capable of passing the below test criteria for drop testing from a height of four feet onto an 85±5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large enough so that when the gun is dropped it will fall and come to rest without interference within the perimeter of the mat.

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The four feet shall be measured from the surface of the rubber mat to the center of gravity of the firearm. The center of gravity shall be determined to an accuracy of \pm one inch by any recognized method for finding the center of gravity of an irregular shaped object. The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.

- The firearm or firearms shall be dropped in such a way as to strike the rubber mat surface once in each of the following attitudes:
 - Barrel vertical, muzzle down.
 - Barrel vertical, muzzle up.
 - Barrel horizontal, bottom up.
 - Barrel horizontal, bottom down.
 - Barrel horizontal, left side up.
 - Barrel horizontal, right side up.
- Tests shall be conducted with the trigger pull force set at the minimum force specified by design, with trigger/sear engagement set to the minimum specified by design, and with the fire control lubricated per the owner's manual.
- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges and inserted in the firearm.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.

Data required:

- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record round level
- TLW Number
- Testers' Names

TLW1012AM - Extended Jar-Off Test: (for Information only.) -

To establish design margin this test simulates the abusive impacting (e.g. bumping) of the firearm against a hard surface with the firearm in a state of maximum readiness under conditions more severe than the SAAMI recommendations. This test will be performed on a sample of six (or the number available after performing the std. SAAMI tests) firearms.

Method:

- With the firearm cocked and in the safety in the FIRE position the firearm shall be dropped from a height of 18 inches, 24 inches, 36 inches, and 48 inches onto an 85 \pm 5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large enough so that when the gun is dropped it will fall within the perimeter of the mat striking the mat once. The distance of drop will be measured from the test surface to the lowest point on the firearm. The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.
- The firearm or firearms shall be dropped in such a way as to cause it to strike the rubber mat surface in each of the following attitudes:
 - Barrel vertical, muzzle down.
 - Barrel vertical, muzzle up.
 - Barrel horizontal, bottom up.
 - Barrel horizontal, bottom down.
 - Barrel horizontal, left side up.
 - Barrel horizontal, right side up.
- Tests shall be conducted with the trigger pull force set at the minimum force specified, with engagement set to the minimum specified, and with the fire control well lubricated with Rem-Oil.

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- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges and inserted in the firearm.
- Conduct this test at 18 inches, 24 inches, 36 inches, and 48 inches.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.
- If a failure occurs on a test sample rifle at a specific height, finish all other orientations at that height and stop testing that rifle only.

Data required:

- Record engagement and trigger pull
- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record the round level on the firearm
- TLW Number
- Testers Names

TLW1012AN - Extended Rotation Test: (for Information only.)

To establish design margins this test simulates the abusive fall of a firearm when left leaning against a vertical surface under conditions more severe than the SAAMI recommendations. This test will be performed on a sample of six (or the number available after performing the std. SAAMI tests) firearms.

Method:

- With the firearm safety in the SAFE state, the firearm shall be capable of passing the following test criteria when allowed to fall freely from an upright position with its butt resting on the surface of a tiled floor backed by concrete. The firearm shall be tested so as to fall once on its right-hand side and once on its left-hand side. The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.
- Tests shall be conducted with the trigger pull force set at the minimum force specified, with engagement set to the minimum specified, and with the fire control well lubricated with Rem-Oil.
- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges, inserted in the firearm.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.

Data required:

- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record round level of the firearm
- TLW Number
- Testers' Names

TLW1012AO - Extended Drop Test: (for Information only)

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To establish design margins this test simulates abusive dropping of the firearm in conditions more severe than the SAAMI recommendations. This test will be performed on a sample of six (or the number available after performing the std. SAAMI tests) firearms.

Method:

- With the firearm safety in the SAFE state, the firearm shall be dropped from a height of 6 feet and 8 feet onto an 85 ± 5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large enough so that when the gun is dropped it will fall and come to rest without interference within the perimeter of the mat. The drop height shall be measured from the surface of the rubber mat to the center of gravity of the firearm. The center of gravity shall be determined to an accuracy of \pm one inch by any recognized method for finding the center of gravity of an irregular shaped object.
- The primed case shall be discharged following the drop and a fresh primed cartridge re-chambered prior to the next drop. A "fresh" firearm may be substituted into the test at any point.
- Test Procedure - The firearm or firearms shall be dropped in such a way as to strike the rubber mat surface once in each of the following attitudes:
 - Barrel vertical, muzzle down.
 - Barrel vertical, muzzle up.
 - Barrel horizontal, bottom up.
 - Barrel horizontal, bottom down.
 - Barrel horizontal, left side up.
 - Barrel horizontal, right side up.
- Tests shall be conducted with the trigger pull force set at the minimum force specified, with engagement set to the minimum specified, and with the fire control well lubricated with Rem-Oil.
- The test shall be conducted with the magazine or clip fully loaded with dummy cartridges and inserted in the firearm.
- Parts breakage or other damage as a result of drop testing does not constitute failure as long as the empty primed case does not fire and the firearm can be unloaded safely after each drop. More stocks are required than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.
- If a failure occurs on a test sample rifle at the 6 ft. height, finish all other orientations at that height and stop testing that rifle only. If a failure occurs on a test sample at the 8 ft. height, finish all other orientations at that height.

Data required:

- Record whether or not the firearm fires an empty primed case of its designated cartridge when tested in accordance with this procedure.
- Record round level on the firearm.
- TLW Number
- Testers' Names

INTENTIONAL ABUSE SAFETY PRECAUTIONS:

Note that for the following tests, the test round is to be loaded remotely and in addition, the test setup shall have the capability of unloading the live round remotely if required.

TLW1012AP - Obstructed Bore Test:

The purpose of this test is to evaluate the effects of a bore obstruction on the strength and integrity of the rifle. This test simulates what might happen if a fired round results in a "squib" leaving an obstruction in the bore.

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For this test use 2 rifles. For the first part of the test the sample rifle will have a rifle bullet driven into the bore to a position immediately ahead of the chamber. A standard round (.22 Long Rifle) will be loaded and fired remotely. All testing will be done in the blow-up room using the new high-speed video camera and witness paper. If the test round produces broken parts or other debris, photographs of the parts as located in the blow-up room will be taken for the record. After collection and removal of the parts from the room additional photographs of the various individual components will be taken for the record. All parts and will put in sample bags, boxed and temporarily stored for review.

For part two of the test, repeat the procedure with a bullet driven into the bore from the chamber to a position approximately half-way the length of the barrel.

Method:

- Place lead bullet from .22 caliber round into the chamber end of the bore.
- With a steel rod of a slightly smaller dia. than the bore drive the bullet down the bore until it is located just ahead of the chamber so that there is room to load a standard factory round (.22 Long Rifle) into the chamber and close and lock the bolt.
- Place the rifle in the test jack in the blow-up room with the muzzle located in the port.
- Place witness paper in position and turn on high-speed video system and prepare to capture shot.
- Tie lanyards in place.
- When preparations are complete, load 1 standard factory round into the chamber and carefully close the bolt, but do not rotate into locked position, and move the safety to the "Fire" position.
- Leave the room, finish closing the bolt to its down and locked position with the bolt-close lanyard, start the video camera.
- When ready pull the lanyard to fire the round.
- Examine the rifle, the witness paper and the video for signs of damage. Take digital photos of any observed damage.

Data Required:

- Record whether or not damage to the rifles is evident.
- Save high-speed video files and any digital photos of damage.
- Note whether any damage was observed on the witness paper.
- Record round level on the firearms.
- Record the serial numbers of the rifles used.
- Record Testers' Names.
- Record TLW Number.

TLW1012AQ - Slam Test:

This test evaluates the "sensitivity" of the rifle to the possibility of inadvertent firing that might result from rough handling during the normal use of the firearm where a user might attempt to close the bolt forcibly. The purpose of this test is to determine if the firing pin will "follow-down" if the bolt is closed in this manner. This test will be done on 6 rifles selected at random from guns A1 to A29.

Method:

- For this test the sample firearm will be placed in the standard Remington test jack with the muzzle located in the port.
- The tester will use a glove for hand protection.
- After checking for live ammunition close the bolt on an empty chamber.
- Move the safety from the "S" or SAFE position to the "F" or FIRE position.
- Open and close the bolt forcibly 3 times, paying attention during each cycle whether the firing pin follows down.
- The firing pin must not follow down during any of the three cycles.
- At the conclusion of testing put the safety in the "S" or SAFE position and open the bolt.

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Data required:

- Rifle Serial Number & Gun Sample ID Number
- Record whether or not the firearm follows down for each of the three trials.
- Record round level on the firearm.
- Record Testers' Names
- Record TLW Number.

TLW1012AR - California DOJ Evaluation:

The state of California requires certification by independent test laboratories of gun safety devices by passing specified tests. For the Model 504 Rimfire rifle and purposes of pre-evaluation before submission to an independent laboratory for certification a sample of rifles (sample number TBD) will be used to perform the tests that Remington is currently able to perform. Please see M. Jiranek for guidance on internal testing. (Ref.: Department of Justice Regulations for Certified Firearms Safety Device Laboratories, Firearms Safety Device Standards and Testing, and Standards for Gun Sales, Chapter 12.6)

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APPENDIX I

Procedure for assembling and adjusting firecontrol

Parts

1 Trigger Housing
1 Trigger
1 Sear
1 Safety Arm
1 Trigger Pull Spring
1 Sear Spring
1 Safety Detent Spring
1 Trigger Pivot Pin
1 Sear Pivot Pin
1 Safety Pivot Pin
2 Retaining Rings
3 Adjustment Screws
1 Engagement Screw
1 Minimum Engagement Screw

1. Insert **Sear Spring** into the spring pocket on the **Sear** and secure **Sear** into the **Trigger Housing** using the **Sear Pivot Pin**.
2. Slip **Safety Detent Spring** into the spring hole on the **Safety Arm**.
3. Put the other end of the **Safety Detent Spring** into the **Trigger Housing** and then rotate the **Safety** into place and secure into housing using the **Safety Pivot Pin**. A small screwdriver is needed to hold down the **Sear Spring** while inserting the **Safety Pivot Pin**.
4. Insert the **Trigger** and secure with the **Trigger Pivot Pin**.
5. Push a **Retaining Ring** on the **Trigger Pivot Pin** and **Safety Pivot Pin**.
6. Attach the **Trigger Housing** to the **Receiver**.
7. Insert the **Trigger Pull Spring** into the bottom hole in the housing. Put loctite 222 on an **Adjustment Screw** and insert it behind the spring. Screw the setscrew in until it is flush with the housing.
8. Put loctite 290 on the **Engagement Screw** and screw it into the **Trigger**. Adjust the screw until it is close to the desired engagement value.
9. Put loctite 222 on the **Over travel Screw** and screw it into the top adjustment hole on the **Trigger Housing**. Screw it in until it is close to the desired over travel.
10. Put the action into the fixture on the comparator.
11. Set the engagement to 0.022-0.025" (DAT guns only) by adjusting the **Engagement Screw** at the front of the **Trigger**.
12. Adjust the over travel to 0.015"-0.020".
13. Put the action on the trigger pull device and set the trigger pull to 2.8 - 3.2 lbf. (DAT guns only).
14. Set the action aside and let the loctite set on all adjustment screws.
15. Put loctite 222 on the **Minimum Engagement Screw** and put it into the engagement screw on the trigger. Screw it all the way in until it bottoms on the engagement screw.
16. Put the safety in the "On-Safe" position. Put loctite 222 on the **Trigger Block Adjustment Screw** and screw it into the rear hole on the **Trigger**. Using a torque-limiting screwdriver set the torque on the adjustment screw to 20 in-lbs.
17. Back the minimum engagement screw out until there is a .015" - 0.025" gap under the head. Use a feeler gauge to set.

Procedure for setting engagement

1. Set the optical comparator to the 50X magnification.
2. With the action secured in a fixture on the comparator close the bolt in the receiver.
3. Put the Safety in the "Off Safe" position.
4. Put the crosshairs on the top back edge of the Trigger and zero the horizontal reading on the comparator.
5. With the thumbscrew on the fixture move the Trigger out of engagement with the Sear until it breaks. Move the crosshairs to the same point on the trigger and record the number on the digital readout as the engagement.
6. Engagement is to be set for DAT at .022 - .025". Adjust the engagement screw as necessary until a value in this range is achieved.
7. Repeat the process and record the value 3 times to get an average.

Procedure for setting over travel

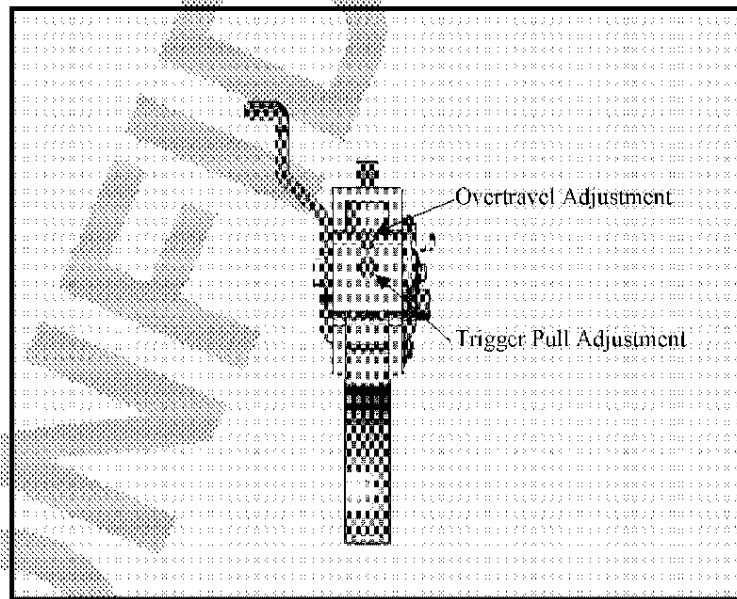
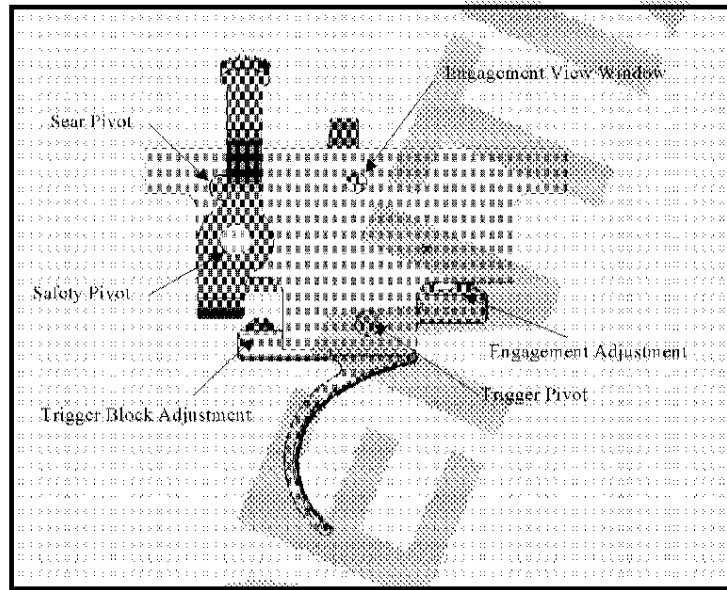
1. Immediately after setting the engagement zero the horizontal reading on the comparator at the break point of the sear.
2. Move the crosshairs on the comparator over .017 - .018". Using the thumbscrew move the trigger until the back edge is lined up on the crosshairs.
3. Using an allen wrench tighten up the over travel screw until it comes in contact with the trigger.

Procedure for setting trigger pull

1. Secure the action into the trigger pull device.
2. Make sure the firecontrol engagement surfaces are lubed with Rem Oil.
3. Take reading and adjust the trigger pull until it is at 2.8 to 3.2 pounds (DAT only).
4. When it is at this level take 2 more readings to check for consistent traces. If consistent then take 3 more readings and average them to establish the trigger pull.

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