

Remington Arms Company Inc.
RESEARCH & DEVELOPMENT TECHNICAL CENTER
315 WEST RING ROAD
ELIZABETHTOWN, KY 42701

TLW 1530

M/710 Extruded Receiver

.30-06 Sprg.

.270 Win.

.300 Win. Mag.

7mm Rem. Mag.

Design Acceptance Test (DAT #1) Test Plan

Revision # 1.0

06/18/04

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M/710 Magnum
DESIGN ACCEPTANCE TEST PLAN - DAT #1

Introduction:

A new version of the model 710 rifle will be tested. This version will consist of rifles with modified receiver inserts and equipped with "extruded tube receivers". The following calibers will be supplied and tested: four (4) .30-06 Sprg., four (4) .270 Win., four (4) 7mm Rem. Mag., and three (3) .300 Win. Mag.

Upon successfully completing the proof test including 4 rifles subjected to a 100 proof endurance test, a 200 round per rifle jack-function test is planned for the 15-rifle sample to determine the probable malfunction rate.

The 200 round per rifle function test will determine if the expenditure of further amounts of ammunition is justified by the performance of the product. Upon passing the jack-function test, the rifles will be subjected to 20 rounds per rifle test shot from the shoulder (standing position) in the long range. These tests are conducted to confirm that each rifle functions as intended when shot in the same manner as would be expected to be used by the customer.

Various inspection points and safety reviews are scheduled into the test program.

After Measurements, preliminary proof and function tests, the rifles will be subjected to a standard battery of rifle test procedures, to include Accuracy, Extended Function & Endurance testing, Environmental, and Abusive testing.

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Initial Tests, Measurements and Inspections:

INITIAL INSPECTION -:

TLW1530A – Out of Box Inspection

All test samples will be inspected upon arrival at the site. Boxes will be opened and the serial numbers will be checked for agreement between the box label and the rifle in the box. They must match. All required owner's manuals, labels, and other paperwork must be present.

The rifles will be inspected for the presence and legibility of serial numbers, all required inspection stamps, and correct caliber markings on the barrels. The rifles will be inspected visually for obvious appearance defects such as scratches, dents, and bright marks.

HEADSPACE AND PROOF -:

TLW1530B – Measure Headspace

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

Method:

- Graduated headspace gauges (if available) will be used and the headspace (i.e. belt) measurements will be recorded to the nearest .001" increment as indicated by the gauge. The appropriate chamber drawing LB-XXX will be used for referenced chamber dimensions.
- The headspace measurements will be recorded to the nearest .001" increment as indicated by the gauge.

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- If the measurement is taken at the start of the test then headspace should be less than or equal to Min. + .005".
- As the test progresses, headspace will be taken at each "Safety Inspection" scheduled in the plan and, in addition, at each "Clean & Inspect" activity scheduled by the plan.
- The readings for each firearm will be recorded on the "Daily Test Data Sheet" to be kept with each firearm in the accompanying data packet.
- For any firearms where the headspace is changing at each inspection point the firearm will be withdrawn from test and examined for the cause.
- In no case will any firearm in the test program be allowed to continue test if the headspace exceeds Min. + .007" after initial proof test.

Data Required:

- Rifle serial number
- Headspace measurements for each sample

TLW1530C – Proof Test

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

Before proof testing the firearm should be inspected for:

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

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

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

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- 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."

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 "TLW1530A - Measure Headspace.")
- After firing the proof round, the firearm will be carefully examined to determine if any damage to the product has occurred due to exposure to the proof pressure. This inspection includes:
- Visual inspection for damage,
 - Damaged receiver or bolt, especially the locking lugs on the bolt or the barrel
 - Bulged chamber or bore; split, cracked or otherwise damaged barrel,
 - Broken stock,
 - Any other part subjected to the proofing stress, which can be visually examined for damage.
 - Any "suspicious" areas should be submitted to magna-flux inspection before proceeding.

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- Magna-Flux all bolt heads after Proof.
- 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 gas leakage.
- Save the spent proof case in a Zip-Lock plastic bag and label and place in the data packet for further reference. If any parts were broken or otherwise damaged, place these parts in the same bag as the proof case and label. Place a label on the firearm and withdraw the firearm from the test.
- Each sample firearms' headspace (see following procedure "TLW1530C - Re-Measure Headspace after Proof") must remain in range from min. to min. +.005" after proofing, with no individual firearm's headspace to grow more than .002" after firing one proof round. After successful proofing, the right lug on the bolt head will be marked in the center (i.e. center of top to bottom and center of front to rear) of the lug with a center punch to indicate that it has been proofed.
- After proof, if the firearm passes the inspection and headspace has been measured (see next section of test plan), stamp the firearm on the barrel with an authorized Remington proof stamp. Locate the proof mark on the right rear of the barrel in the specified location for the Remington proof stamp. **DO NOT STAMP** if the headspace exceeds Min + .007".
- Because of the higher pressures involved in shooting proof cartridges, adequate precautions, both mechanical and procedural, should be taken to protect personnel performing the firearms proof testing. To this end, the firearm should be securely mounted, completely shielded from the operator and firing accomplished by a remote control method.

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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 as necessary. 83

TLW1530D – Re-Measure Headspace after Proof

All test samples will be re-measured for headspace after proof and before being tested in either the jack or shot from the shoulder. The chamber, bolt face & locking block/locking notch will be inspected for the 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 appropriate chamber drawing LB-XXX 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. + .007" 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.

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Data Required:

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

FORCES --:

TLW1530E - Measure Firing Pin Indent:

The firing pin indent will be measured for each of the sample rifles using SAAMI qualified copper crushers. The average of three trials per sample rifle will be calculated. The Average of three indents should be equal to or greater than 0.017". If the average indents are less than 0.017" final acceptance of the appropriate level of the indents will be determined by review of the data by engineering and the test lab.

Method:

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

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- Repeat procedure two more times and record the dial indicator readings using a new copper crusher for each trial.
- Each firearm sample should have three readings that will be averaged.
- Record all three readings for the data file.

Data Required:

- Rifle serial number
- Each of the three trial indents
- The calculated average indent by rifle.
- Any determination by the review committee to accept average indents less than 0.017"

TLW1530F - Measure Sear/Trigger Engagement and Sear Lift:

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

Method for measuring Sear/Trigger Engagement:

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

Method for measuring Sear Lift:

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

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- Minimum sear lift is 0.006".

Data Required:

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

TLW1530G - Measure the Sear/Firing Pin Head Engagement:

The amount of Sear to Firing Pin Head engagement will be measured using the following method.

Method:

- Use digital height gauge and one-tenth dial indicator attachment.
- Visually check to ensure the firearm is unloaded.
- Clamp firearm in portable vise and set on top of granite table.
- Remove the bolt assembly.
- Use a small bubble level to level the top of the receiver relative to the granite table.
- 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 / Firing Pin Head engagement
- Record Testers' Names
- Record TLW Number

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TLW1530H - Measure Trigger Pull Forces:

Trigger pull (the force and displacement required to manually operate the trigger)

Method:

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

Data Required:

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

TLW1530H - Measure Safe On/Off Forces:

Using the Chatillion Digital force gauge, push the Safe to the "Safe Off" position on each test sample. Complete three trials. Record all three readings for each firearm. Repeat the test, this time pushing the Safe to the "Safe On" position on each trial. Record all three readings. Average each of the three sets of readings in each direction for each test sample. These measurements are for information only. A minimum of 1 lb. force in either direction will be assumed as the reference criteria.

Method:

- Use vise or other adequate device to securely hold the rifle for this test.
- Use the Chatillion Digital Force gauge (0-10 lb. range) with the disc point or the "v" shaped point. Use the same tip on all subsequent trials.
- Make three trials in each direction for each sample.

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- Average the results of each of the three trials.

Data Required:

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

TLW1530J - Measure Bolt Lift and Bolt Closing Forces :

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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:

- After locating the rifle in the trigger pull fixture and securely locking in place, (it may be necessary to clamp the fixture to the bench if not already securely fixed in place), locate the hook of the force gauge at the point on the bolt handle just behind the ball.
- With the chamber empty, pull the trigger to release the firing pin. Using the Chatillon gauge, pull the gauge straight up and perpendicular to the bore, measure the force required to open the bolt.
- Lock the firearm in a horizontal position, using the trigger pull holding fixture, (i.e. shooting position) before taking the measurements.
- Take three readings for each gun in the sample.
- Record all readings.
- Repeat the procedure only this time rotate the bolt closed by pulling downward on the bolt handle.
- Note that it may be necessary to start the bolt closed by hand. A forward force may have to be applied on the bolt handle before bolt closing can be started so the firing pin head is depressed sufficiently to clear the notch and can then start up the cam surface of the bolt as the firing pin is cocked.
- Repeat the above procedure this time with a new, unused dummy round in the chamber.

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Data Required:

- Rifle serial number
- Each of the three readings taken for each of the 4 states for each test sample
- The average of each set of three measurements per state

TLW1530K - Measure Magazine Spring Force:

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

Method:

- Use the Chatillion TCD200 Spring Testing Machine with the Chatillion Digital Force Gauge (0-10 lb. range). Use the disc probe (1/2" dia.) on the gauge.
- Place the magazine box, bottom side down, on the staging table.
- Zero 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", and take the spring force measurements.
- 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.
- There is no established criterion for this measurement and the measurements will be taken for information only.

Data Required:

- Force Measurements taken on each trial per box at each of the measurement locations.
- The Average Force measurement per box.

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- The serial number of the Chatillion Digital Force Gauge used for the procedure.

TLW1530L – Safety Operation (S.A.A.M.I.)

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.
- Make a specific observation as to the position of the "on-safe" and the "fire" and determine if there is a discernible "detent" detectable when the safety is moved between the two positions. Record the observation 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 Chatillion 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.

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- 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.

TLW1530M - 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 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.
- Locate the firearm in a vertical position with the muzzle pointed up.
- 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.
- Using the "pegboard" for primed cases (*please refer to procedure TLP 0210.0*)— remove the primed case from the pegboard and carefully load a primed case into the chamber and close the bolt.
- With the safe in the "On-Safe" position, using the NRA trigger pull rod, load the trigger with a 40-lb. weight.

- **BE EXTREMELY CAUTIOUS TO STAY CLEAR OF THE MUZZLE IN**

CASE THE FIREARM DISCHARGES THE PRIMED CASE.

- Remove the load from the trigger.
- Place the muzzle in the small snail bullet trap.
- Move the Safety to the "Fire" position, the rifle must not discharge.
- Return the Safety to the "On-Safe" position.
- With the muzzle still located in the small snail bullet trap, pull the trigger, the rifle must discharge. Extract the shell case.
- Remove the rifle from the small snail bullet trap.

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- Using the plug gauges measure the minimum clearance between the rear of the trigger and the inside rear of the trigger guard.
- Re-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.

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FUNCTION & ENDURANCE TESTING:

FUNCTION AND ENDURANCE TESTING --:

TLW1530N - Basic Jack Function Test (to 200 Rounds):

To get an early picture of the product's functional capability, a 200 round per rifle jack function test will be conducted. 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 overall average of all sample rifles should be at or below 1-% malfunction rate. Up to two rifles from the sample of 15 are permitted to be removed from the averaging process if they have excessive malfunction rates relative to the remaining group of 13 samples. These rifles will be investigated by engineering to determine the probable source of the problem and engineering will provide written documentation for possible inclusion in the DAT report. No major mechanical failures are allowed in the test sample. Major mechanical failures are defined as those failures that cannot easily be repaired with simple tools and/or readily available replacement parts. At the conclusion of this test the firearms will be carefully examined for signs of excessive wear, especially with respect to the plastic components. Competitive ammunition will be included in the test rounds.

Method:

Check each rifle for the presence of the proof stamp(s) – do not shoot unless the stamp(s) are present.

- Check each rifle for headspace
- Draw ammunition from stores – See test manager for ammo types to be used for this test.
- Each tester to have five rifles for test at any given time.
- The muzzle of each rifle will be inserted into the shooting port and the rifle placed securely in the test jack before the rifle is loaded.
- Load the four rounds into the rifle, one in the chamber and three in the magazine; do not shoot single shot by hand-feeding single rounds into the chamber.

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- Push the safe to the "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.
- Open the bolt; eject the spent round, note any extraction or ejection problems.
- Close the bolt to load the first round from the magazine into the chamber, note any feeding or stemming problems.
- Continue to fire the remaining rounds in the magazine until the last round is fired.
- Push the Safety to "On Safe" position, the safety will be pushed to the fire position at the start of every four round trial and will be pushed to the On Safe position at the end of every four round trial. Repetitive action of the safety lever on the trigger assembly side-plate needs to be determined.
- After firing twenty rounds (1 box of ammo) the rifle will be checked carefully for the presence of any live ammunition and if empty will be removed from the test jack and placed in the cooling rack. The safety will be in the "On Safe" position and the bolt will be unlocked and fully open at all times. Compressed air may be used, if necessary to cool the inside of the chamber area if the rifle is excessively hot from firing.
- All malfunctions will be recorded on the data sheets.

Data Required:

- Rifle serial number
- Tester's name
- Date of test firing
- The TLW#
- The ammunition, by manufacturer, used for the test with the ammo lot code number of the rounds actually used.
- Any malfunctions noted or other unusual items of note. Record ammunition manufacturer and lot number for each malfunction observed.

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TLW1530O - Basic Shoulder Function Test:

To get an early picture of the product's functional capability from the perspective of the customer, a 20 round per rifle shoulder function test will be conducted to evaluate the potential for feeding problems. 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 shooting from a standing position.

All malfunctions and any unusual behavior will be noted on the data forms. The overall average of ~~all~~^{all 3} sample rifles should be at or below the 1% malfunction rate. All rifles must pass the 1% criteria due to the small number of rounds being fired. No major mechanical failures are allowed in the test sample. Major mechanical failures are defined as those failures that cannot easily be repaired with simple tools and/or readily available replacement parts. At the conclusion of this test the firearms will be carefully examined for signs of excessive wear, especially with respect to the plastic components.

Method:

(Note: Check each rifle for the presence of the proof stamp(s) – do not shoot unless the stamp(s) are present.)

- Check each rifle for headspace.
- Draw ammunition from stores – See test manager for ammo types to be used for this test.
- 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.
- Load the four rounds into the rifle, one in the chamber and three in the magazine; do not shoot single shot by hand-feeding single rounds into the chamber.
- Push the safe to the "fire" position,
- Fire the first round in the chamber, listen for any off-sounds, and be alert for any other unusual behavior.
- Open the bolt; eject the spent round, note any extraction or ejection problems.

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Close the bolt to load the first round from the magazine into the chamber, note any feeding or stemming problems.

Continue to fire the remaining rounds in the magazine until the last round is fired.

Push the Safety to "On Safe" position, the safety will be pushed to the fire position at the start of every four round trial and will be pushed to the On Safe position at the end of every four round trial. The effect of the action of the safety lever on the trigger assembly side-plate needs to be determined.

- After firing ten 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#
- 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.

TLW1530Q - Extended Function & Endurance:

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

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

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

The test will be performed according to Remington's standard endurance test procedures for centerfire rifle. Rounds for this test will be shot according to the attached schedule.

Records 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 re-assemble. Record headspace for each.
- Fire each test firearm in accordance with the firing procedure (number of rounds, firing cycle) specified by engineering and the test plan.
- Before commencing design acceptance testing, calibrate, adjust, or re-build the shooting jacks, if necessary.
- Allow the firearm to completely recover in the shooting jack between each shot and do not lean or "stiff arm" the firearm while shooting the gun.
- All ammunition is to be functioned through the magazine - no "single shot" hand feeding permitted.
- Allow the rifle to cool between cycles. One cycle is 20 rounds fired. The use of forced air to accelerate cooling of the barrels between firing trials is permitted. The air should be directed from the chamber toward the muzzle to prevent it from washing the lubricant from the firearm's action.
- Cycle the safety from fire to safe every 4 rounds, from Safe to Fire at the start of the four round cycle and from Fire to Safe at the end of the 4 round cycle.
- After 500 rounds, disassemble, inspect, clean and lubricate the entire mechanism and take all required measurements.
- The Standard Remington Jacks (using the heavy configuration) are to be used for this test.

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Data Required:

- Rifle serial number
- Tester's name
- The Test Jack Identification
- TLW#
- Date of actual testing
- Headspace after the 500 round intervals.
- Malfunctions per ammo type, breakage, and replacement parts used.
- Any failure that requires the gun to be removed from testing completely.
- Notify management of any unusual events or malfunctions immediately.
- Any firing of the firearm without the trigger being pulled.
- Record ammunition lot code information as it is used throughout the test.

TLW1530R - Clean Rifles and Inspect:

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

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

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ACCURACY TESTING:

ACCURACY TESTING --:

TLW1530P - Group Size & POI at 100 yards:

One hundred-yard accuracy testing will be completed utilizing standard factory ammunition. The test will consist of three, 5-shot groups. Guns will be cooled after every other group. Each firearm will be cleaned and fired with five fouling shots prior to beginning the accuracy work-up. 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 must be less than or equal to the sizes per the attached.

| | <u>3 Shot Groups</u> | <u>4 Shot Groups</u> | <u>5 Shot Groups</u> |
|--|----------------------|----------------------|----------------------|
| <u>As Appropriate per caliber type</u> | TBD | TBD | TBD |

Method:

- Certify the ammunition selected for muzzle velocity and pressure.
- Fire three, 5-shot groups at 100 yards, using a 36 power scope for each ammunition type selected. Prior to beginning of the test, clean the bore and shoot 5 "fouling" shots to seat in the rifle.
- Cycle the safety from fire to safe every 5 rounds.
- Accuracy should be shot from a recoiling rest. Shoulder shooting is acceptable but not the preferred way.

Data Required:

- Measure group sizes center to center
- Record takedown screw torque

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- Record make and identifier of scope
- Record ammunition type used.
- Record ammunition lot numbers used during the test
- Record and label any fail-to-fire ammunition.
- Record any malfunctions that occur during the test.

ENVIRONMENTAL TESTING:

TEMPERATURE TESTING --:

TLW1530S - Hot Function Test:

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

Method:

- Condition test firearm and 100 rounds of ammunition for each test rifle in the environmental chamber for at least 6 hours at a temperature of 120 degrees F. (or as close to 120 degrees F. as the equipment can be maintained.)
- Test each firearm by removing the rifle and 20 rounds of ammunition from the chamber and testing as follows:
 - Fire 20 rounds of ammunition in the test rifle from the test jack. After firing all 20 rounds, return the rifle to the chamber. Wait 2 hours and repeat the procedure, 20 rounds at a time, until all 100 rounds have been fired.
 - Do not perform maintenance during the 100 round cycles.
 - Cycle the safety from fire to safe every 4 rounds.
 - The tester should wear gloves to protect his hands from the hot metal.
 - After 100 rounds have been fired through each firearm, remove the firearms from the conditioning chamber, 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

TLW1530T - Cold Function Test:

This test evaluates the effect of extreme low temperatures on the functioning performance of the 31 firearms. Shoot the firearm from inside the environmental test cabinet in the long range.

Method:

- Condition the firearm and 100 rounds of ammunition in the freezer for at least 6 hours at a temperature of -20 degrees F.
- Test each firearm by removing the rifle and 20 rounds from the freezer as follows:
- Fire 20 rounds of ammunition; return the rifle to the freezer. Wait 2 hours and repeat until all 100 rounds have been fired.
- Do not perform maintenance during the 100 round cycles.
- Cycle the safety from fire to safe every 5 rounds.
- After 100 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

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TLW1530U – 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 Model 710. The sample rifle will be alternately cycled between a temperature of 120°F. and -20°F. for at least 3 complete cycles, brought back to ambient temperature and test fired in the test jacks for 200 rounds to evaluate both function and safety related characteristics.

Method:

- Shoot sample rifle in test jack to determine rifles malfunction characteristics and rate.
- Do not clean rifle
- 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 as close to the +120°F as can be attained by the equipment. 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 100 rounds recording malfunction types and rates.
- 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

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- 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.

TLW1530V - Heat & Humidity Test:

This test evaluates the effects of high heat combined with high humidity such as might be found in some shooting environments.

Method:

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

Data Required:

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

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ABUSIVE TESTING

IMPACT TESTING --:

TLW1530Y - SAAMI 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 Durometer (Shore A) rubber mat backed by concrete. Trigger Pull weight will be adjusted to minimum specification. The Sear engagement will be set to min.. 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 a 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.

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- 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 firecontrol 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.
- 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.

TLW1530Z - SAAMI Rotation:

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 Durometer (Shore A) rubber mat backed by concrete. Trigger Pull weight will be adjusted to minimum specification. Sear engagement will be set to minimum. 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. Six Rifles will be used for this test.

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 a 85±5 Durometer, Shore A, rubber mat, one-inch thick backed by concrete. The mat and concrete shall be large

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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, with engagement set to the minimum specified, and with the firecontrol 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.

ata 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

LW1530AA - SAAMI Drop Test:

This test will simulate abusive dropping of the firearm from a distance of 48 inches onto a 1" thick, 85-durometer (Shore A) rubber mat backed by concrete. Trigger Pull weight will be adjusted to minimum specification (4 lb.) The Trigger/Sear engagement will be set to the minimum specification (0.020"). 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

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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 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, with engagement set to the minimum specified, and with the firecontrol lubricated as in 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

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TLW1530AB- Extended SAAMI Jar-Off Test: (for Information only):

With the intent to establish design margin this test simulates the abusive impacting (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, and 48 inches onto a 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 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 firecontrol 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.
- Conduct this test at 18 inches, 24 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

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than the amount of test guns to allow for breakage due to the drop testing. If a stock cracks - replace before continuing test.

ata 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

LW1530AC - Extended SAAMI Rotation Test: (for Information only):

With the intent to establish design margin this test simulates the abusive fall of a firearm when left leaning against a vertical surface under conditions more severe than the SAAMI recommendations.

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 firecontrol 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.

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ata 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.

LW1530AD – Extended SAAMI Drop Test: (for Information only):

With the intent to establish design margin this test simulates abusive dropping of the firearm in conditions more severe than the SAAMI recommendations.

Method:

- With the firearm safety in the SAFE state, the firearm shall be dropped from a height of 6 feet and 8 feet onto a 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 firecontrol 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.
- 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.

INTENTIONAL ABUSE :

Note that for the following tests, the rounds are to be loaded remotely and the test setup shall have the capability of unloading live rounds remotely if required.

TLW1530W - Obstructed Bore Test:

One of the sample rifles will have a rifle bullet driven into the bore to a position immediately ahead of the chamber. A standard round, of the same caliber, will be loaded and fired remotely. All testing will be done in the blow-up room using the high-speed video camera and witness paper. Before removing or otherwise disturbing the test samples after blow-up photographs will be taken for the record. After collection and removal of the parts 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 if required.

TLW1530X - High Pressure Test:

One rifle will be tested with a high-pressure hand load loaded to an estimated pressure of 120,000 psi. The purpose of this test is to determine the extent of damage if an individual does purposely or accidentally handload an extremely high-pressure load. Use standard Remington high-pressure ammunition safety

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procedures for these tests. The pressures for the test round will be worked up using various grain size loads giving pressures below 95,000 psi, (approaching the limits of the transducer gauges.) The grain size load will be plotted and a curve extrapolated to determine the load expected to produce a load of approximately 120,000-psi.

All testing will be done in the blow-up room using the high-speed video camera and witness paper. Before removing or otherwise disturbing the test samples after blow-up, photographs will be taken for the record. After collection and removal of the parts 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 if required.

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