BROWNELLS® FITTED BARRELS

READ & FOLLOW THESE

INSTRUCTIONS

BROWNELLS®
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Fitting a Brownells pre-threaded and short-chambered Fitted Barrel to an action can be done with a minimum of equipment and difficulty. However, barreling a rifle does require CARE and ATTENTION TO DETAIL. Because of the high pressure involved (the .308 Winchester cartridge generates as much as 50,000 pounds of pressure per square inch!), you cannot be too careful!

PLEASE NOTE: Be sure you have the appropriate barrel for your action: Barrels designed to fit the Model 1898 Large Ring Military Mauser with a 1.1" x 12 tpi shank will also fit the commercial equivalent, such as the Interarms Mark X. These barrels will NOT fit the Small Ring Mausers, such as the Models 93, 95, or the Swedish Models 96 or 38.

Barrels threaded with a shank size of .980" x 12 tpi are for use on the Small Ring Mausers such as the Models 93, 95, or the Swedish 96 or 38 and some Small Ring Model 98's and Large Ring/Small Thread Model 98's.

Barrels for the Remington 700 series will fit most Remington actions using a 1.062" x 16 tpi shank. These include the long and short M-700, the M-600, M-660, Model Seven, and 40X Centerfire. A Shilen Oversize Recoil Lug is included with the Remington barrels and MUST be used with these to provide proper fit to the receiver.

Barrels for the Savage 110 series will fit most Savage actions using a 1.062" x 20 tpi shank, made after 1966, with a bolt head having the recoil lugs extending the full length of the head.

BE SURE OF THE IDENTITY OF YOUR BARREL AND ACTION BEFORE STARTING THE JOB! Although Brownells Fitted Barrels are held to close tolerances on the length and diameter of the threaded shank, they may not necessarily fit your individual action due to variations in the tolerances allowed in the barrel threading, action and bolt manufacturing processes. IT IS YOUR RESPONSIBILITY to determine that the action and barrel can be used together. Double check the barrel thread size, the pre-cut chamber dimensions and the bore size before proceeding with the work! The instructions which follow assume you are starting with an action that has had the barrel previously removed, and any work necessary to true or repair the action has been done.

In considering an action for rebarreling, be very leery of military actions produced during the latter part of World War II, 1944 or 1945, either in Germany or any of the Nazi-occupied countries. Production controls and procedures were often quite lax under the pressures of wartime, and some unsafe guns were produced. Most importantly, the receiver may not be properly heat treated. In addition, some actions made for Spain or the Latin American countries may also have questionable heat treatment. If the receiver or bolt shows signs of extreme wear, pitting, abuse, or any indication of having been in a fire, DO NOT USE IT! Use only those actions that are in good condition. If you are in doubt about a particular action, **DON'T USE IT!**

WARNING

Never attempt to disassemble or reassemble a firearm unless you are absolutely certain that it is empty and unloaded. Visually inspect the chamber, the magazine and firing mechanism to be absolutely certain that no ammunition remains in the firearm. Disassembly and reassembly should follow the manufacturer's instructions. If such instructions are not immediately available, contact the manufacturer to see if they are available. If they are not available at all, then you should consult other reference sources such as reference books or persons with sufficient knowledge. If such alternative sources are not available and you have a need to disassemble or reassemble the firearm, you should proceed basing your procedures on common sense and experience with similarly constructed firearms.

With regard to the use of these tools, the advice of Brownells Incorporated is general. If there is any question as to a specific application it would be best to seek out specific advice from other sources and not solely rely on the general advice and warnings given.

TOOLS AND SUPPLIES: To properly fit a barrel to your action, you will need the following tools and supplies in addition to your new Brownells Fitted Barrel: Barrel vise with blocks or bushings matched to your new barrel's contour; action wrench to fit your receiver; "Finish" chambering reamer with an extension handle; "GO" and "NO-GO" headspace gauges to match your chambering reamer; cutting oil (such as Brownells Do-Drill); Brownells Barrel Assembly Paste, or other good quality, anti-seize lubricant.

You will also need some means of crowning the barrel's muzzle at finished length. We recommend the Brownells Muzzle Facing Chamfering

Tools if a lathe of suitable size is not available. You will need appropria metal polishing and finishing supplies. A set of good quality letter a number stamps to mark the caliber designation on a visible section of t barrel after the chamber is finished is highly recommended. The norm practice is to stamp the caliber designation parallel with the bore, abo 1/16" to 1/8" above the wood line, in the area above the barrel's chamber.

INSPECTING THE ACTION: Prior to fitting the barrel to the action, t action must first be inspected carefully for any damage or flaws that m be hidden once the barrel has been installed. Some problems may be c rected if found at this stage; others found now will mean that the acti will have to be scrapped. IT IS FAR BETTER TO SCRAP OUT A ACTION THAN TO BUILD A RIFLE WHOSE COMPONENTS M WEAR EXCESSIVELY OR FAIL UNDER NORMAL USAGE!

Assuming you have a suitable action, begin with a thorough examin tion. Completely disassemble the action and clean it with solvents. Che the front ring and threads for cracks, deformed threads, or other imp fections. Check to ensure that the action was not twisted, warped crushed when the original barrel was removed.

Look inside the front of the action and carefully examine the are where the bolt locking lugs seat when the bolt is in the locked position there are pits or cracks, or if previous gunsmithing attempts have plac a scope mounting hole into the face of the bolt lug seating area rather th behind or ahead of it, DO NOT use this action. If the lug seats show sig of being "set back" from excessive pressure, it is possible they can cleaned up by judicious lapping and re-heat treating to salvage the acti We recommend the use of **Brownells Bolt Lapping Tools** and 600 g **Lapping Compound** when it proves necessary to lap the bolt and receiv lugs. A complete discussion of this subject can be found in *The Mau M91-M98 Bolt Actions, A Shop Manual*, by Jerry Kuhnhausen.

Next, examine the bolt. Pay special attention to the locking lugs. Lo for pits, cracks, or indications of "set back" from excessive pressure. Als

examine the bolt face for signs of primer leakage (pitting or gas cutting in a circular pattern around the firing pin hole) or an oversized firing pin hole. Check the firing pin tip diameter, shape, and amount of protrusion. A bolt face with minor, primer leakage pitting can usually be cleaned up in a lathe with an appropriate lathe bit. If you find pits, cracks, lug damage or a grossly oversized firing pin hole (compare using a normal firing pin tip in good condition), the bolt MUST be replaced.

IMPORTANT NOTES ON MAGNUM BARREL INSTALLATION ON MAUSER 98 RIFLES: These barrels are intended for use on commercial magnum Model 98-type actions such as the Interarms Mark X and FN-Browning magnum models in good condition. If you choose to fit one to any action that was not originally built as a magnum action, the following safety inspections, alterations and re-heat treatment must be done.

Bolt Assembly - Inspect locking lugs for cracks or uneven wear. Check the firing pin tip for diameter and protrusion. Inspect the firing pin hole for size compared to the firing pin tip. Inspect the cocking cam for wear and galling. If the bolt shows any cracks, excessive wear or galling, or a grossly oversized firing pin hole, it should be replaced before any work is done. Uneven locking lug wear can be corrected by proper lapping procedures. If the bolt and action are lapped, inspect the third locking lug for contact with the action; it should not touch the recess. The bolt face must be opened to magnum rim dimensions using a lathe, and the extractor refitted to work with the larger rim diameter of the cartridge.

Receiver - Inspect the locking lug recesses for cracks, pits, or signs of bolt lug setback. Reject the receiver if any cracks or pitting are found. Lap the bolt lugs if the setback is not severe. After the bolt has been altered and the barrel fitted, the receiver's feed rails may have to be opened up for proper feeding of ammunition from the magazine box. Be sure to test for feeding using ACTION PROVING DUMMY AMMUNITION - not live ammo! If you are converting a military action, the magnum conversion should be done first, then the bolt handle alteration, drilling and tapping for scope bases, and trigger and safety changes. After this work is done, have the bolt and receiver re-heat treated.

IMPORTANT NOTES ON RE-HEAT TREATING: Any military action altered to accept magnum ammunition, and any commercial action that has had bolt setback should be re-heat treated after alterations and repairs have been completed. Re-heat treating should be done only by competent heat treating shops familiar with the process as it applies to Mauser rifles. After heat treating the action and bolt, re-inspect for bolt locking lug contact, re-fit the barrel and check the headspace. Correct any problems before test firing.

INSPECTING THE BARREL: You should thoroughly examine the barrel you will be using. Make sure there are no imperfections in the bore, the chamber, or the barrel threads. Never assume, or take for granted, that an item is free of defects. Make certain that the pre-cut short chamber is correct and matches both the markings on the barrel and your requirements. Double check the diameter of the bore by making a chamber and bore cast with Cerrosafe™, slug the bore or insert the pilot of the chambering reamer into the muzzle end of the barrel. Note: It is possible to get a "tolerance stacking" situation with a minimum bore diameter and a maximum chamber reamer pilot diameter where the pilot will not enter the rifling. It is also possible to have a maximum bore and minimum pilot where too much clearance may cause a chamber reamer or muzzle crowning reamer to chatter in use. Please call our Technical Support Department for advice if either of these situations occur with your individual barrel. Check the barrel carefully BEFORE fitting it to a receiver. You should also use this time to put a slight radius on the edge of the chamber at the barrel breech. If this edge on the "mouth" or end of the chamber is too sharp, it may interfere with feeding of the cartridges. DO NOT remove too much steel in this area. Excessive removal can lead to inadequate support for the cartridge case, resulting in a ruptured case upon firing. Normally, just "breaking" the edge will suffice. Assuming that the bolt and receiver are in good condition, secure the barrel in a barrel vise with at least 3" to 4" of the breech section of the barrel exposed. Check the threads of the barrel to be sure there are no burrs or imperfections that would prevent proper threading into the receiver. Place a bit of lubricant such as Brownells Barrel Assembly Paste, **Stock #083-050-100**, on the barrel threads to prevent galling when it is threaded into the receiver.

SHORT CHAMBERS AND HEADSPACE GAUGES: These barrels are short chambered with a special, small-diameter reamer. This is done so your finish chambering reamer will clean up the diameter of the short chamber, whether it is at the large or small end of the allowable tolerance range. Because of this small diameter, some headspace gauges with large, full case diameters at the rear point of the shoulder, may not fit fully into the short chamber. You can check this by putting inletting black or Dykem Hi-Spot Blue on the shoulder of your "GO" gauge, then placing the gauge into the chamber. Remove the gauge carefully and examine the shoulder of the gauge and the chamber to see where any color has transferred. If your gauge does not fully enter the chamber, BEFORE you install the barrel on the action you will have to cut the chamber partially with your finish reamer, until the shoulder of your reamer just touches the shoulder of the chamber.

When cutting the chamber so your headspace gauge will enter the short chamber, place the barrel vertically in a padded bench vise with the chamber end up. Use a tap wrench to turn the chamber reamer and plenty of cutting oil on the reamer's flutes. CAUTION: Cutting oil is absolutely essential to produce a smooth chamber and prevent damage to the reamer. Cutting should be done by exerting smooth, even pressure along the axis of the bore. Turn the reamer only in a clockwise direction. NEVER turn it counterclockwise or you will "roll" the edges of the reamer and ruin it. Remove the reamer after only 3 or 4 complete revolutions in the chamber. Clean away all traces of cutting oil and metal chips from the chamber and bore, and check your chamber as above, using your headspace gauge. Continue cutting and checking until your "GO" headspace gauge just touches the chamber's shoulder. At this point, your chamber will still be short. IMPORTANT: Do not remove any material from the shoulder of the chamber at this time. You may now install the barrel on your receiver and finish fitting and headspacing it.

INSTALLING THE BARREL: Before installing a barrel on any of the actions listed, place a small amount of Brownells Barrel Assembly Paste on the threaded shank. Brownells Barrel Assembly Paste prevents the barrel and receiver threads from galling; makes installation and future removal of the barrel safer and easier.

For Mauser Rifles: Remove the bolt from the action. Fit an appropriate action wrench such as the Brownells Rifle Action Wrench System with appropriate Large or Small Ring Mauser Heads, to the receiver. Carefully thread the receiver onto the barrel in a clockwise direction. Continue threading the receiver onto the barrel until it is snug and secure. There is no need for excessive force in installing the barrel. A snug, tight fit (usually ¹⁄₁₀th to ⅛th of a turn past hand tight) will suffice. Remove the action wrench.

For Remington Rifles: Remove the bolt from the action. Fit an appropriate action wrench to the receiver. We strongly urge you to use the **Brownells Rifle Action Wrench System** with heads for the Remington action. Be sure the barrel shoulder is clean and free from burrs. Place the **Shilen, Oversized Recoil Lug** provided with the barrel, on the shank. Carefully thread the receiver onto the barrel with the recoil lug engaged into the clearance cut on the Action Wrench. If you are using an "in-the-receiver"-style action wrench, make certain the recoil lug will be at the "six-o'clock" position to the scope mounting holes when the barrel is fully tightened. Continue threading the receiver onto the barrel until it is snug and secure. There is no need for excessive force when installing the barrel. As with the Mauser barrels, a snug, tight fit (¹⁄₁₀th to ⅛th of a turn past hand tight) will suffice. Remove the action wrench.

For Savage Rifles, *Type 1:* These barrels use a Shilen recoil lug and barrel with a shoulder. Remove the bolt from the receiver. Fit an appropriate action wrench to the receiver. We strongly recommend the use of the Brownells Rifle Action Wrench System with the Remington M-700 heads for this purpose. Be sure the barrel shoulder, receiver face and recoil lug are all clean and free from burrs. Place the Shilen Oversized Recoil Lug, provided with the barrel, on the shank. Carefully thread the receiver onto the barrel with the recoil lug engaged into the clearance cut on the Brownells Action Wrench. If you are using an "in-the-receiver"-type action wrench, or any other type of action wrench, make certain the recoil lug will be at the "six-o-clock" position to the scope mounting holes when the barrel is fully tightened.

Clamp the barrel in an appropriate barrel vise. Continue threading the barrel onto the receiver until it is snug and secure. There is no need for excessive force when installing the barrel. A snug, tight fit (¹⁄₁₆th to ¹⁄₁₀th of a turn past hand tight) will suffice. Remove the action wrench from the receiver and the barreled action from the barrel vise.

Clamp the barreled receiver securely in a padded bench vise. Secure the action in the vise vertically (muzzle pointed downward) with the padded jaws clamping the barrel just ahead of the action. Use swabs and cleaning patches to thoroughly clean the chamber, locking lug recesses and the entire bolt assembly. Insert the bolt into the receiver and attempt to close the bolt. The bolt should close completely without striking the breech end of the barrel. If the bolt does strike the breech end of the barrel, the receiver has either been faced off or was manufactured to the "short" end of the allowable tolerances. If you intend to use this barrel, it must be faced off at the breech end until the bolt will close without interference. This operation requires the skilled use of a lathe.

CHECKING HEADSPACE: Before headspace can be checked, the bolt must first be stripped. **For Mauser Rifles:** Strip the bolt of the striker assembly and the extractor. **For Remington Rifles:** Strip the bolt of the striker assembly and the ejector assembly. Since the extractor is riveted in place on most Remingtons it can remain in the bolt, if desired, provided extra care is taken when checking the headspace. **For Savage Rifles,** *Type 1:* Post-1966 Savage 110/112 series rifles use an extractor that slides in a slot in the bolt lug and is held in place by a detent ball and spring. Remove the extractor by depressing the detent ball, insert a pin punch through the access hole in the extractor and slide the extractor out of the bolt head. Note: the detent ball and spring may fly from their hole in the bolt head, and are easily lost. The ejector is a spring-loaded plunger similar to the Remington 700 type, and must be removed to check headspace. **CAUTION:** Because of its complicated design, it is not practical to remove the firing pin assembly from the Savage bolt. Use care not to pull the trigger and allow the firing pin to strike the headspace gauge. The headspace gauge is hardened and damage to the firing pin or headspace gauge may result.

Clean your "GO" and "NO-GO" headspace gauges of all traces of oil and dirt. Check the headspace by carefully placing the "GO" headspace gauge in the appropriate caliber into the chamber and attempt to close and lock the bolt using "one-finger, fingertip pressure". The bolt normally will not close on the "GO" gauge. If it does, check the chamber next with the "NO-GO" gauge. Insert the "NO-GO" gauge into the chamber and attempt to close and lock the bolt using the same amount of pressure as initially used with the "GO" gauge. The bolt should not close on the "NO-GO" gauge. If it does close on the "NO-GO" gauge, you have an excessive headspace condition. Correction of this condition may require either setting back the

shoulder of the barrel or facing off the forward end of the receiver. Both of these operations will require the skilled use of a lathe. Occasionally, fitting a new bolt will tighten up an excessive headspace condition to where the bolt will not close fully on the "NO-GO" gauge.

Normally, the bolt will fail to close on the "GO" gauge indicating that the chamber is too "short" and must be lengthened. When this occurs, remove the headspace gauge and bolt. Attach an extension and a "T" handle to a finishing reamer of the appropriate caliber. Coat the chamber and reamer with a liberal amount of a good grade cutting oil such as Brownells Do-Drill™. **CAUTION:** The use of cutting oil is absolutely essential to produce a smooth chamber and to prevent damage to the reamer. You cannot use too much cutting oil. Carefully insert the reamer into the chamber.

Cutting should be done with a smooth, even pressure exerted along the axis of the bore. Turn the reamer only in a *clockwise* direction. NEVER turn it counterclockwise or you will "roll" the edges of the reamer and ruin it. A good quality reamer will virtually pull itself into the barrel as it cuts. Be extremely careful that you do not remove too much material from the chamber. We suggest that you remove the reamer after only 3 or 4 complete revolutions in the chamber. Clean away all traces of cutting oil and metal chips from the chamber, barrel and locking lug recesses.

After removing all traces of oil from your headspace gauges, check the headspace of the rifle. The bolt should show evidence of moving further forward and coming closer to locking with the "GO" gauge in place. If the bolt does lock, check the chamber with the "NO-GO" gauge. Remember that you do NOT want the bolt to close fully on the "NO-GO" gauge. If it does, you have excessive headspace.

Assuming that the bolt did not close on the "GO" gauge, remove the gauge and bolt. Using liberal amounts of cutting oil on the finish reamer, insert the reamer into the chamber and remove a bit more material from the chamber. Again, three or four turns of the reamer is all that you should make before checking with the "GO" gauge. DO NOT HURRY this process. Take your time; check frequently to make sure you do not remove too much metal from the chamber. The chambering with the finish reamer will be complete when the bolt will close on the "GO" gauge. It should NOT close to the fully locked position on the "NO-GO" gauge.

When the lengthening of the chamber is completed, the chamber, receiver, and barrel should be thoroughly cleaned of all traces of cutting oil and metal chips. **CAUTION: Make sure the bore is completely clean and unobstructed. We repeat: Make sure the bore is clean and unobstructed.**

If you have fitted a new barrel and recoil lug to a Remington or Savage rifle, you MUST inlet the stock for the oversized recoil lug. It may also be necessary to open the barrel channel of your stock to accept the new barrel, especially if one of the heavy contour barrels has been fitted.

For Savage Rifles, *Type 2:* These barrels use the Savage recoil lug and barrel nut. Brownells Fitted Barrels for Savage rifles using the original recoil lug and barrel nut have a full diameter, full length chamber. A chamber reamer is not needed to install this barrel.

To fit this barrel, clean the chamber, barrel threads, barrel nut threa receiver threads, bolt locking lugs and receiver locking lug recesses. T extractor and ejector must be removed from the bolt head. Clean the b face. Place a small amount of Brownells Barrel Paste on the barrel threa and screw the barrel nut onto the barrel. Place the Savage recoil lug o the barrel with the small projection facing the breech end of the barr Place the bolt in the action and close it. Place the appropriate "GO" hea space gauge into the chamber and screw the barrel into the receiver u you feel the headspace gauge contact the bolt. Engage the projection the Savage recoil lug into its slot in the receiver and hand tighten the b rel nut against the recoil lug. Use the Brownells Action Wrench w Savage 110 Barrel Nut heads to tighten the barrel nut by about 1/16th 1/10th of a turn past hand tight. Note: Excessive tightness is not necessa or desirable. Remove the "GO" headspace gauge from the chamber, a check the headspace with the "NO-GO" gauge, making certain the bolt w not close fully on the "NO-GO" gauge. DO NOT attempt to force the b closed . . . only fingertip pressure on the bolt handle is needed. Forcing a bolt closed on a headspace gauge may damage the bolt, the chamber, t action locking lug recesses, the headspace gauge or any or all of the abo Reassemble the extractor and ejector into the bolt. **CAUTION: Make su the bore is completely clean and unobstructed. We repeat: Make su the bore is clean and unobstructed.**

When fitting a Type 2 Savage barrel, we recommend that the headspa be set using the "GO" gauge as described above, and then **double check** with the "NO-GO" gauge after test-firing is completed. Check the bar nut's tightness. It should not unscrew using hard hand pressure. Re-tig en if needed.

Reassemble the bolt, striker assembly and extractor, and install t complete bolt assembly in the receiver. Reassemble the firearm accordi to the manufacturer's instructions. Check for proper functioning usi **ACTION PROVING DUMMIES.** Make sure **ALL SAFETY MECHANISM** are fully functional as designed and approved by the manufacturer. these tests prove satisfactory, test-fire the firearm with live ammuniti in a **SAFE** and **APPROPRIATE** manner.

If all of your tests are satisfactory, the rifle can now be fitted w sights, reblued, etc. Don't forget to stamp the barrel caliber in an expos area of the barrel.

For additional information on chambering, use of headspace gaug barrel installations, etc., we recommend the National Rifle Associati publication, *The NRA Gunsmithing Guide - Updated*. This outstandi gunsmithing book is available from both the NRA and Brownells. You m also wish to consult *Gunsmithing Tips & Projects* by Wolfe Publishing a *The Mauser M91-M98 Bolt Actions, A Shop Manual* by Jerry Kuhnhaus

If you have any problems or need additional information, do not he tate to contact our Technical Support Group.