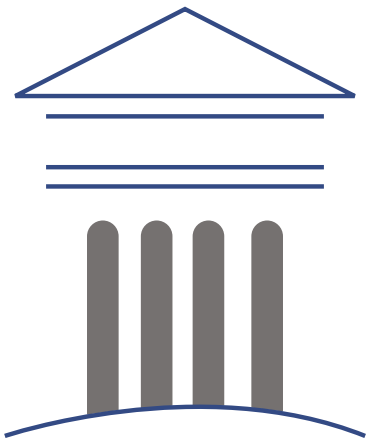
Sling Swivels, Buttplates, and Receivers Lesson: 2189

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Objectives

After completing this lesson, you should

1. Know how to install a sling swivel in the fore-end of a bolt-action rifle.
2. Understand how to seal the holes when swivels are installed.
3. Be familiar with the different types of buttplates.
4. Know how to contour a recoil pad so it conforms to the lines of the stock.

Introduction

Embellishments for the gunstock are normally referred to as *gunstock furniture*. Items included in this category include recoils pads, sling swivels, inlays, fore-end tips, etc. Some of these items—like stock inlays and fore-end tips — are strictly cosmetic, but many furnishings are quite functional, and enable the shooter to have better control of the firearm.

Today, few hunters would consider taking a center-fire rifle on a hunting trip without the convenience of a rifle sling. A rifle sling makes carrying the gun less tiring and more convenient. It also increases the hunter's or target shooter's chances of hitting long shots on target by helping to steady the rifle. Another functional piece of gunstock furniture is the *buttplate*, which offers protection to this very vulnerable portion of the stock.

A recoil pad will do the same thing and will also lessen the recoil kick that you feel with heavier firearms.

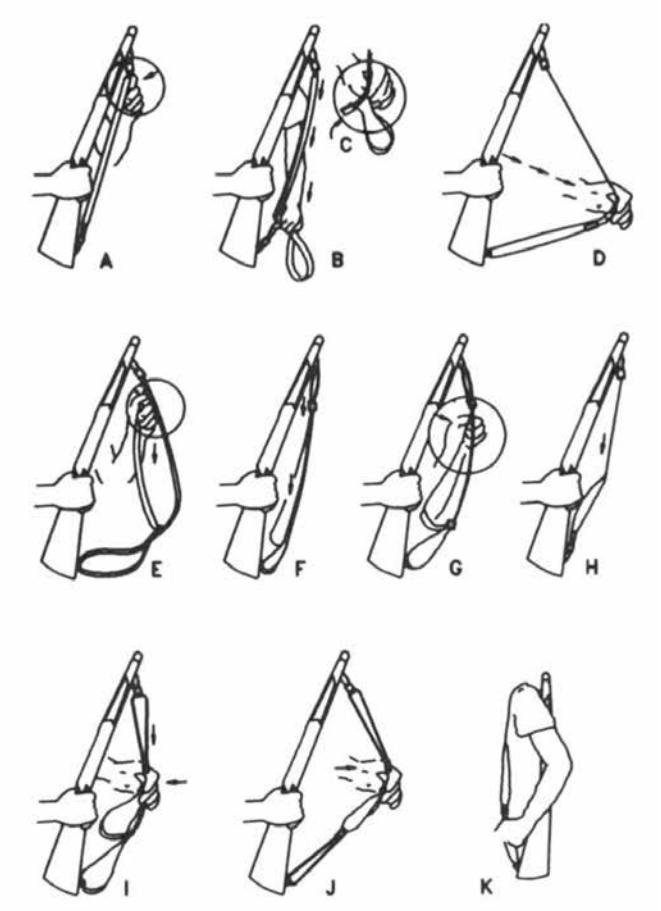


***Figure 1**: Brownells Latigo Sling and how to use it.*

Most gunstock furniture is easy to install once you know the basic techniques. Installing such items for your customers is another way to profit from your gunsmithing training.

This lesson is designed to show you how to install all of these items on any firearm correctly. However, it is recommended that you practice before attempting any of these installations on a valuable gun. For example, before drilling a gunstock for the installation of sling swivels, try the technique out on a damaged stock or a piece of scrap wood. Before cutting the outline for a stock inlay, practice the outline on a piece of scrap wood. Once you gain a little experience, the jobs should go rather smoothly.

Slings

The gun sling not only provides a means of comfortably carrying a firearm, but it also offers tremendous assistance in steadying a weapon while firing, regardless of the shooter's position — prone, sitting, kneeling, or standing. Every competitive shooter uses the sling in all positions, and few would attempt to shoot without one.

In adjusting the gun sling, the upper portion of the sling, called the *loop*, should be set so that it will come to within approximately 2" of the butt swivel. If the loop is too short, the butt cannot be fitted to the shoulder; if too long, the sling will not be tight around the arm. The rear portion of the sling, called the *tail* should be loose enough so that it will never be stretched tight when the shooter is in the firing position.

To place the sling on the shooter's arm (for right-handed shooters), the arm should pass through the loop from its right to its left. This twists the upper portion of the sling so that it rests flat against the wrist. Then move the left hand in a circular motion, high and to the left, over the forward part of the sling. Grasp the fore-end behind the rear of the front sling swivel. Then, with the right hand, pull the loop as high up on the left upper arm as it will go. Slip down the *keeper* to hold it there.

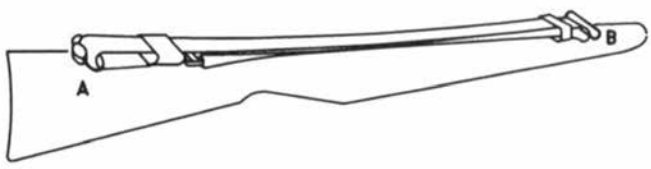


***Figure 2**: Tips of swivels must be facing each other and be located approximately 27" apart.*



***Figure 3**: After threading the sling through the swivel, attach the keeper as shown.*



***Figure 5**: Place the free end through the buckle. This is now the center strap.*

When shooting with the sling in place, the gun should be held in a relaxed and calm manner. With experience, anyone can learn to hold a rifle firmly but gently for accurate shooting.

The sporting sling differs slightly from the target rifle sling in that its main purpose is to carry the rifle rather than to steady it. While hunting with a rifle, in all but rare cases, the shooter does not have time to make sling adjustments and get into a steady position before firing. Most of the time, instantaneous reactions are required to hit a moving target.

One type of sling recommended for sporting rifles is Brownells Latigo sling, shown in Figure l. To install this sling you will need a yardstick or ruler. Measure the distance from A to B as shown in Figure 2. Using the shortest whole inch within ¾", obtain the correct measurement; if the measurement is 27¾" when the tips are toward each other, 27" is the measurement to use. Next, remove the brass joining stud from the sling using either a screwdriver or a coin. However, do not disassemble the sling. On the open end of the strap you will find that the numbered holes are spaced more closely together. Locate hole 27 of these closely spaced holes and cut off the remaining end of the strap close to hole 28.

Thread the sling through the swivel on the buttstock of the gun, and attach the keeper as shown in Figure 3. Then thread the sling through the fore-end swivel and back through the sliding keeper as shown in Figure 4. Thread the sling through the loop of the buckle, bend it back towards the outer strap of the sling, and pull it tight. The free end of the sling now becomes the center strap of the sling as shown in Figure 5.

Match the measurement number on the end of the sling with the same number on the buckle end. Put the female half of the stud through the holes and screw in the other half with a coin or screwdriver to tighten the retainer as shown in Figure 6. In case these holes cannot be matched due to tightness of the sling, attach the loose end to the nearest convenient hole and pull the sling into shooting position. Then refasten the stud to the proper hole. The sling will automatically correct the length when pulled to a tight position.

The Brownell Latigo sling is a modification of the original leather military sling and the design is sometimes known as the Whelen sling — a type designed originally by the late Col. Townsend Whelen.

INSTALLING RIFLE SLINGS

Sling studs are normally placed at varying distances apart, usually between 26" and 28", with the rear stud located about 3" from the toe of the stock.

If no studs have been previously fitted to the stock, you will have to drill two holes for the studs and swivels. In general, the rear stud screws directly into the wood, while the front studs require a special retaining nut which presses firmly into the wood of the fore-end so as not to protrude against the barrel. Therefore, the front holes must be drilled completely through the stock. Both studs must be countersunk.

An excellent swivel installation tool kit is available from B-Square Co. This kit enables sling swivels to be installed



***Figure 4:** Feed the sling through the fore-end swivel and back through the keeper.*

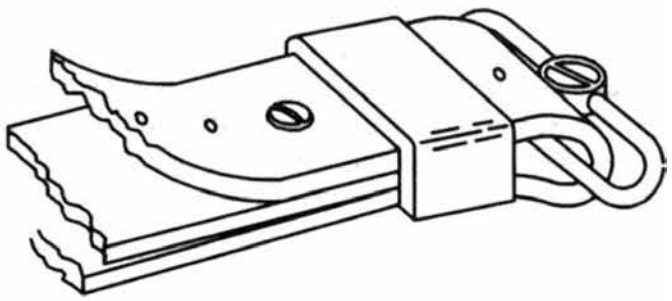


***Figure 6**: Tighten the screw stud with either a screwdriver or a coin.*

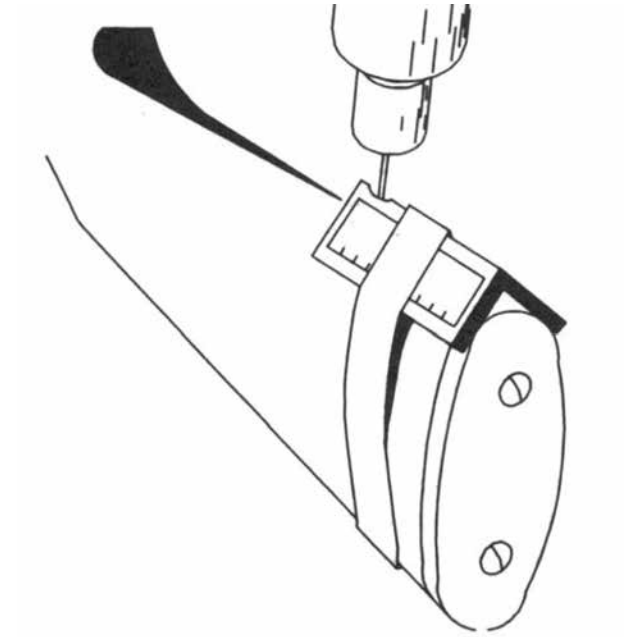


Figure 7: When using the "V" jig for swivel installation, simply place the jig over the edge of the stock so that it's flush with the butt. Secured the jig in place with the wide rubber band that comes with the kit.

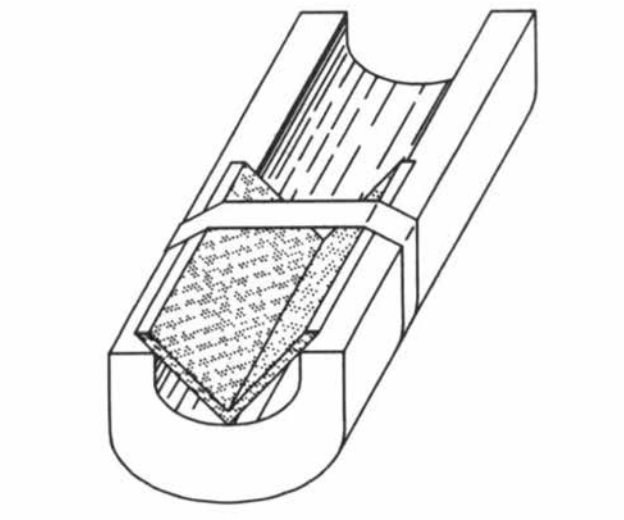


Figure 8: When installing the front fore-end swivel, place the jig directly in the barrel channel with the "V" downward. Again, use the wide rubber band to secure the jig in place.

quickly on any stock without risk of damage. The "V" jig has a hardened drill guide bushing and will automatically position the 5/32" diameter drill (furnished with the kit) the correct distance from the fore-end or from the toe.

To install the rear swivel, turn the rifle upside down and clamp it in a suitable padded vise. Place the swivel jig over the edge of the stock so that its end is flush with the butt and band into place. This puts the pilot drill about 2½" from the butt. Insert the 5/32" pilot drill in a drill press or electric hand drill and drill a hole approximately 1" deep. Refer to Figure 7 on the next page.

Exchange the 5/32" pilot drill for the 7/32" diameter safety counter-bore and counter-bore the 5/32" hole just drilled. This last operation provides for the unthreaded portion of the swivel screw.

Before inserting the swivel screw into the gunstock, it should be dipped in linseed oil to seal the wood and bind the fibers. Then, using a drift punch or a common nail as a wrench, screw the swivel screw flush against the gunstock with its cross hole correctly positioned. Never use the swivel itself as a wrench.

To install the front swivel screw on most one-piece rifle stocks, remove the barreled action from the stock and clamp the stock in a padded vise with the barrel channel facing *up*. Place the swivel jig in the barrel channel with the "V" down as shown in Figure 8. One end should be flush with the fore-end tip so that the drill is approximately 2½" back from the tip. The jig is designed to center the 5/32" pilot drill in the barrel channel. Using this drill in the drill press or a hand-held electric drill, drill a hole completely through the fore-end of the gunstock. Then use the No.10 safety drill to enlarge and counterbore for the swivel nut. Again, coat the counterbored hole with linseed oil and press the swivel screw nut into the counterbore. A small amount of Loctite should be placed on the screw threads before tightening the swivel screw into the nut with a drift punch or nail. Be sure that the front swivel installation is permanent; an improper installation can greatly affect accuracy, not to mention the damage that could be caused to the gun if the swivel came off the stock and the gun dropped off one's shoulder while climbing into a tree stand.

MISCELLANEOUS SWIVELS

There are many different types of sling swivels. The barrel band swivel, for example, is traditional on classic big-game rifles and single-shot rifles with splinter fore-ends. Such bands are readily available in sizes .650"-.950" to accommodate almost every barrel size. However, if the barrel differs from these dimensions, barrel band swivel bases are available with a .250" pilot hole that may be drilled out to fit any barrel diameter.

This type of swivel base is placed over the barrel prior to installing any front sight or front sight ramp. The exact placement of the barrel band is marked on the barrel before removing the bluing or other finish in this area.



Figure 9: *Winchester Model 1300 slide-action turkey gun. Note that the front sling swivel is an integral part of the magazine tube.*

Other types of sling swivels include those designed for mounting directly onto magazine tubes or fore-end caps. Most require no drilling. All that is necessary is to loosen the retaining screw on the swivel base, position the base in place on the magazine tube, and tighten. Practically the same technique is required for installing sling swivel fore-end caps like the one shown in Figure 9. Complete installation instructions are included with each set of swivels.

SELF-TEST QUESTIONS

Please check your answers on page 15.

1. **What type of oil should swivel screws be coated with to seal the wood when the screws are inserted into the gunstock?**
2. **What is the normal distance between the front and rear sling swivels (when installed and facing each other)?**
3. **Name two tools that can be used to tighten swivel screws.**
4. **How are barrel band swivel bases attached to the gun barrel?**

Buttplates

Plates used to cover the wood of a rifle or shotgun vary in materials from metal to plastic to wood or rubber. The main objective of a *buttplate* is to offer protection to the butt end of the stock. The plate also provides a more comfortable feel for the shooter than plain sharp wood edges held against the shoulder. Along with buttplates, recoil pads are also secured to the butt of a gunstock. These consist of a soft cushion of rubber or other soft material. Besides offering protection to the butt of the rifle or shotgun stock, they lessen the force of recoil, making shooting more comfortable.

Many shooters prefer a checkered steel buttplate for use on rifle stocks. Plastic or hard rubber have a tendency to become brittle and easily breakable with age. On the other hand, steel can be handled roughly without severe damage, which in turn offers the highest degree of protection to the buttstock.

There are three types of steel buttplates commonly used: checkered steel buttplates, steel-trap buttplates, and skeleton buttplates.

All three offer about the same degree of protection to the butt of the stock, but each is different in appearance. The standard checkered steel buttplate is solid. Those currently available include the Neidner steel buttplate with matching steel grip cap. These are very attractive and popular, and reasonably priced.

Skeletonized buttplates and grip caps have been used on high-quality gunstocks for quite some time and are considered to be one of the more elegant and desirable refinements than can be added to a beautifully crafted stock. The rifle shown in Figure 10 is an example of this feature.

When a skeletonized buttplate is installed on a rifle, usually a skeletonized grip cap is also used. The one shown in Figure 11 is a Bisen skeleton grip cap installed by a professional stocker.

In general, the basic installation of either a skeletonized buttplate or grip cap consists of first marking the outline of the items in their appropriate places on the finished stock. Using these markings as guidelines, wood is removed from the stock to perfectly inlay the buttplate and grip cap so their edges fit flush with the adjacent wood. The two items are then removed from the stock, and the wood areas showing through the skeletonized portions of the plate and cap are checkered using conventional checkering tools and techniques. When the

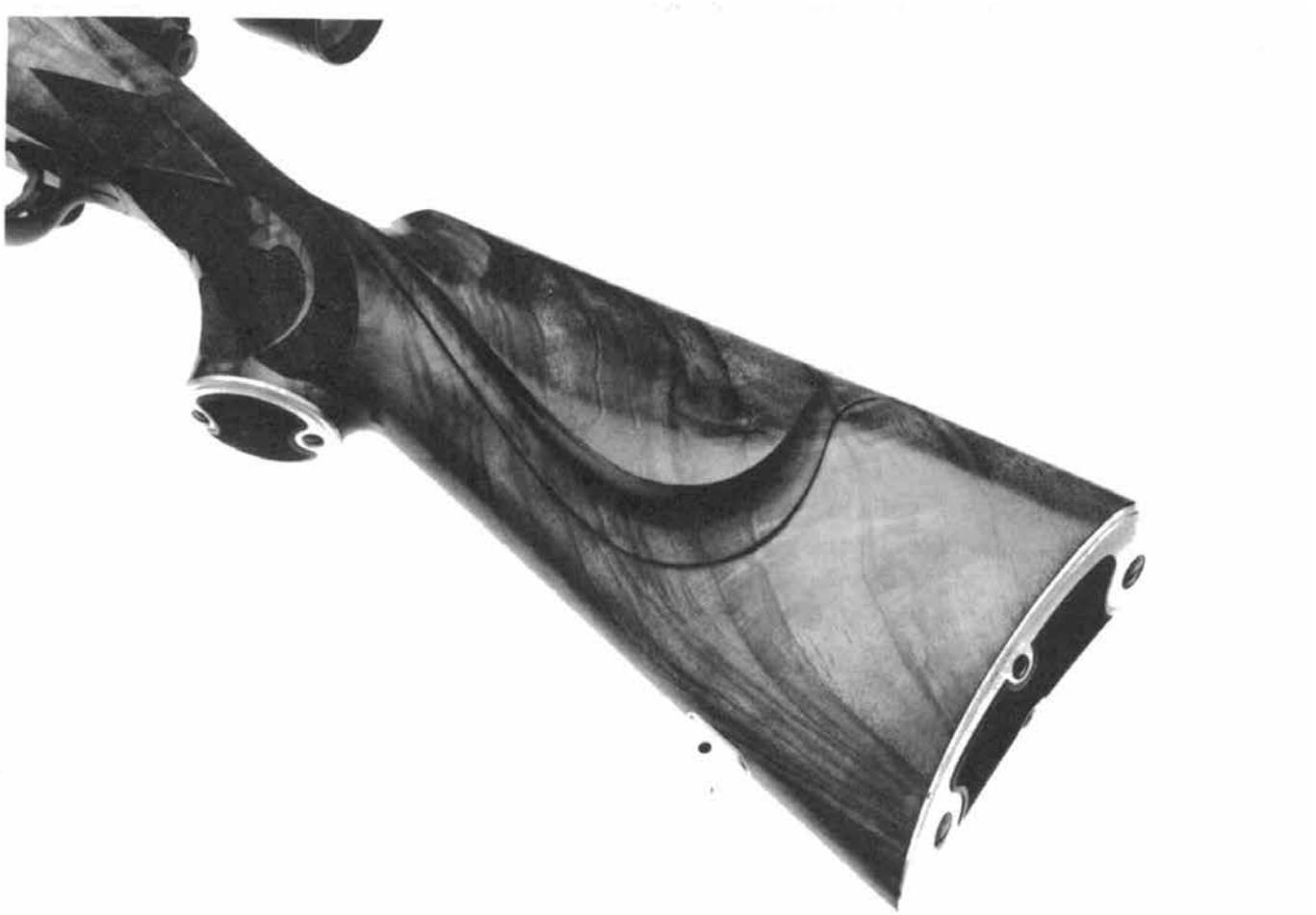


***Figure 10**: A custom stock that can be ranked among the best. The skeleton buttplate and grip cap enhance the beauty of the stock. Note the European-style sling-swivel base carefully inlayed in the bottom of the buttstock.*



***Figure 11**: Skeletonized grip caps are a favorite of custom stockers. This standard Mauser action utilizes a Bisen skeleton grip cap. The stock work was done by Warren Heydenberk.*

checkering is done, the buttplate and grip cap are once again installed to finish the job.

Most steel buttplates have a slight curvature that requires precise fitting to the butt of the stock. This curvature must first be calculated and then transferred (marked) to the stock. A coping saw or band saw is then used to cut the butt to the correct shape. A wood rasp may then be used to smooth up the cut before final finishing with various grits of sand paper.

Once a precise fit is obtained, the screw holes for the buttplate retaining screws are marked in their appropriate location on the butt of the stock and then drilled slightly undersize with a drill bit. All that is required to finalize the

job is to dip the wood screws into a container of linseed oil (to seal the surrounding wood) and screw them into the holes to secure the buttplate in place. Make certain you use the proper size screwdriver to avoid damaging the screw heads.

RECOIL PADS

The primary purpose of a recoil pad is to provide a cushion against the gun's "kick" as it is fired. Sometimes such a pad is used to extend the stock's length for a better fit. For example, one gunstock may have been fitted for a shooter with relatively short arms. Perhaps the gun was then purchased by a person with longer arms, making the stock entirely too short. Of course, the gun can be restocked, but in the case of a good walnut stock, this operation could be rather costly. It is cheaper and easier to install a recoil pad around an inch thick.

On the other hand, when a stock is of the correct length and fitted with a common thin buttplate, considerable wood may have to be removed when a thick recoil pad is attached.

Recoil pads for shotguns are normally manufactured in three different styles: skeet, field, and trap. The skeet style is designed for fast gun handling with a minimum of interference from the stock slinging to the fabric of the shooting coat. This type of pad will feature either a smooth surface or a rounded, corrugated ribbing running lengthwise with the butt's outline. Furthermore, this type of pad is not concave like many plates and pads; it is nearly straight from heel to toe.

The standard field recoil pad, found on a great number of shotguns, is slightly concave in outline and features an extended toe. The corrugation that covers much of the pad's surface runs from side to side, or opposite to that on the skeet pad. This design is intended to discourage slippage of the stock after it has been placed to the shoulder.

The trap-style recoil pad is very individualistic in design, giving improved accuracy and added comfort to a trap shooter. One characteristic is that the pad is deeply concave about midway between the heel and toe. This pronounced concave design is intended to fit snugly over the shoulder muscles to ensure holding the stock in the identical position for each shot. If fitted correctly, this pad will aid in both accuracy and comfort.

To correctly install a recoil pad on either a rifle or shotgun, the following preliminary steps should be taken:

- Determine the desired length of pull and then subtract the thickness of the recoil pad.
- When installing the pad on a rifle stock, the stock should be cut 90° to the barrel as shown in Figure 12 on next page.
- Cut the stock butt so as to maintain the desired pitch angle.

Once the above measurements have been obtained, use a flexible straightedge to mark a line on the buttstock from heel to toe. Then scribe it for the cuttoff line.

Having scribed the cutoff line, use a fine-toothed saw (such as a coping saw) to remove the surplus wood, being careful in doing so that the cut is square, even, and clean. To ensure a tight joint between the pad and stock, cut the stock slightly longer than necessary and work the new surface down with a

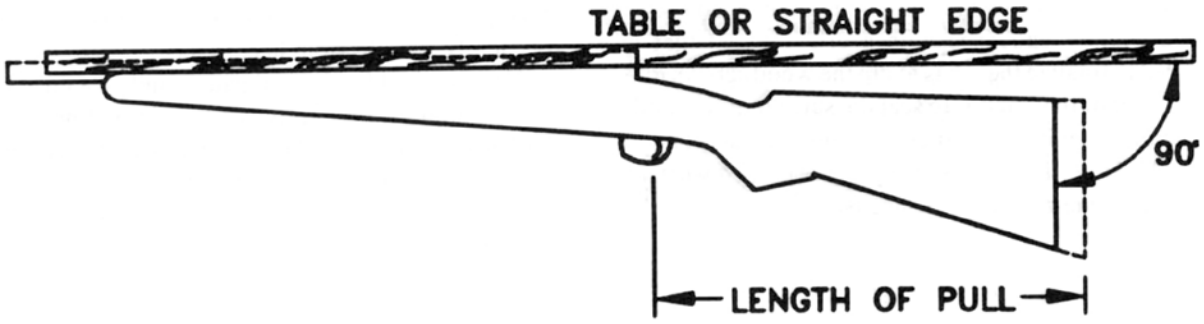


Figure 12: *When cutting a rifle stock for the installation of a recoil pad, the cut should be made exactly 90° to the rifle bore.*

disk sander or wood rasp. During this operation, test the stock often to ensure that the face of the butt is flat and even.

When selecting the pad, be certain that it is long enough to permit the existing outline along both the comb and bottom of the stock to continue straight and unbroken (Figure 13).

With the preliminary work out of the way, insert a screw or dowel pin through the screw slot in the bottom face of the recoil pad. Push the screw or pin upward until the soft rubber raises slightly on the face of the pad. Mark the spot with a ballpoint pen. Do the same to the other hole.

Put some petroleum jelly on the screws and push them through the soft rubber from the face side until the screw head rests on the washer located just above the white line spacer, as shown in Figure 14.

To mark the stock for drilling, push both recoil pad screws into the pad so they barely show at the pad base. Center the pad over the stock in the correct mounting position. With a hammer, tap the screw head lightly to mark the position of the holes to be drilled as shown in Figure 15. Drill the screw holes to the smallest diameter of the screw's threads.

Use a narrow screwdriver with the corners rounded off (so the rubber will not be damaged) to set the screws completely as shown in Figure 16. Never remove any rubber over the screw slots; if any is removed, the surface will not close over after removing the screwdriver – a nonprofessional job.

After the screws have been tightened, use a belt sander to grind off any excess rubber to make the recoil pad fit exactly flush with the sides of the buttstock.

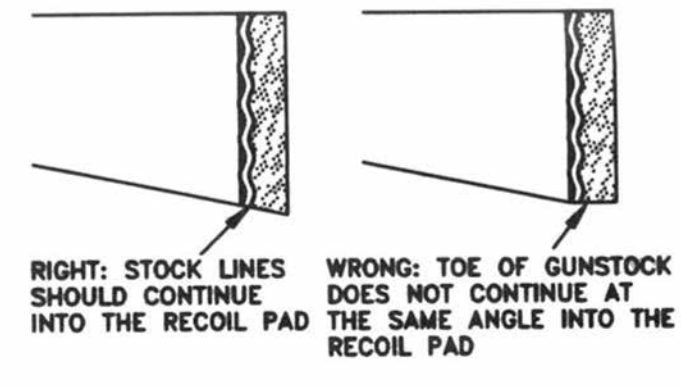


Figure 13*: The existing lines of the stock must carry over to the recoil pad.*

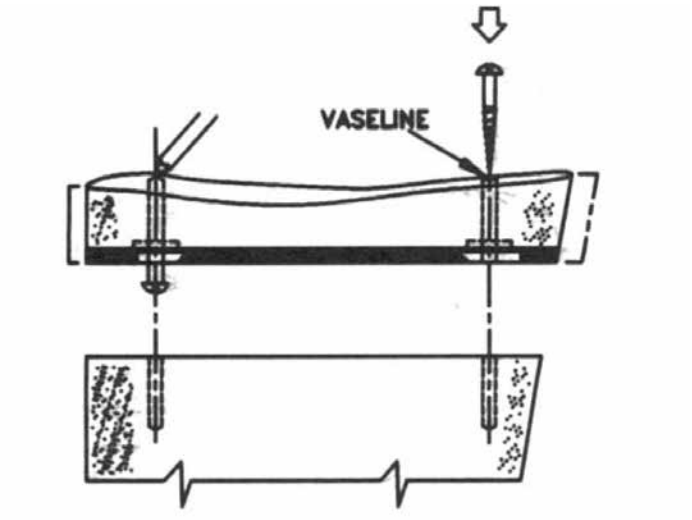


Figure 14*: Method used to locate screw holes in the recoil pad.*

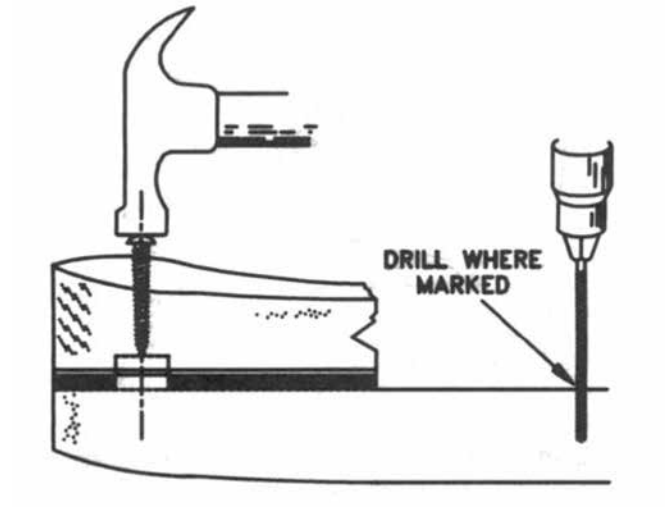


***Figure 15**: Method used to locate screw holes in a buttstock for securing recoil pad.*

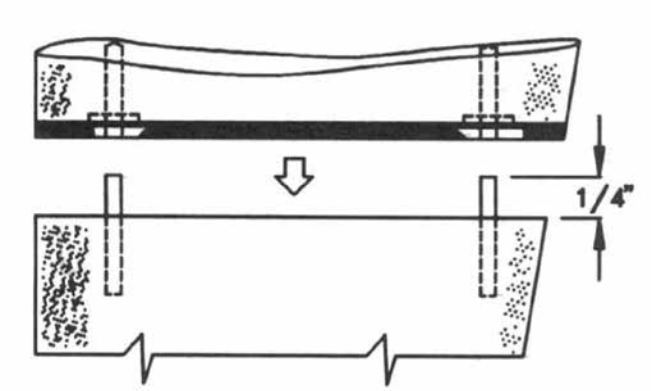


***Figure 17**: The use of wooden dowels, in place of wood screws, is another way to install recoil pads.*

Another method used to install recoil pads requires the use of two wooden dowels, the same diameter as the screw holes in the recoil pad. Cut the dowels so that when they are inserted into the stock they will protrude about ¼" as shown in Figure 17.

To mark the stock for drilling, push both screws into the pad so they barely show at the pad base. Center the pad over the gunstock butt in the correct mounting position. With a hammer, tap the screw head to mark the position of the holes to be drilled. Drill these holes to ¼" diameter.

Most of the better stockers who stock high-quality shotguns prefer not to puncture the recoil pad at all. Instead, they center the recoil pad on the butt of the stock and scribe or pencil the outline of the stock on the base on the recoil pad as shown in Figure 18 on the next page. The distance from the top and sides to the scribed line is then measured and these dimensions are transferred to the stock itself so ¼" holes may be drilled in the buttstock.

Glue the dowel pins into the stock and then place some glue on both the stock and pad before joining the pad to the stock. The pad should be clamped to the buttstock until the glue has dried to obtain the tightest fit possible. One way to do this is to stretch an old inner tube over the pad and the front of t he stock. This will apply pressure while the glue is drying.

After the glue dries, grind off any excess pad material as discussed previously.

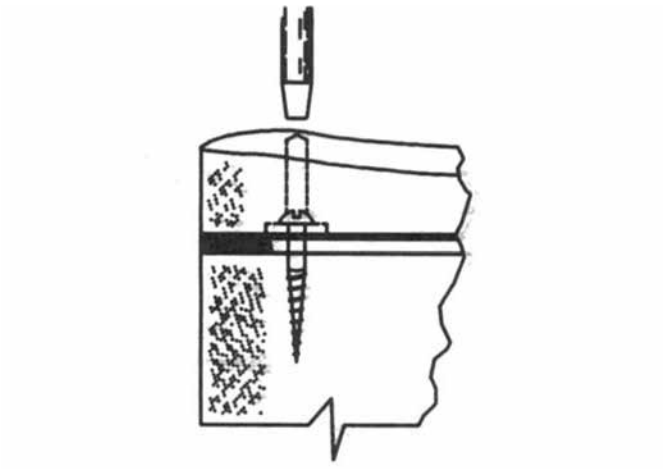


***Figure 16:** Use a narrow screwdriver with rounded corners to prevent damage to the recoil pad material.*

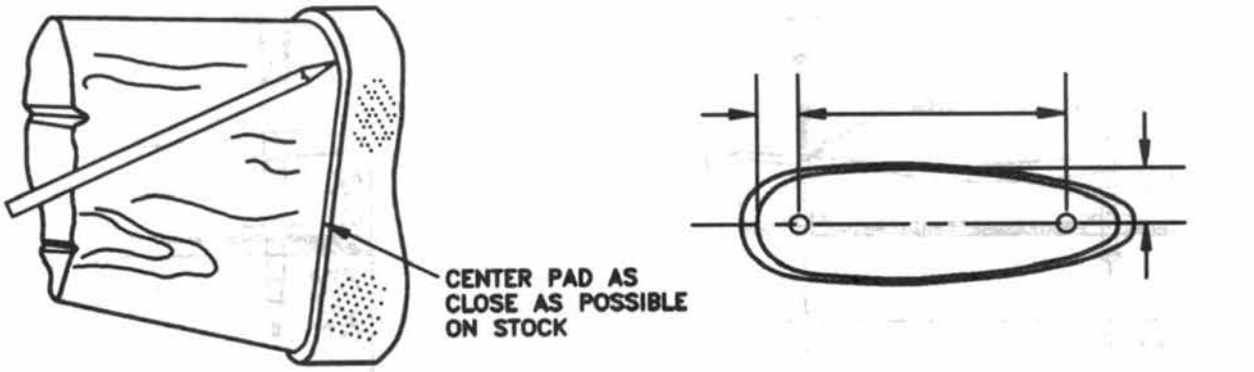


Figure 18: *If puncturing the pad is not desirable, center the pad on the stock and trace the outline of the stock on the base of the pad. Measure the distance from the top and sides to the traced line, then transfer dimensions from edge of the stock to locate dowel holes.*

RECOIL PAD JIG

A handy device that can aid you in recoil pad installations is a recoil pad jig such as the one shown in Figure 19. This jig enables you to shape and install any shotgun or rifle recoil pad at the correct angle. Because all shaping and sanding of the pad is done off the stock, there is no danger of damaging the stock's finish.

You simply draw the outline of the stock butt on the pad back and place it upside down on the pad jig. No sander alteration is required and it can be used with any disc or belt sander.

To install a recoil pad without a jig, make sure the joint between the pad and stock are even and tight. These two parts can be drawn together with the two pad screws provided for this purpose. However, it is best to first apply a coat of linseed oil to the raw surface of the wood before attaching the pad permanently. Locate the holes for the screws so that the heel of the pad will be drawn up as near as possible in line with the top of the heel. This reduces your work in dressing down the oversize pad to fit the stock's outline.

After securing the pad, wrap a piece of masking tape around the stock edge. This should be even with the base of the recoil pad to prevent marring the stock while sanding the pad down to the level of the existing stock. Next, using a sanding disk, as shown in Figure 20, or emery wheel, sand the newly installed recoil pad down to the correct size.

SELF-TEST QUESTIONS

Please check your answers on page 15.

5. **Name the three types of steel buttplates that are used on rifle gunstocks.**
6. **What dimension must be deducted from the trigger pull length when installing a recoil pad?**
7. **What other methods are sometimes used to secure recoil pads to buttstocks besides wood screws?**
8. **What is the name of the tool that has been designed to facilitate the installation of recoil pads?**



Figure 19: *Miles Gilbert Recoil Pad Installation Fixture is available from Midway USA.*

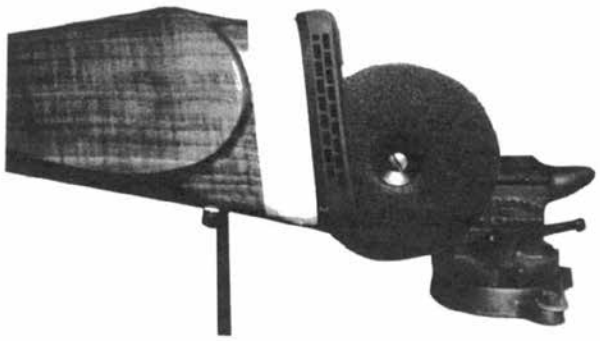


Figure 20: Masking tape helps prevent splintering or marring the stock during the final shaping of the pad.

Miscellaneous Stock Furniture

RECOIL REDUCERS

Heavy recoil from rifles and shotguns is one of the chief causes of flinching, which causes the shooter to miss the mark. There are several ways to reduce the recoil felt by the shooter. One of the most important aspects of eliminating recoil kick is the design of the rifle or shotgun stock. A gunstock that fits the shooter with good straight-line design will enable the shooter to absorb recoil even from the most powerful, hard-kicking weapons. Add to this a cushioned recoil pad and the recoil will hardly be noticed.

In some cases, such as when lightweight shooters tackle a hard-kicking firearm, other steps must be taken to reduce the recoil even more. One relatively inexpensive way is to install a buffer, shown in Figure 21. Several types are available. One is the Mercury Recoil Suppressor that uses mercury inertia to absorb recoil. Another uses hydraulic action to cushion recoil, while another is based on pneumatic, or air, action. These units are easily installed in the buttstock, and some shooters are putting an extra one in the fore-end, too.

To install a typical unit, a $^{57}/_{64}$" x 6" spur point drill is used. The unique ability of the spur point drill to cut straight, true holes in any grain structure makes it a real lifesaver when installing these popular recoil buffers.

Another means of reducing recoil is to use a muzzle brake on the barrel. While there are several different models available, most work on a gas trap propulsion principle with an outlet for surplus gas to escape—usually from jet-type, sharp-angle ports. Such recoil reducers claim to cut recoil 20-60 percent. This means that the movement of the shooter's body backward and the muzzle jump upward are reduced to a minimum. The installation of these muzzle brakes requires about $^{3}/_{8}$" of barrel extending forward of the gun sight to be threaded, using a thread of approximately 28 tpi (threads per inch); then, the muzzle break is screwed on.



***Figure 21**: Recoil buffers that may be installed in either rifle or shotgun stocks to help reduce felt recoil. All are available from Brownells.*

Some gunsmiths also provide a muzzle brake on a rifle or shotgun by making it an integral part of the barrel: small ports or holes are drilled around the muzzle of the barrel to allow gas to escape. This action reduces the recoil and muzzle movement of the firearm.

THE ANSWER SYSTEM

A few years ago, Sam Johnson of the Answer Products Co. came up with a combination recoil-reducing system consisting of three parts: a counterforce recoil pad, the Answer "Quiet" muzzle brake, and a fibercomb gunstock.

The recoil pad operates on five conical springs and is designed to create progressive resistance—the harder the springs are compressed, the harder they push back. This results in a gentle push rather than a sudden jab on the shooter's shoulder.

The muzzle brake utilizes gas slips and a resistance diverter cone — machined internally — to lessen the muzzle report. The dozens of tiny holes further help to reduce both recoil and the ear-splitting effect so common on some earlier muzzle brakes.

The fibercomb stock is made from a regular stockmaker's blank. The trick is to keep the price down on a custom wood stock, have all the benefits of a synthetic stock, and still retain the beauty and feel of wood. In general, the stock is split end-to-end; the internal wood is then removed and this space filled with epoxy resin that is full of air pockets similar to a beehive. Titanium rods are placed in the fore-end and pistol grip for added strength and the action area is liquid bedded in titanium-reinforced glass. The maker claims a stock that is seven times stronger than wood with a great reduction in stock vibration.

When the firing pin hits the primer and ignites the powder to force the bullet down the barrel, the shooter is immediately hit with a portion of the rifle's recoil. The counter force recoil pad reduces this initial recoil to a push rather than a kick. The pad is also partially compressed before the bullet and hot gases reach the muzzle brake, which then takes over to divert the gas and to greatly reduce muzzle jump. These two devices alone cut the felt recoil by as much as 40 percent. Then add the fibercomb stock for an additional 15-20% reduction of felt recoil. The total system makes a .300 Winchester Magnum feel like a .243 and a .375 H&H Magnum feel like a .30-06.

Contrary to popular belief, muzzle brakes do not reduce muzzle velocity. In fact, in some recent tests, the velocity was actually increased slightly when fired with a muzzle brake.

FORE-END TIPS

The fore-end tip on a gunstock really has no practical purpose, but many shooters feel that a rifle stock without a fore-end tip looks naked. It has been the traditional style for several decades.

There are several methods used to install a fore-end tip on a rifle stock: wooden dowels, metal pins, epoxy, or a combination of these. Regardless of the method used for installation, the tip should be kept clear of the barrel because this is the area where barrel whip and vibrations are great. The fore-end tip is exposed to the same variations of heat and moisture as the stock, and if you try to inlet the barrel to the tip, with metal-to-wood contact, rifle accuracy will be reduced. Consequently, the rifle barrel should be "free-floating" in the fore-end tip area.

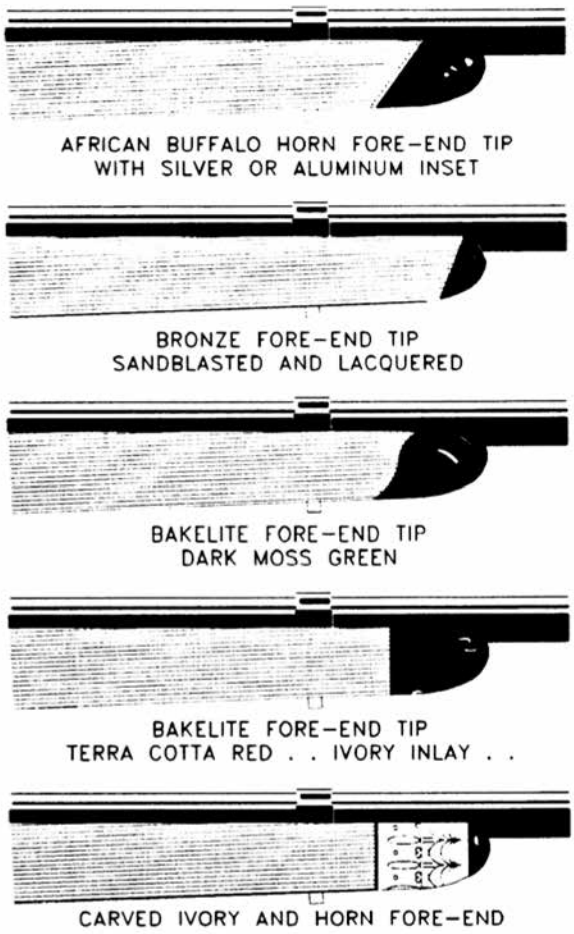


***Figure 22**: Sporting rifle fore-end tips consist of many kinds of materials. The current trend is to use some type of plastic or exotic woods, like rosewood or zebra wood.*

Materials for fore-end tips, like the ones in Figure 22, have varied considerably over the years, but the current trend is to use either black plastic or a piece of exotic wood. The material used is a matter of personal taste.

To install, cut the tip material to about 2" in length and of a sufficient thickness that will allow you to finish it squarely on both sides and the bottom of the gunstock. Drill a $^{7}/_{16}$" hole, 1¼" deep in the center of the material below the barrel channel. Drill a hole the same depth in the rifle stock, at the appropriate location beneath the barrel channel, after cutting the stock off square. Use a " hickory or maple dowel 2½" long, so it will fit the drilled holes snugly. Use inletting black to perfectly mate the fore-end tip material to the rifle stock. Once the fore-end tip matches, it is shaped flush with the original stock and the barrel channel cut so the barrel will "free-float" and not touch the fore-end tip at all. Some gunsmiths prefer to shape the tip off the stock, while others secure the fore-end tip tightly before shaping. If the former method is used, check the tip often for proper fit.

An epoxy cement is used to secure the tip and dowel to the rifle stock. While the adhesive is drying, use a fixture like the one shown in Figure 23 to draw the fore-end tip as tight as possible to the gunstock.

Again, the installation of a fore-end tip is a matter of personal taste. If your customer wants a fore-end tip, be prepared to install it.

SELF-TEST QUESTIONS

Please check your answers on page 15.

9. **Name three ways to reduce felt recoil of a firearm.**
10. ***True or False*. Muzzle brakes installed on a rifle tend to reduce the sound of the rifle firing.**
11. **What should be used on fore-end tips to draw the tip up tight to the gunstock while the glue or adhesive is drying?**
12. **Approximately how much barrel distance must extend past the front sight ramp to allow threads for securing muzzle brakes?**

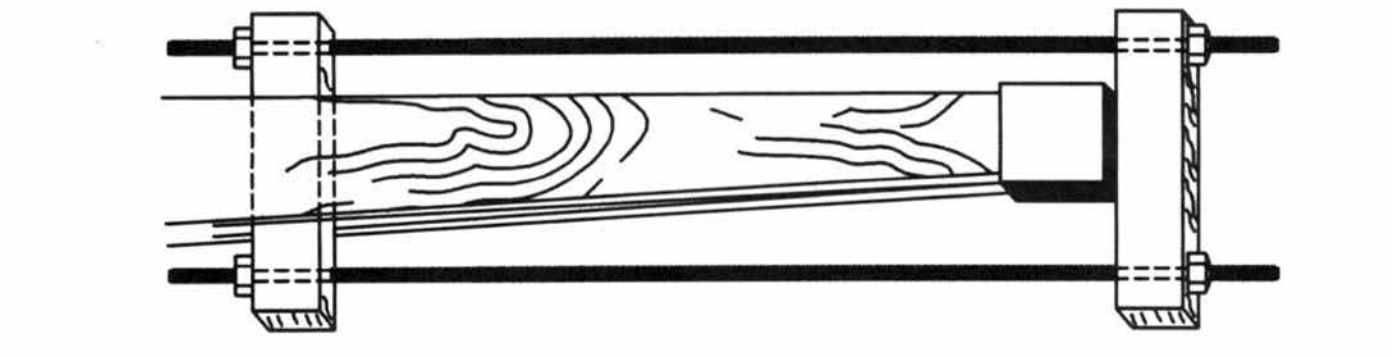


***Figure 23**: This clamp is slow action, but is quite capable of applying the required pressure onto the tip without jarring it off. The threaded rods can be cut from 3/8", or heavier, stock. The crosspiece that enters the magazine mortise can be slotted on one end to make it easier to adjust. The corners should be rounded slightly to avoid damaging the magazine mortise on the lower front edge.*

Answers to Self-Test Questions

1. Linseed oil.
2. 27 inches.
3. Drift punch or nail.
4. Barrel band swivels are normally secured with solder.
5. Checkered steel, steel trap, and skeleton buttplates.
6. The thickness of the recoil pad.
7. Wooden dowels and adhesive.
8. B-Square Recoil Pad Jig.
9. Muzzle brake, recoil buffer, and recoil pad.
10. False. The sound is usually louder.
11. Fore-end tip clamp.
12. 3/8 inches.

Lesson Questions

THIS IS LESSON NUMBER 2189.

Make sure you print your name, student number, and lesson number in the space provided on the Lesson Answer Form. Be sure to fill in the circles beneath your student number and lesson number.



REMINDER: A properly completed Lesson Answer Form allows us to evaluate your answers and send the results and additional study material to you. Do not hold your Lesson Answer Forms to send several at one time. You may run out of study material if you do not send your answers for evaluation promptly.

You may also complete your exam online at www.sdi.edu, click on the *online exams* tab.

1. **Which of the following definitions describes a recoil pad?**
   a. A metal plate with a trap door for storing ammo or a cleaning rod.
   b. A plastic extension of the stock to shorten trigger pull.
   c. A metal plate attached to the buttstock to prevent damage to the butt.
   d. An extension of the buttstock, attached to the butt of the stock to extend trigger pull and/or cushion recoil.

2. **When installing a sling swivel stud on a one-piece stock for a bolt-action rifle, what type of hole should be drilled for the retaining screw?**
   a. A blind hole for a typical wood screw.
   b. The hole should be drilled all the way through the fore-end and a recessed area provided for the screw nut in the bottom of the barrel channel.
   c. A hole should be drilled slightly larger than the screw.
   d. A screw hole should be provided in the bottom of the fore-end cap.

3. **What should be applied to the front swivel screw threads before tightening the swivel screw into a nut?**
   a. Loctite to insure that the swivel screw nut will remain tight on the screw.
   b. Linseed oil to seal the metal pores.
   c. Some type of gun oil to insure that the nut can easily be removed in the future.
   d. Bore cleaner to clean the threads prior to installing the nut.

4. **Which of the following is a good description of a skeletonized buttplate?**
   a. A completely solid plastic plate that fits on the butt of stocks.
   b. A completely solid rubber recoil pad.
   c. A completely solid steel buttplate at least ¼" thick.
   d. A metal plate that fits on the butt of a gunstock to protect the edges but is hollow in the center portion of the plate. This inside area usually shows checkered wood.

5. **One type of gunstock furniture that matches a skeletonized buttplate is**
   a. A skeletonized fore-end tip.
   b. A skeletonized sling swivel.
   c. A skeletonized grip cap.
   d. A skeletonized recoil buffer.

6. **What are the three types of recoil pads normally manufactured for shotguns?**
   a. Prone, kneeling, and offhand.
   b. Skeet, field, and trap.
   c. Prone, sitting, and kneeling.
   d. Trapdoor, skeletonized, and checkered steel.

7. **What is one of the first preliminary steps for installing a recoil pad?**

   a. Determine the desired length of pull and subtract from this distance the thickness of the recoil pad.

   b. Determine the required cast-on or cast-off, and work down the appropriate side of the recoil pad before installing on the buttstock.

   c. Determine the desired length of pull, cut the stock to this dimension and install the recoil pad without considering the pad's thickness.

   d. Sand the pad down so it will fit flush with the stock's edges.

8. **During final sanding, how must the lines of the recoil pad be shaped in relation to the lines of the stock?**

   a. The toe of the recoil pad should not follow the lines of the stock. Rather, the line should angle back to exactly 90˚ from the bottom of the buttstock.

   b. The drop at heel should be higher on the recoil pad than it is on the buttstock itself.

   c. The recoil pad should make an abrupt change where it joins the buttstock.

   d. The lines and angle of the stock should continue along the same plane to the recoil pad.

9. **Once a recoil pad has been attached to a buttstock and is ready for final shaping, what is recommended for protecting the finished buttstock during this shaping?**

   a. Linseed oil.

   b. Masking tape.

   c. Loctite.

   d. Rubber cement.

10. **How should the barrel channel in a fore-end tip be inletted for barrel fit?**

   a. It must be finished very roughly so only parts of the wood touch the barrel.

   b. It must always be inletted with epoxy for a perfect barrel fit.

   c. The fore-end tip should not come in contact with the barrel. The barrel should be "free-floating."

   d. The fore-end tip must fit tightly onto the barrel.