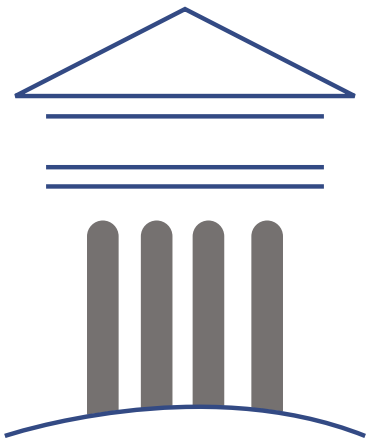
Inletting and Shaping
Lesson: 2187

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Objectives

After completing this lesson, you should

1. Be familiar with the different procedures used on a stock blank and a semifinished stock.
2. Know what tool can be used for shaping.
3. Know why proper inletting is important.
4. Know what inletting black is and how it is used.

Introduction

Shaping and inletting a gunstock from a slab of walnut or other hardwood is no easy task. In fact, many beginners who attempt such a project find their half-finished blanks ending up as expensive kindling. Even professional stockmakers who have successfully completed dozens of gunstocks from wood slabs, like the ones shown in Figure l, find it more convenient to purchase the semifinished stocks — those that have been preshaped and inletted by machine — and completing the job from that point. Yet, every lover of fine firearms should attempt to shape a stock from scratch at least once, if only to see how much work is involved, and to understand why custom stockmakers charge $1000 and up for their work.

As in other types of gun work, the shaping of a gunstock requires patience and attention to detail. You must also have an idea of what you are striving for; that is, the traits that distinguish a fine stock from a run-of-the-mill factory job.

If you find that you enjoy this type of work, you will probably become good at it. With more practice, you could be one of the many stockers who are much in demand throughout the world, stocking one-of-a-kind custom rifles for high-paying customers.

Inletting the Gunstock

Before inletting or shaping a gunstock for a shotgun or rifle, perform all the metal work (with the possible exception of final bluing). This work includes alterations such as bending the bolt handle on a military rifle to accept a telescope sight, altering an old Browning semi-automatic shotgun to handle longer 2¾" shells, or changing the contour of a rifle barrel. Often, rear sight bands on military rifles will have to be removed during the customizing, and this should be done before any stock work is performed. Fore-end screws should be fitted, new triggers installed, the desired type of buttplate obtained, and any other planned metal alterations should be performed.

Before the actual job of inletting may begin, a blank of wood must be obtained. English or Circassian walnut is considered much better than American walnut for gunstocks. American walnut is not quite as hard or figured as well as the other types of walnut. It is also not as strong as English or European walnut, and therefore has to be made a little heavier, particularly in the grip area. American walnut does not checker or finish very well, either.

Once the walnut blank has been obtained and the style of stock has been decided upon, lay the pattern of the stock on the side of the blank as shown in Figure 2.

Rather than using an actual gunstock, many stockers like to make gunstock patterns, like the ones shown in Figure 3, from ¼" plywood. Patterns are especially useful if several stocks of the same design will be made. When marking the outline,



***Figure 1**: Circassian walnut blanks before shaping and inletting. A good piece of walnut can cost $500 and more, some blanks run as much as $3,500 which increases the overall value of the gun.*

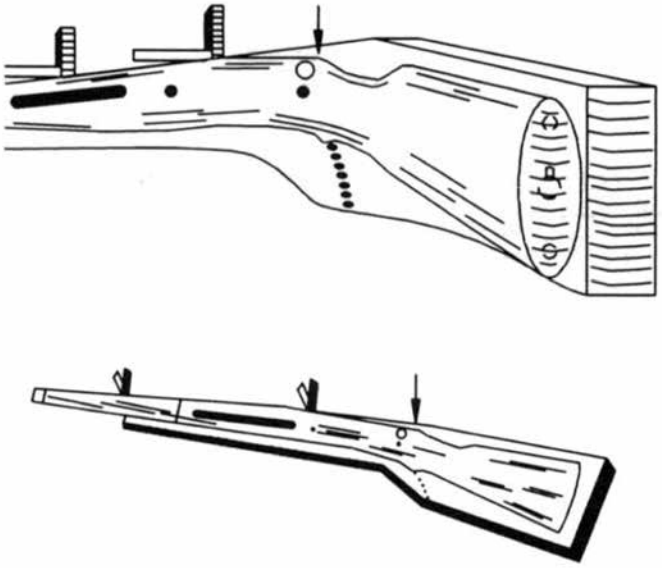


***Figure 2**: Lay an existing stock of the desired design onto the new stock blank so the top fore-ends are even on both. Rather than using an actual gunstock for the pattern, many stockers like to cut stock patterns from 1/4" plywood.*

leave a generous amount of margin all around except for the very top of the stock where the barrel and receiver will lie. This portion of the stock should be carefully planed so that it is perfectly level, accurate, and smooth.

Next, draw a centerline, heavily and accurately, completely around the edges and ends of the blank. If your blank is two inches thick, this line will be just an inch from each side surface. One way to obtain this centerline easily is to drive a sharpened nail through a hardwood block. Then, square and precisely finish the bottom surface of this block to the proper dimensions so that the nail will touch the stock blank exactly at its center point. Lay the stock blank on a large piece of plate glass or an old mirror. Then move your "gauge" around the blank to score a centerline as shown in Figure 4, on page 5. Preserve this centerline while you work, renewing it from time to time if it gets dim. This is necessary to keep everything in line— barrel, receiver, comb, heel, buttplate, pistol grip cap, trigger guard, holes through the stock, etc.

No further shaping of the stock is done at this time. All metal parts must first be inletted accurately before starting to shape the stock or perform any work on the sides of the blank. Metal parts include the barrel, receiver, trigger guard and floor plate, tangs, magazine, buttplate, and the like.

Accuracy with any rifle depends on many factors, but one of the most important is the proper inletting of the stock so it accepts the metal parts of the barrel, receiver, guard assembly, and the bedding of the metal parts into the wood gunstock. To inlet a stock blank correctly to form the recesses for the metal parts of the gun, time, patience, and knowledge of quality inletting are all important. Quality work requires accuracy when marking off the blank in the areas to be inletted and care when working to close tolerances while removing the wood.

The tools required for a good inletting job are few, but the addition of some special inletting and power tools will make the job smoother and faster. Remember though, power tools can remove a lot of wood quickly, and an error with a hand tool is usually not as severe as a mistake made with a power tool. For this reason, when the project reaches its final phases, it is recommended that the beginner use only hand tools to put the finishing touches on the gunstock.

The main principle of stock inletting is to exactly fit the metal parts of a shotgun or rifle gunstock. Basically, the process of inletting requires coating the metal surfaces with a coloring compound, such as lampblack or inletting black as shown in Figure 5, touching the marked metal surfaces to the wood at their proper location, and then removing wood marked by the compound. The coloring compound acts as a "road map," showing where wood needs to be removed to allow the metal to fit into the gunstock. Of course, there is much more to inletting than this simple explanation. Knowing exactly how much wood to remove, and exactly which tool to use in certain areas requires a high degree of skill and quite a bit of practice. However, it is possible for the beginner to completely inlet a gunstock blank almost as well as the seasoned professional — except that it might take the beginner longer to complete the job.

The barrel and receiver are to be let-in first, followed by the guard and magazine. Next, fit the buttplate by cutting the wood down to the correct point at comb and heel, and the pistol grip cap is located. Each operation should be completed before proceeding to the next. All of these operations should be completed before the stock is shaped up at all, or the sides of the blank touched.

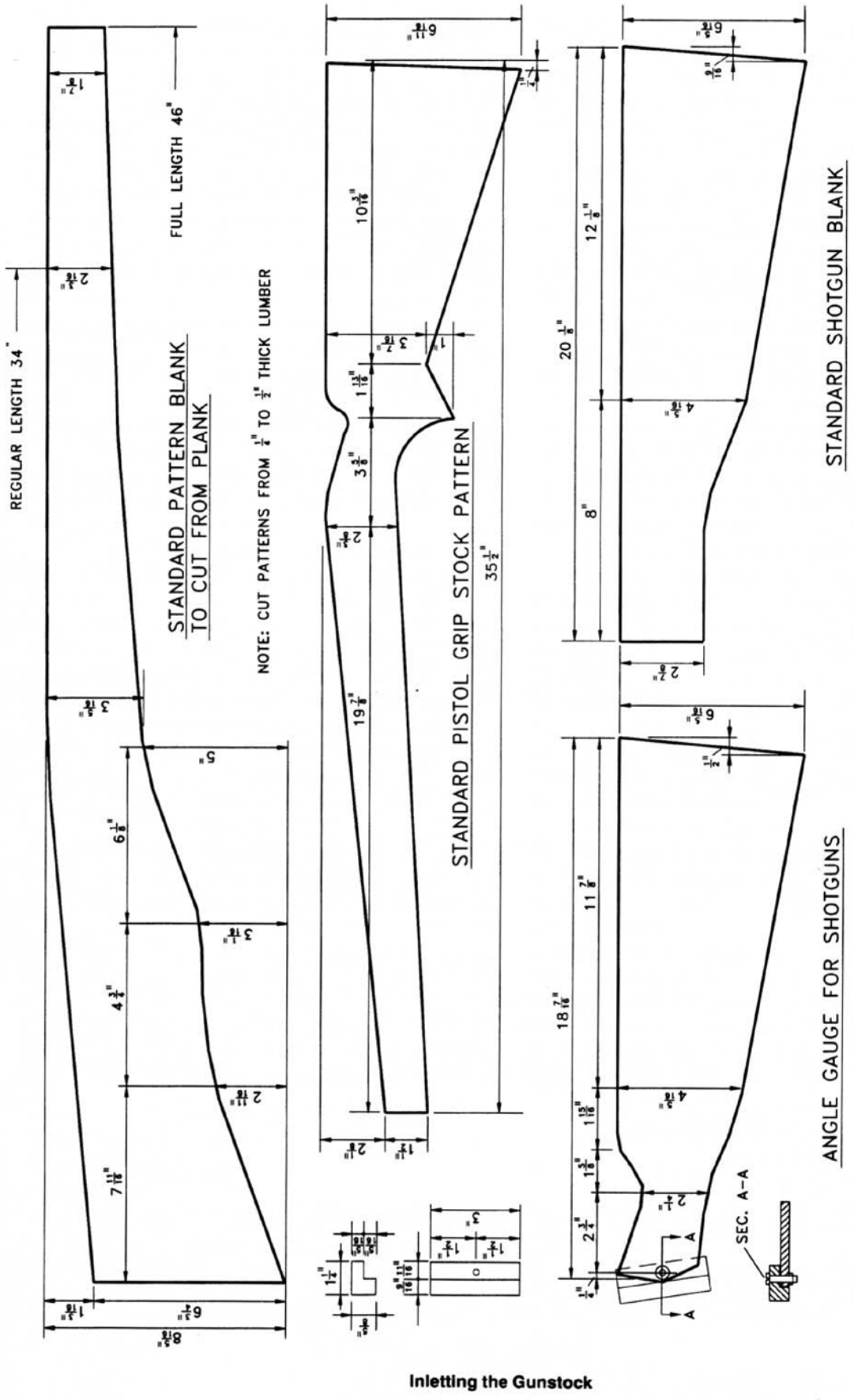


Figure 3: Stock patterns or templates cut from 1/4" plywood. These are especially useful, and can save much time if several stocks are to be made from the same pattern.

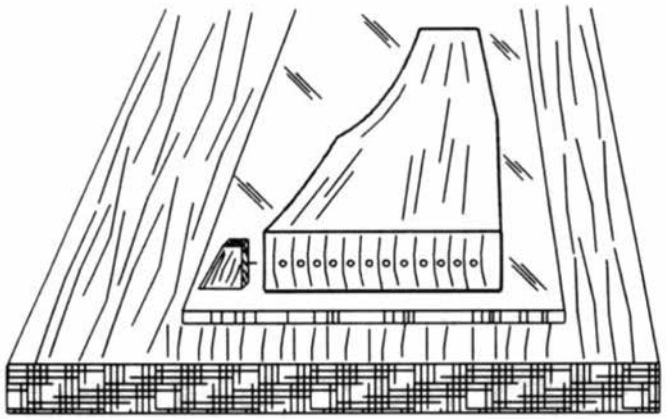


Figure 4: Laying out centerline on a stock blank placed on a piece of plate glass. The 'surface gauge' is made from a piece of hardwood with a sharpened nail to scratch the centerline.



Figure 5: Jerrow's Inletting black or some similar coloring compound is indispensible for stock inletting. In a pinch, lipstick will work. Applying the coloring compound to the metal parts and then touching them to the wood gives the stocker a "road map."

Using calipers and an accurate steel rule, measure all the cross dimensions and lengths for each different cut that will be required, and mark the outline plainly on the top side of the walnut blank. This is the side that was planed and trued to final dimensions as the gunstock was laid out. When measuring, it helps to have an old stock laying along side the new blank to act as a guide. However, if an old stock is not available, the dimensions can be measured accurately from the metal gun parts.

After laying out all cuts, you can save time by securing the stock in a drill press vise and then use the drill press to bore a series of holes through the blank from top to bottom inside the area where the magazine of the bolt-action rifle will be located as shown in Figure 6. This starts the cut of the recess where the magazine will lie, and gets a lot of wood out of the way. When boring these holes, be sure they are perfectly straight so that their centers will strike the centerline on both the top and bottom edges of the blank. Cuts can be made between the holes with a sharp chisel. Cut out the barrel channel and bed for the receiver using gouges and wood chisels, keeping them sharp at all times. Remember, the outside lines of the barrel should be marked on the blank, and when chiseling, do not cut within $^{1}/_{32}$" of the outside lines. Proceed very slowly until you get the knack of this. One slip can ruin the whole job. Line the work up constantly, and fit the barrel and receiver to the work every few minutes to see that measurements are correct.

The grain of the wood usually requires you to gouge and chisel in one direction only. Find out what this direction is and stick to it, as working in the opposite direction can split the wood. You can also have different working directions in various sections of the wood. Work around the grip area might require chiseling in one direction while the work around the barrel channel might require chiseling in the other direction. Just be sure to proceed slowly and carefully during this critical phase of stock work.

When the wood has been cut away to within about $^{1}/_{16}$" of the correct depth, the stocker then proceeds very slowly, frequently trying the barrel and receiver to see where the high spots are according to the marks left on the wood by the blackening compound applied to the metal.

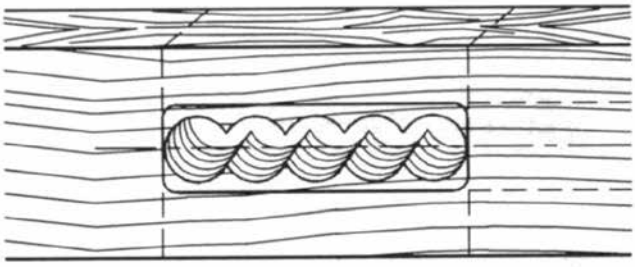


Figure 6: After scoring the bottom outline of the magazine mortise, five holes are bored to lessen the job of chiseling out the bulk of the wood. It is easier to draw the holes as close to the end marks as they are then it is to bore them.



***Figure 7**: Once the inletting black is applied, pressed into the stock, and lifted, the high spots on the stock will appear as black marks on the wood.*

Apply the inletting black to the under surfaces and contact points of the barrel and receiver. Carefully place the barrel and receiver without sliding it; lower it straight down and parallel so that all points make contact simultaneously, and lift it straight out again. The wood at the points of contact will be marked with the inletting black as shown in Figure 7. Cut off these marks lightly with the gouge and chisel, and again place the barrel and receiver in its appropriate place in the stock blank.

Continue to shave off the wood at the blackened spots until the barrel and receiver sink to their proper bed in the wood and fit perfectly at the edges and over the entire surface of contact. As you near the required depth, be very cautious and only take off a paper thickness at the marked spots. This will be slow work, but the care will pay off in a perfect-fitting stock. Also, each time the barrel and receiver is seated in the stock, look at the placement from every angle to ensure that it is going into the blank straight and level. Sometimes it will start to twist if care is not taken, which results in a poor job as well as spoiled accuracy in the case of rifle stocks. If you detect any twisting at all, you must forcibly straighten it out before progressing. You will not be able to straighten the twist out completely by force alone because as you release the pressure, the barrel and receiver will return to its original position. However, by doing so, the marking compound or inletting black will appear heavier on the spots causing the twisting and in cutting away these spots, the barrel and receiver should straighten up. Do not wait too late to correct any twisting; observe the barrel and receiver before you reach the bottom and correct any problems before you are too close to the bottom depth. If you wait too late, you will have to cut away more wood than necessary and fill in the gaps with glassing compound.

One word of caution: Spread the inletting black evenly and thinly over the metal parts to obtain a true reading. The inletting black tends to gather in a thick mass on certain steel portions, resulting in a false reading. Thin the inletting black with oil, and wipe it off with oil when necessary. If the inletting black is used carefully, there will be only a few contact points that show each time the barrel and receiver are lowered into and taken up from the stock, and these are immediately shaved off. Apply the compound only on the portions of the metal that will come into contact with the wood. Then you will have clean metal to grasp when lowering the barrel and receiver into the blank. Your hands should not come into contact with the blackening at all. But regardless of how careful you might be, chances are you are going to get the marking compound all over you on your first couple of attempts. If this happens, merely clean your hands and the wood before continuing.

Most centerfire bolt-action rifles have a projection, like the one shown in Figure 8, on the next page, on the underside of the barrel just ahead of the magazine which is intended to hold the entire action and barrel in the stock against the recoil. It is necessary that the rear surface of this projection bears snugly and accurately against its shoulder in the stock. If it does not, chances are the receiver will gradually be driven to the rear of the rifle as it is fired until the receiver tang finally splits the stock at the grip. Pay close attention to this area and make certain of a perfect fit.

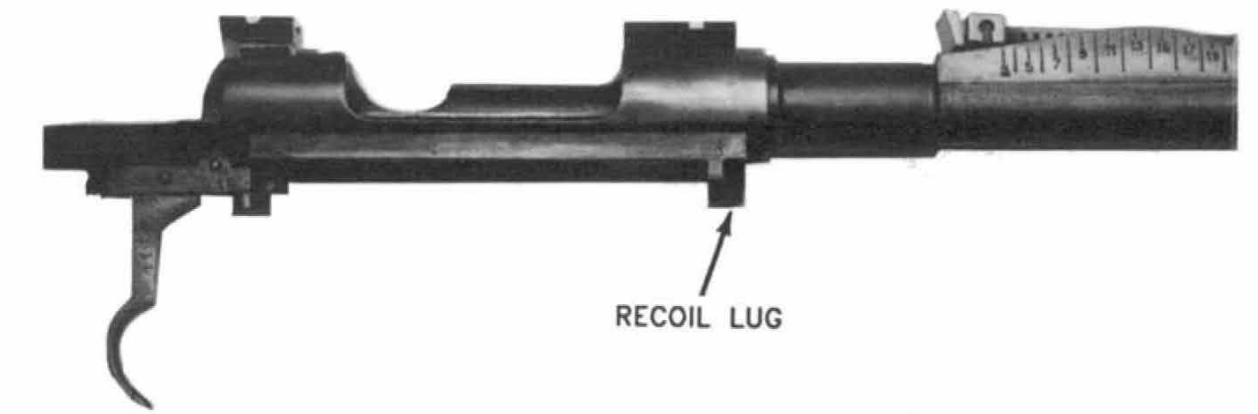


***Figure 8**: Recoil lug of a high-powered rifle.*

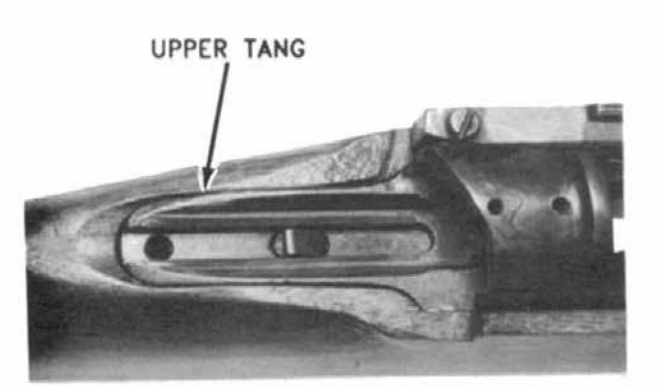


***Figure 9**: Upper tang of a receiver bridge.*

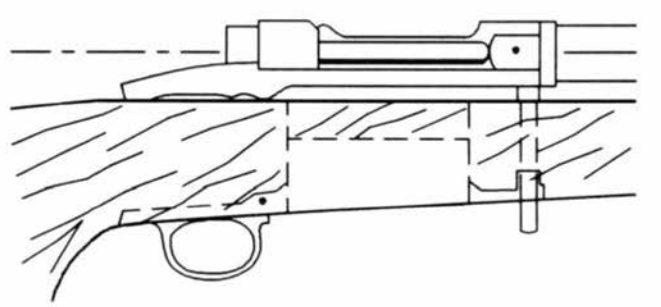


***Figure 11**: A receiver with guide screws in place.*

On certain magnum rifles with high recoil, crossbolts are sometimes used as an added measure to keep the barrel and receiver in place during firing. However, in recent years, many stockers have used fiberglass to bed the recoil lug area of the stock. This offers a very strong support and is not visible from the outside of the stock. In fact, if this glassing is done properly, the crossbolts may be eliminated altogether.

As the rear of the receiver is inletted into the blank, the top surface of the wood will have to be cut away and rounded to follow the upper surface of the upper tang in the rear of the receiver bridge, shown in Figure 9. However, take care not to cut away too much at a time. Work slowly and get it right on the first attempt. Cut down just enough wood to enable you to maintain the fit of the edges of the cut in the blank accurately.

After the barrel and receiver have been completely and accurately inletted in the blank so that the barrel is imbedded with just half its diameter in the blank, the next operation is to mark and drill the holes for the guard screws which connect the receiver and trigger guard/floor plate.

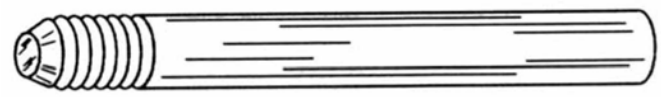


***Figure 10**: Guide screws can be made on a metal-turning lathe or they can be purchased from gunsmithing supply houses already made for certain popular bolt-action rifles receivers.*

At this point, smooth off the bottom side of the blank and inlet the trigger guard and floor plate first. You will also need some inletting guide screws, shown in Figure 10, to perfectly align and hold the trigger guard in its proper position in relation to the receiver. The holes, of course, must be drilled accurately so that the receiver is not twisted to either side nor forced backward or forward when the screws are tightened.

On most bolt-action rifles, the forward guard screw goes in straight while the rear screw is usually slanted. This slant must be allowed for drilling the hole. This rear hole should be drilled the correct size for the rear guard screw bushing. Use a drill press to insure accuracy; it is very important for these holes to be precise. Most semifinished stock blanks have these holes drilled at the factory.

Once the holes are drilled, screw the inletting guide screws into the guard screw holes in the receiver. Lower the barrel and receiver into the blank so that the inletting guide screws project through the guard screw holes at the bottom of the stock about an inch or so as shown in Figure 11. You are now ready to inlet the trigger guard and magazine.

Run the trigger guard assembly to its approximate position on the stock by using the projecting inletting guide screws as guides. Use a sharp pencil or scribe to trace the outline of the guard assembly onto the wood. This will be used as a guide when cutting away the wood to let this assembly be recessed into the wood blank. First, you will want to inlet the magazine well inside the stock before doing any cutting on the bottom for the guard itself.

Using inletting black constantly, run the guard on the guide screws until it meets wood. Remove the guard and remove the wood as before where indicated by the black marks. Each time the guard is run up on the inletting screws, be sure that it comes up parallel in proper relation to the receiver, and that it does not slant to the front or rear. Also, be very careful when cutting out the recess for the magazine portion of the guard. If it is too long, it will leave holes at the forward and rear ends of the magazine when the stock is completed.

The bed for the guard should be hollowed out gradually and carefully. When completed, replace the guide screws with the regular guard screws to secure the guard to the receiver with perfect fitting of the wood everywhere.

On most bolt-action rifles, the receiver really starts at the rear of the trigger guard, not at the rear of the lower tang. Do not cut too much stock away at this area or you won't have the proper curve for the pistol grip.

Now with the barrel and receiver inletted as well as the trigger guard, screw the barrel and receiver tight to the stock, insert a cleaning rod, a patch, and a drilled empty cartridge case in the bore. In other words, use a fired cartridge case for the rifle being worked on. Drill a hole in the base of the cartridge case to allow the cleaning rod to pass snugly. Put the cleaning rod in from the muzzle end, letting it pass through the hole in the cartridge case and out through the rear of the receiver. Then measure down from the cleaning rod to the comb and heel to obtain the proper drop of the stock at these points. Carefully cut the comb and heel to these dimensions.

Locate the point of the comb, which is usually just above the center of the pistol grip cap. When these portions have been cut as required, the centerline will still be on the raised edge of the stock between the two cuts. Re-mark this centerline where it was cut away at the comb and heel areas so you can line it up with the buttplate later. Cut off the raised portion of wood between these comb and heel cuts, providing a true and final surface of the stock between comb and heel. Again, replace the centerline by drawing a straight line between the center marks at comb and heel. The buttplate can now be fitted.

The butt of the stock should be sawed and trued to receive the buttplate. However, this initial cut should be approximately 1/8" longer than the final dimensions. This will allow a little room for adjustment during the fitting. A conventional flat buttplate requires little fitting— it's only a matter of scribing the outline of the buttplate on the butt of the stock, marking the screw holes, and then securing the buttplate or recoil pad to the stock. This can be used as a guide to shape the stock around it. However, on certain metal plates, additional inletting will be required.

Coat the under surface of the plate with inletting black and fit the buttplate on the stock blank using a file and chisel if necessary. When filing across the grain, be careful that you do not rip off small chips from the side of the stock at the edges and ruin the whole job. High-figured wood chips easily in this area, so be very careful.

The buttplate should be fitted at such an angle to obtain the desired pitch. Pitch enables the butt to be placed against the shoulder without catching on clothing or the underarm, and also helps to keep the stock in place during firing. The pitch can vary, but many shooters like about a 3" pitch: when the buttplate is resting on a flat surface evenly, the barrel will slope forward at the muzzle about three inches.

Sloping the buttplate will make the toe of the buttplate come nearer to the trigger than the heel does. It might also be desirable to give the butt a small amount of cast-off to mount the buttplate a little off center. When the buttplate is moved to the right of the centerline, obtaining cast-off, the whole buttstock will be thrown tighter against the cheek for aiming. If the buttplate is set off to the left of the centerline, cast-on will be obtained to throw the whole buttstock slightly away from the cheek. It can be readily seen that a stout-faced person may require cast-on while a thin-cheeked person may require cast-off.

The usual cast-off is from 1/8" to ¼" at the heel, and from¼" to 3/8" at the toe of the buttplate. Of course, the cast-off for a left-handed shooter should be to the left. Cast-off basically results in the whole buttstock being slightly twisted outward from the shoulder.

The next step is to shape the pistol grip area of the stock. First, locate the cap if a pistol grip cap of metal or plastic is to be used. Secure this in place also. The pistol grip cap is usually located at a point so that the center of the cap will be from $3^{3}/_{16}$" to $4^{1}/_{8}$" from the center of the bow of the trigger, but this can vary depending upon how the shooter holds his finger on the trigger. Also, the length of the stock has some bearing on this dimension. A pistol grip pushed well to the front will make the stock feel longer than it actually is, and vice versa.

The distance that the grip cap extends below the general lower line of the stock (from guard to toe), and the angle at which the cap is placed on the grip, depend on the shooter's preference. Once decided upon, the final line between the grip cap and the toe of the buttplate is cut.

Now, the sides of the stock can be shaped. Using gouges and rasps, shape the sides of the stock according to your original plan or pattern. Finish the shaping process by sanding.

SELF-TEST QUESTIONS

Please check your answers on page 15.

1. **Name the screws (usually two) used to align the receiver to the stock blank for inletting.**
2. ***True or False*. A pistol grip formed well to the front will make the stock feel longer.**
3. **What is the purpose of inletting black during the inletting process?**
4. **After taking a "reading" with inletting black, these high spots are removed with a gouge or chisel. Should these cuts be heavy or light?**



Example of customized rifle stock.

Fitting Semifinished Stocks

In stocking a shotgun or rifle, you can start with a chunk of cured wood and do all the inletting, shaping, and finishing yourself — in other words, building a stock from scratch. However, unless you want a really new stock design, it is best for the beginner to start with a machine-formed stock, commonly called a semifinished or semi-inletted stock. Several companies sell these stocks and each uses a machine in shaping and inletting the stocks. Some of these machines do 90-95% of the shaping and inletting; others maintain tolerances so precise that only minor sanding and touch-up inletting are required before final finishing.

SUPPLIERS

Many manufacturers such as Precision Gun Works, www.precisiongunstocks.com and Macon Gun Stocks, www.macongunstocks.com make semifinished stocks in several different styles for nearly all popular military and commercial actions. Replacement stocks that closely match the originals are also available at very reasonable prices. With such a readily available supply of these semifinished stocks, many gunsmiths and stock makers see little justification for shaping any stock from scratch.

In general, the manufacturer of semifinished gunstocks will offer their products in two ways: with only the action inletted and a standard ½" barrel channel that has to be shaped and inletted to fit the barrel attached to the receiver; or with the barrel channel and receiver completely inletted. In either case some inletting will be required, but even the beginner can achieve professional results if the project is approached with care and knowledge.

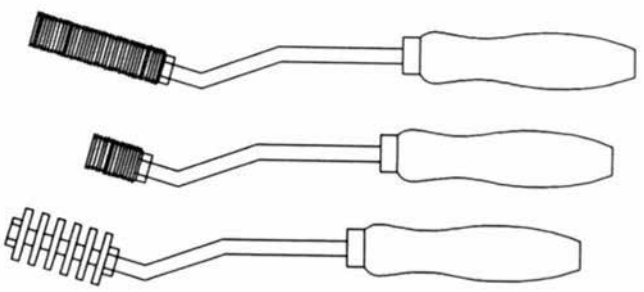


***Figure 12**: Barrel channeling tools are necessary in inletting a semifinished stock; few channels are cut to the correct size.*

TOOLS

Constant fitting of the metal parts to the wood with slow and careful removal of the excess wood will achieve the desired results. Inletting black is applied to the action, which is fitted into the semifinished stock and then removed. This black will then indicate on the stock just what metal parts are touching, leaving a map which shows where the excess wood must be removed. If you cannot find any inletting black at a local gun shop, you can make your own by mixing lampblack oil paint with petroleum jelly.

As the job progresses, you will need special tools. The barrel inletting tool, shown in Figure 12, is used to clean out the barrel channel. High bumps can be removed with chisels and gouges. Final touch-up and cleaning can be accomplished with a bottoming file. A word of caution: remove a little wood at a time. Remember, once the wood is gone, it cannot be replaced. Once you have a few projects under your belt you can work at a faster pace, but at first, remember to work slowly.

Even the beginner can turn out a reasonably good stocking job with semifinished blanks, but the work is not easy. You can figure on spending at least 40 hours of your time, and maybe even more, working on one stock. If you include checkering and carving, add an additional 8-16 hours before the stock is ready to be permanently attached to your barrel and action. Once you have experience — say, a dozen or more such projects completed — the work will go smoother and faster, enabling you to turn out a completed project in only a couple of days (less the time required for the wood finish to dry).

GETTING STARTED

The starting procedure will vary depending on the type of rifle or shotgun being stocked. In the case of most bolt-action rifles with trigger guards and floor plate assemblies, the trigger guard should be inletted at the start. This must be done with extreme care to keep the guard screw holes in line with the holes drilled in the semifinished stock. Begin by trying the trigger guard unit in its appropriate place in the semifinished stock. It will probably start in, but will meet with wood resistance that prevents it from fitting as it should. If so, inletting black should be applied sparingly to the metal surfaces that come in contact with the wood. Replace the guard as far as it will go and then remove it again. The inletting black will indicate the areas where wood must be removed in small amounts before the guard is retried for fit. Perhaps as many as 20 tries will be required before the floor plate/trigger guard assembly (and the box magazine on some rifles) fits exactly in its proper location. The fit should be exact like the one in Figure 13.

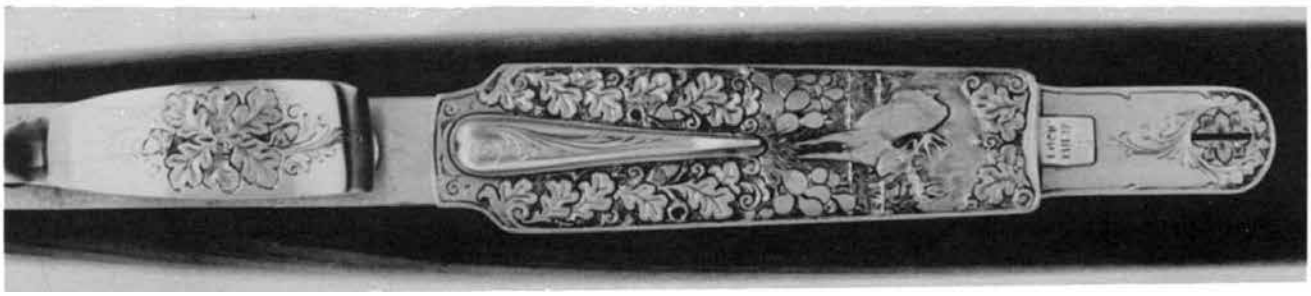


***Figure 13**: The floorplate must be inletted perfectly, with no gaps between the metal and the wood. The arcs, or curved areas, will be the most difficult to fit.*

During this initial inletting of the trigger guard assembly, you should learn the "feel" of the metal units as you remove minute amounts of wood and retry them for fit. It is important to keep the trigger guard/magazine box unit straight, level, and in exact alignment. Twisting or tipping the unit will give the inletting black markings a false reading, which can cause you to remove wood in the wrong places.

At this point, the bottoming tool should not be used on any bottom surfaces of the trigger guard/floor plate mortise. Rather, as soon as you get a reading on the bottom of the semi-inletted cut using the inletting black, stop inletting work in this area for the time being.

USING GUIDE SCREWS

It is now time to turn your attention to the receiver. Although not absolutely necessary, it is best to inlet the receiver separately without the barrel attached. However, if this is impractical or inconvenient, the barrel and receiver can be inletted as a unit. In either case, you should use gunstocker's guide screws that fit the guard screw holes in the semifinished stock. These will enable you to line up the receiver and trigger guard assembly perfectly.

Guide screws can be made on a metal-turning lathe or premade ones can be purchased from gunsmith supply houses. These screws are headless, clear of threads in the fitting area, and are absolutely necessary for fitting and inletting either semifinished or "made-from scratch" stock blanks.

Stockmakers' T-handle hand screws, shown in Figure 14, are also available, but these should not be used during the initial inletting; they can be twisted too tightly, which might split the stock. Also, excessive tightness can give false inletting readings, resulting in too much wood being removed or wood being removed in the wrong place. Use the headless inletting guide screws at first, and make sure to bring the receiver screw holes in exact line with the ones in the trigger guard/floor plate holes.

Later, during the final accurate fitting of the stock to the receiver, you will want to use the T-handle hand screws. These are precision-made and hardened for repeated trial fittings, and will help you avoid damaging the original guard screws or ruining the stock. They will also save much time in the final fitting of a semifinished gunstock.

In inletting the receiver, do not remove wood from every place indicated by the inletting black. Inletting black is messy stuff and has a tendency to smear on places where it should not. While inserting the receiver in the semifinished stock, carefully observe it from every angle to ascertain that it is not twisted or out of alignment with the trigger guard section of the rifle.

Then remove wood only where there is a definite pressure contact made during a true alignment. Use a hard rubber (or



***Figure 14**: Stockmaker's T-handle screws are available from Midway USA. These, along with inletting guide screws, are absolutely necessary for properly aligning the action to the stock blank during inletting.*



***Figure 15**: You must also inlet any flush-mounted stock furniture like this fancy combination fore-end tip and sling swivel.*

leather) mallet to bump the receiver downward gently, at the same time making sure that the guide screws point straight down through the center of the trigger guard unit without binding. If the guard was inletted correctly, it should fit snugly and remain in place. To make certain that it does not fallout, you might want to tape it with masking tape. Make sure it fits snugly against the bottom of the mortise before taking readings from the receiver above.

Inletting black is then applied, and the receiver is tried and retried, removing small amounts of wood each time at pressure points. Make certain that no wood is removed from the bottom surfaces of the opening until the receiver has made even contact with the wood. The T-handle screws will be handy as you approach bottoming, but be extremely careful not to tighten them too much. Now observe the edges and sides of the inletted opening, looking for pressure points that should be relieved by scraping, cutting, filing, or rasping a little at a time until a perfect fit is obtained. Do not start removing wood as soon as you notice the black contact marks—take the time to evaluate each one first.

You are looking for a perfect metal-to-wood fit of the receiver and trigger guard unit at this point. There should be no visible gaps between the metal and the wood. You cannot have the wood flush with the metal surfaces at this point, but this will be taken care of during the finishing of the outside surfaces of the stock. The metal should never protrude above the wood surfaces; it should be recessed into the wood. The exact depth will vary according to the amount of excess wood left on the semifinished stock during its shaping and the type of firearm being stocked.

You must also consider the inletting of miscellaneous stock furniture such as buttplates and decorative fore-end tips like the one shown in Figure 15. However, these items should be inletted last, after the final shaping of the gunstock.

BARREL CHANNEL

If you removed the barrel from the receiver before inletting the receiver, the barrel must be reinstalled and the action again inserted into the semifinished stock to open the barrel channel. This portion of the project should give you fewer conflicting inletting black readings than during the inletting of the action. Otherwise, the procedures are the same: Apply inletting black to the underside of the barrel, set it in place, remove, notice areas of black marks, and remove them with the proper tools. The round barrel channel rasp will be most helpful at this point.

On the other hand, if the barrel was left attached to the receiver, then the barrel channel will have to be inletted at the same time that the receiver is inletted. Just be sure to keep the assembly level during this operation. Apply inletting black to both the receiver and barrel pressure points, observe the black marks, evaluate each one, and then remove small amounts of wood from the appropriate locations until a perfect fit is obtained.

During the final stages of fitting and inletting, you should get in the habit of being more and more careful as you remove wood. Remember, none can be replaced. However, if you do make a mistake, glass bedding can be used to fill in some gaps. This bedding compound may also be used elsewhere, but it will be noticeable and reveal that an amateur has done the job. As you approach the final fitting, the top of the magazine box should either meet the bottom of the receiver or clear it by not more than .010" when the guard screws are cinched up firmly and there is full tension against the top of the stock's recoil lug by the receiver ring flat. The same should apply for the wood surfaces on which the guard screws pull the fore and aft ends of the trigger guard/floor plate assembly unit.

BEDDING

The bedding of the barrel and receiver is very important to ensure good accuracy and prevent damage to the stock under the rifle recoil. The methods used, however, vary from stockmaker to stockmaker or from shooter to shooter. Some want a free-floating barrel; others want an even pressure from receiver to end of fore-end, while others want pressure points only at the end of the fore-end. No recommendations are given here; use whichever system works best for you. In most cases, gunsmiths prefer a perfect metal-to-wood fit the entire length of the stock. Weather conditions and moisture content in the air can change the point of bullet impact on the target, but these same conditions exist with a free-floating barrel. Again, the method is left entirely up to the shooter.

The main point of concern, regardless of which bedding method is used, is to avoid excessive tension or pressure at any point. If the receiver is pulled down into the stock in a twisted or bound tension, trouble will develop. The same is true if the barrel is pulled down into a very tight barrel channel in the stock. You want to strive for an even tension overall, since uneven tension will vary the point of bullet impact during changes in humidity The point of impact can also be affected by change in temperature or even by the natural tendency of the stock wood to shift or warp.

SHAPING

Most semifinished stocks are 90% shaped on the outside, but you will still have to remove some wood from nearly all surfaces, particularly around the trigger guard and receiver recesses. These latter areas are purposely built up to ensure a perfect fit, so that the wood surfaces can be made to fit exactly flush with the metal edges. Extreme care must be exercised in these areas. Many gunsmiths like to install the metal parts in the stock, use a scriber to mark around the recesses, and then remove the metal parts during the trimming operation to avoid damaging the bluing or other metal finishes. As the mark is approached, several tries are necessary to ensure a perfect fit. It only takes a split second to take off too much wood and ruin the whole job. In some cases gunsmiths use masking tape to protect the metal parts while they use a small end rasp and sandpaper to obtain the final results.

Once the detailed work is completed, the entire stock is sanded into shape with several sizes of sandpaper. In cases where excess wood must be removed, a belt sander can be used to remove and shape most of the surfaces and then go to either a high-speed orbital sander, shown in Figure 16, or else sand the surfaces by hand, using progressively smaller grits of sandpaper to approximately 380-grit, and finally, steel wool.



***Figure 16**: A high-speed orbital sander can save a lot of work in final sanding of a semifinished gunstock.*

The stock can be finished by any number of methods as described elsewhere in this course, but before starting this process, check over the entire stock once again to make sure that absolutely all inletting and shaping has been completed.

The need for patience and care has been stressed in describing the procedures for inletting the semifinished gunstock. But more than likely, you are going to make a few slips on your first job or two, removing a little too much wood from one spot or another. But here's a secret: It happens to the pros too! The main difference between amateur and professional gunsmiths is the methods employed to cover up the mistakes. The novice often uses methods that appear as bad as the space or gouge would if left unfilled.

It is especially difficult to make an accurate cut on arcs, an operation frequently required in inletting a stock for receiver tangs, trigger guards, and the like. The slightest deviation from the marked line when cutting shows up as a large cavern when the metal part is seated in place. Do not be too alarmed if this happens to you. With a little practice, you will be correcting your mistakes just like the pros. The correction, however, is more time-consuming and tiring than the inletting, but this might have its advantages – it will make you be more careful on your next attempt so you will not have to go through the process more often than absolutely necessary.

SHELLAC STICKS

One method of patching damaged gunstocks is the use of shellac sticks. A gunsmith assortment is available from either Brownells. It contains eight different colored sticks and one transparent stick. The color or tone of gunstock wood can be matched closely with one of these sticks.

A correct color match is imperative because the sticks do not take on the color of the finish applied over it. In other words, what you see is what you get. For this reason, when filling a crack or recess on a light-colored wood that has not received the final finish, it is best to use a shade of shellac stick darker than the untreated wood. When the wood is treated, the shellac stick-filled area will more nearly match the tone of the stock.

Seldom will you be able to match the finish exactly without some prior testing. A little experimenting with the various color sticks on a piece of scrap wood — preferably from the stock being repaired — will give you a good idea of color tint. The finish you plan to use should also be applied to these test finishes. If none of the eight colors matches exactly, try mixing the shades until you get one close to that of the finished gunstock.

On some gunstocks, especially the lighter shades, good results can be obtained by first coloring the gouge or scratch with water-soluble wood stains to match the surrounding wood. Then, use the transparent shellac stick to make the fill.

The most difficult part of using the shellac stick is getting a good match. After that, it is very easy. All you need to do is heat a knife blade or hacksaw blade and touch it to the end of the shellac stick. There is no need to get the blade red-hot; very little heat is required to cause the shellac to melt and flow. When a small amount of melted shellac has formed on the end of the blade, immediately wipe it across the area to be repaired. The motion should be quick, yet gentle. If the defect is not filled on the first pass, repeat the process, but be careful not to get too much of the shellac in the area. Removing excess amounts is difficult.

To do the best job, first clean the recess to be filled with solvent. This will dissolve most oil and foreign matter that might interfere with the shellac holding securely. Where it is possible to deepen or undercut a place being filled, it is usually best to do so as it will afford a better gripping area for the shellac and lessen any tendency for the shellac to break loose.

When filling around any metal parts, such as a trigger guard or receiver tang, leave the metal parts in place when flowing the shellac. The shellac will not adhere firmly to the metal, but it will make a closer fit than would be possible if it were flowed in and then trimmed to fit the metal piece. In fact, trimming or tooling the shellac once it has hardened is very difficult; every effort should be made to shape it upon application. When attempting to tool the hardened shellac, it is more likely to chip than be cut. Fortunately, though, it can be sanded using abrasive paper (not under 220-grit size) with fairly good results.

Brownells offers a spatula for applying the shellac, but almost any flexible steel blade will work — a table knife, a section of hacksaw blade, etc. Set a lit propane torch with tank on the workbench near the stock being repaired. Pass the blade through the flame for a few seconds to heat it, and then quickly press against the shellac stick and quickly wipe across the area to be repaired. It is extremely important to get a good flow of the melted shellac during this application, or the finished job will result in layers of shellac that probably will not hold together.

Remember that the shellac sticks are meant only for repairing small dents and scratches and are not for filling in larger areas. For large repairs, wood dowels or wood splices are used.

You will also want to investigate the possibility of using epoxy compound for covering up places where the chisel slipped. Brownells Acraglas and Acraglas Gel kits contain everything you need, including a dye powder to match the gunstock wood.

SELF-TEST QUESTIONS

Please check your answers on page 15.

5. *True or False*. **During the inletting process, visible gaps should be seen between the floor plate and wood to avoid stress points.**
6. **If the barrel is attached to the receiver during inletting, when should the barrel channel be cut?**
7. **What is the name of a time-saving device that can speed up the final sanding of a semifinished gunstock?**
8. **How are most recoil-lug areas bedded on bolt-action rifles?**

Answers to Self-Test Questions

1. Inletting guide screws.
2. True.
3. To indicate the high spots in the wood that must be removed.
4. Light, paper-thin cuts should be taken.
5. False. No visible gaps should be seen.
6. At the same time the receiver is inletted.
7. High-speed orbital sander.
8. Fiberglass is the most popular method.

Lesson Questions

THIS IS LESSON NUMBER 2187.

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. Code the lesson number as shown at the right.



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. **Besides knowing the basic techniques of gunstock shaping and inletting, which of the following is also required of anyone attempting to build a gunstock from scratch?**
   a. Patience and attention to detail.
   b. The ability to work very quickly.
   c. Thousands of dollars worth of woodworking power tools.
   d. The time to complete the job before taking a break from your work.

2. **When inletting or shaping a gunstock, perform all metal work (bluing, machining, etc.)**
   a. After the shaping and inletting has been finished.
   b. As the inletting progresses.
   c. Prior to test firing the rifle.
   d. Before the shaping and inletting is started.

3. **When building a gunstock from scratch, what should be done before cutting or shaping the wood?**
   a. Install a fore-end tip.
   b. Decide on the critical dimensions and layout the pattern.
   c. Checker the grips and fore-end area.
   d. Test fire the rifle or shotgun for functioning.

4. **Besides appearance, what will a proper inletting job on a rifle stock accomplish?**
   a. Lessen felt recoil.
   b. A heavy rifle.
   c. Rifle accuracy.
   d. A lightweight rifle.

5. **When do patterns or templates of gunstock designs really payoff the most?**
   a. When several stocks of the same type are to be built.
   b. When only one stock is to be made.
   c. When the metal is to be engraved.
   d. When the grips and fore-end areas are to be checkered.

6. **When are heel and comb cut?**
   a. Before the trigger guard is inletted.
   b. Before any inletting is done.
   c. After the sides have been shaped.
   d. After the barrel, receiver and trigger guard have been inlet.

7. **When using inletting black during stock inletting, what do the black marks on the wood indicate?**
   a. Low spots that need to be raised.
   b. High spots that need to be cut down.
   c. Areas where the metal must be ground down.
   d. Areas where the metal must be built up.

8. **Inletting black should be spread on the metal parts**
   a. On bolt-action rifles only.
   b. Only at the outset of the inletting job.
   c. Very thick.
   d. Evenly and thinly.

9. **When inletting a semifinished stock, you should follow the same procedure as the stock blank.**
   a. True.
   b. False.

10. **Which of the following statements is true concerning the inletting of semifinished stocks?**
   a. Inletting guide screws are used only for inletting lever-action rifles.
   b. Inletting guide screws are needed only on stocks made from scratch; they are never necessary for inletting semifinished stock blanks.
   c. Inletting guide screws should be used to align the stock to the action before using stockmaker's T-handle hand screws.
   d. Stockmaker's T-handle hand screws are always used prior to inletting guide screws.