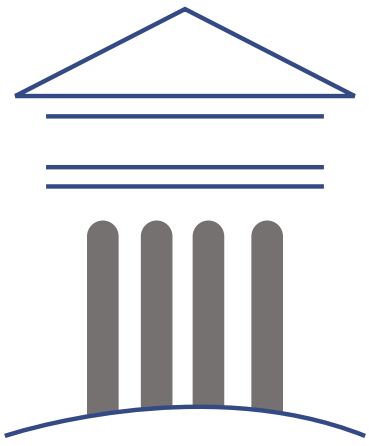
Reloading and Custom Ammo-Making Lesson: 2200

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Objectives

In this lesson, you will learn

1. The various reasons for reloading.
2. The rich vocabulary specific to the reloader.
3. How to reload using basic reloading equipment.

Introduction

The flintlock was the popular method of ignition until a powder compound that could be ignited by percussion was patented in 1807. The invention of the percussion cap eight years later started the chain of progressive improvements that eventually resulted in the modern metallic cartridge.

Unlike muzzleloading rifles, which had to be handloaded for each shot, the modern metallic cartridge permitted breechloading. Most early muzzleloading rifles were originally sold with handloading tools—a round ball mould and a ramrod. Later, breechloading rifles were also sold with such tools. Collectors can still find handloading tools that bear the rifle manufacturer's name and were part of the original rifle sale.

Twentieth-century mass production of metallic cartridges changed handloading from a necessity into a hobby. The term handloading was originally used to differentiate between a reloaded cartridge and a factory cartridge. Today, the more frequently used term is reloading.

There are at least four good reasons for reloading ammunition:

- The shooter can shoot four reloaded cartridges for the same cost as one factory round.
- The shooter's use of the gun is broadened since the same cartridge can be reloaded for different types of game.
- Special wildcat cartridges must be handloaded since they are not available in factory loads.
- Reloading is a fascinating hobby.

Because of the high cost of commercial ammunition, more and more shooters take up handloading. Besides the money saved in shooting reloaded ammo, handloading is also done to improve accuracy, to obtain a wider variety of loads for any cartridge, as shown in Figure 1, and to use rifles for which commercial ammunition is no longer available.

The practice of handloading is a popular method for gun dealers and gunsmiths to enhance their profits.

Profits in Reloading Ammo

A gun shop that carries a complete line of reloading tools and a good selection of reloading components will always attract customers. Unlike the sale of new firearms, which are almost always sold at a tremendous discount, reloading components frequently sell at full retail prices. Therefore, if a good supply of reloading components is stocked, regular customers will be willing to pay full retail price for the items they need.

Since many sporting goods stores do not carry a full line of components, it is likely that the store or gun shop that carries a complete line will attract new customers. When these customers come into a shop to buy their reloading supplies, they will probably look at other merchandise.

Reloading tools and components currently carry a markup of 25%-50%, depending upon the item and manufacturer. Many dealers find that profits on reloading supplies closely match their profits on new firearm sales.



***Figure 1**: One of the many benefits of handloading. This cartridge is the .458 x 2 American, a cartridge that is not factory loaded. Handloading gives this cartridge more versatility than any factory load of comparable size.*

**Prices are just generalization and vary greatly by type of ammunition and region.*

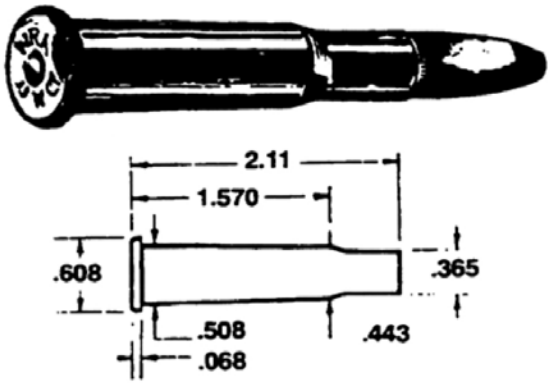


***Figure 2**: The.33 WCF is just one of the hundreds of obsolete cartridges that can bring a profit of over $25* per box.*

A store or shop owner can benefit from reloading ammo even if a customer does not shoot enough to warrant purchasing a complete reloading outfit. For example, one dealer attached a label to each box of new centerfire rifle and shotgun ammo sold. The label read:

> *When these cartridges are fired, they may be reloaded at (dealer's name and address) at a substantial savings to you. Return the empty cases with your order.*

For example, if the dealer sold a box of centerfire cartridges for $12 per box*, then would reload them for $8, the customer saves $4 per box, and the dealer gets an extra $4 profit on the ammo sale. This requires a separate license from the Bureau of Alcohol, Tobacco, and Firearms (AFT) that can be obtained using the FFL application form.

Another avenue to investigate is the possibility of reloading obsolete cartridges. For example, the .33 Winchester centerfire cartridge, shown in Figure 2, has not been chambered for any rifle since before World War II, nor has commercial ammo been manufactured for it since about 1950. There are still many Winchester Model 1886 and Marlin Model 1895 rifles around chambered for this cartridge. Most likely the owners of these firearms would like to use them if reasonably priced ammo could be found. An enterprising dealer can purchase a set of reloading dies, some .45-70 cases, and bullets and turn out around $100 worth of ammo in a single evening.

The .45-70 brass is easily formed to .33 WCF dimensions in the .33 dies, and loading is simple for this cartridge. Forty grains of IMR 3031 powder behind a 200-grain FN jacketed bullet gives ballistics close to the original factory cartridge. So by investing less than $10* in components (powder, primers, bullets, and cases), a 20-round box of .33 WCF ammo can easily be sold for $25-$35 — a profit of $15-$25 per box!

The current rate for standard reloads is about half the retail price when the customer furnishes the brass. Therefore, if a box of new .30-30 cartridges retails for $15* per box, then the charge for reloading the customer's brass is $7.50. A person already set up for reloading can usually reload a box of twenty .30-30 cases in about 20 minutes.

Developing custom reloads is another possible source of extra income for the gunsmith. Although each rifle shoots more accurately with a particular load than with others, many shooters do not know how to develop such loads for their rifles.

To develop a suitable load for a rifle, use a reliable reloading manual, like the one shown in Figure 3. Load three rounds each of the loads that safely come closest to the velocity the shooter wants. There should be at least five different sets for a total of 15 cartridges. Be sure to mark the rounds for identification while you are shooting.

Once the loads have been prepared, take them with the customer's rifle to a shooting range. Using a good sturdy shooting bench with sandbag rests, and a good visible target, such as those used by benchrest shooters, carefully shoot each group of cartridges, three at a time. Be sure to squeeze the trigger while striving to keep the bullet holes as close together as possible, in order to obtain the smallest groups possible.

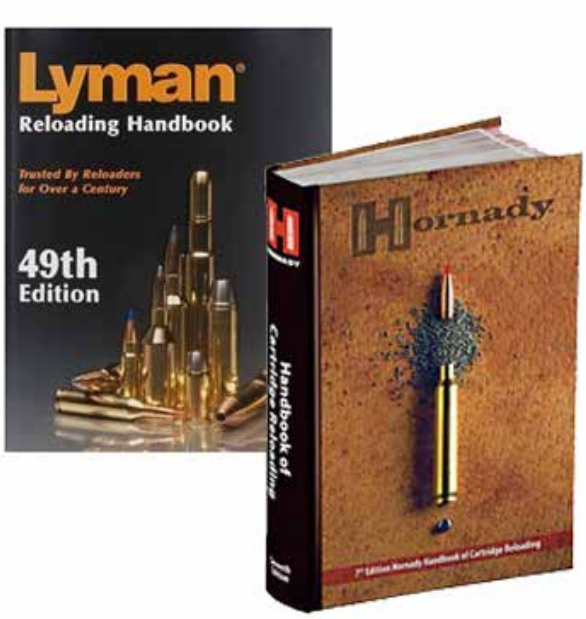


***Figure 3**: A reliable reloading manual is a necessity for any reloading.*

When the firing is complete, observe the targets. If you were sure of each shot and you held your best on each group, then you should be able to choose the two best groups out of the five fired. Next, use the same reloading data for these two best loads but reduce the powder charge by 0.2 (2/10) grain, loading up three more rounds for each. Then return to the range. Again, select the smallest of the two groups, and use the powder and loading data for the load that gives the smallest group.

This load can be further enhanced by loading groups of three rounds, cutting each group by 0.1 (1/10) grain each time, until you have loaded five groups. For example, if your original load called for 50 grains of IMR 4064 powder behind a 180-grain bullet, then you would load three rounds at 49.9 grains of power, three rounds at 49.8 grains, three rounds at 49.7 grains, three rounds at 49.6 grains, and three rounds at 49.5 grains.

During this test firing, one of the groups will be smaller than the rest. If it happens to be the last group (49.5 grains), load three more rounds with this load and then load some other groups of three at 49.4, 49.3, 49.2, etc. As you use less powder, the groups should start to open. At this point you should stop. In most cases, this will be the best group for the particular rifle.

ECONOMY

The subject of economy is a concern to many shooters. Authorities state that to become thoroughly familiar with a rifle, hundreds of rounds should be fired through it yearly. With centerfire ammo costing anywhere from $1 to $4, or more, a round, this practice can become quite costly, and few people possess the means to do a fraction of the shooting they would really like to. This is where reloading comes into the picture.

Upon firing a loaded cartridge, the empty cartridge case that remains is almost as good as new and represents more than half the cost of the original cartridge. Primers, powder, and bullets are easily replaced in the fired cases with a set of reloading tools, like those shown in Figure 4. The cost of these components, even for the duplication of high-powered factory loads, is surprisingly low and represents a fraction of the price of the factory-loaded commercial cartridge. The smart reloader can save even more with reduced loads that are suited for smaller game and short-range target shooting.

If cast bullets are used, centerfire cartridges can often be loaded at a cost close to that of .22 rimfire cartridges.

Reduced loads use only a small powder charge, and when used with cast bullets, thousands of rounds can be rued through any centerfire rifle without undue wear on the barrel. Full-powered, high-velocity loads, on the other hand, can wear out a barrel in fewer than 1,000 rounds if these high-powered rounds are fired rapidly.

It is recommended that shooters load for accuracy, using reduced loads for most shooting, and then load full-powered loads for hunting. Much money can be saved in ammo costs, and the barrel will usually last longer. There is no need to load practice rounds at full power.

IMPROVED ACCURACY

As a rule, properly reloaded ammunition is more accurate than the average commercial cartridge. There are several reasons for this. Factory-loaded cartridges must be loaded to a certain definite standard; they must function properly in any arm chambered for a particular cartridge, regardless of the model. The brass cartridge case must be small enough to enter the smallest chamber likely to be encountered freely. Factory-loaded cartridges must also be short enough to use in any action designed to receive the cartridge. Finally, factory-loaded cartridges must be loaded so they do not develop pressures which may prove dangerous in older firearms that are no longer made but are still used.

Handloaded cartridges adapted to an individual rifle or handgun are more accurate than average commercial cartridges because they were developed and reloaded for a particular firearm, not for any gun of the same caliber. Cartridge cases once fired with full-power loads expand to fit exactly the chamber of the arm in which they were fired. A bullet carefully seated in



Figure 4: *Unlike new guns, which are often sold at a substantial discount, reloading tools and components normally bring full retail price. The gunsmith can make anywhere from 25% -50% profit on each sale. This kit is an example of a complete reloading kit from Lyman Products.*

an expanded case will be centered when placed in the chamber. This perfect centering increases accuracy. The overall length of the cartridge is also important. For best accuracy, the forward section of the bullet should nearly touch the rifling when the cartridge is chambered. Factory ammo is of a standard length, but the reloaded ammo may vary the depth of seating the bullet in the case to fit a particular rifle perfectly. In doing so, the shooter gets superior results.

When only factory ammo is used, the greatest accuracy of a particular firearm is usually unknown to the user. The reason is that supposedly identical arms are actually not identical, and the bullet and powder charge which proves best in one will not be the most accurate in another. The handloader has a choice of bullets, powder, and powder charges, as well as primers, etc. The handloader can then experiment with charges, powder, and the like to develop cartridges that are more accurate in a certain firearm.

Every shooter is proud of a fine gun in his or her collection, but the pleasure derived from it depends largely upon its use. If the shooter does not reload, he or she has only commercial ammo available. This centerfire ammo, especially in calibers larger than .257, is designed primarily for big-game hunting. It is usually too powerful to use for smaller game. The recoil from it is usually excessive, and a good barrel will be worn out after firing 500-1,000 rounds. On the other hand, the handloader can take this same rifle, load it with reduced loads suitable for short-range loads, and load high-velocity loads with light bullets that will break up on impact rather than glance off rocks and other objects it might come in contact with. This will lower the recoil to a level in which more shots can be taken in any given period of time.

SAFETY

The question is often asked, "Is reloading dangerous?" If reasonable care is taken, it definitely is not. Few accidents occur during the process of reloading. Handloading ammunition does require ordinary care, but if the reloader reads a good handloading manual and the instructions that accompany the equipment before reloading, the practice is perfectly safe. However, certain precautions must be observed:

- Do not smoke while reloading.
- Wear eye protection.
- Do not manipulate reloading tools that would give a sharp or heavy blow to any primer. Primers normally will not explode from pressure alone. Handloaders should never attempt to prime cartridge cases which contain a powder charge, but only prime empty cases in good, clean condition.
- When loading powder into cartridge cases, be extremely careful not to throw a double charge into the case. This is especially true when using fast-burning powder for reduced loads in rifle cases. A double charge can stretch the chamber and cause the rifle to explode. One good practice is to observe each case as the powder charge is thrown, noting the depth of a correct powder charge and comparing this to the others. If a charge does not look right, weigh it on an accurate powder scale just to be sure. Also, it is a good idea to check every tenth case when using a powder measure to make sure the measure is still throwing the correct charge.
- Never exceed the maximum charges recommended by the reloading manuals.
- Always start a few grains under the maximum recommended charges and gradually work up, observing all signs of pressure during the process.
- Before reloading, examine cartridge cases closely for defects. Give particular attention to the base of the case. Discard any cracked cases.
- Do not continue to fire a lot of cartridges when signs of high pressure are present. Indications of excessive pressure are undue recoil, difficult extraction of the fire case, and pierced primers or longitudinal streaks appearing on the body of the fired cartridge case.



RELOADER'S LANGUAGE

Reloading, like golf, tennis, fishing, or boating, has its own language. Become familiar with this language. You should understand the following terms thoroughly before continuing.

BELL: To taper a case mouth to receive a bullet easily.

BULLET: A piece of metal or plastic, which varies in size and shape, that is formed into a projectile.

BULLET SWAGING: The forming of a bullet in a die.

CALIBER: The approximate diameter of a bullet or gun bore.

CANNELURE: One or more grooves, cut around the circumference of a bullet, where the crimped case can grip the bullet. These are sometimes used to hold bullet lubrication.

CARTRIDGE: A completely loaded, ready-to-fire round of ammunition.

CASE: A metal cylinder which holds the primer, powder, and bullet. Also called brass.

CASE FORMING: Forming cases of one caliber into a different caliber.

CHAMBER: The breech part of a gun's bore that receives and supports the cartridge for firing.

CHAMFER: To ream or bevel the inside of a case mouth.

CHRONOGRAPH: An instrument used to measure the velocity of a bullet.

COMPONENTS: The parts that make up a cartridge; the cases, primer, powder, and bullet (Figure 5).

CRIMP: To bend inward the mouth of a case to grip the bullet. Used only with bullets having a cannelure or crimping groove.

DEBURR: To remove the small metal burrs from the inside and the outside of a case mouth.

DECAPPING: Removal of the spent primer from a fired case.

DECAPPING PIN: The slim, needlelike rod in the sizer or expander die which expels the spent primer.

EXPANDER: The part of a die that expands the case mouth to receive the bullet.

EXPANDER BALL: Same as expander.

FLASH HOLE: The hole through which the primer ignites the powder charge in a case.

FULL-LENGTH SIZER DIE: A die used to resize the full length of a fired case.

HANDLOADING: Another term for reloading.

HANGFIRE: The delayed ignition (firing) of a cartridge.

IGNITION: The action of setting a powder charge on fire.

JACKET: The covering on a bullet.

MISFIRE: The failure of a cartridge to fire after the firing pin strikes the primer.

NECK: The top part of the case which grips the bullet.

NECK-SIZER DIE: A die used to resize only the neck portion of the fired cartridge case back to its approximate original dimensions. Such dies are not suited for centerfire semi-automatic rifles.

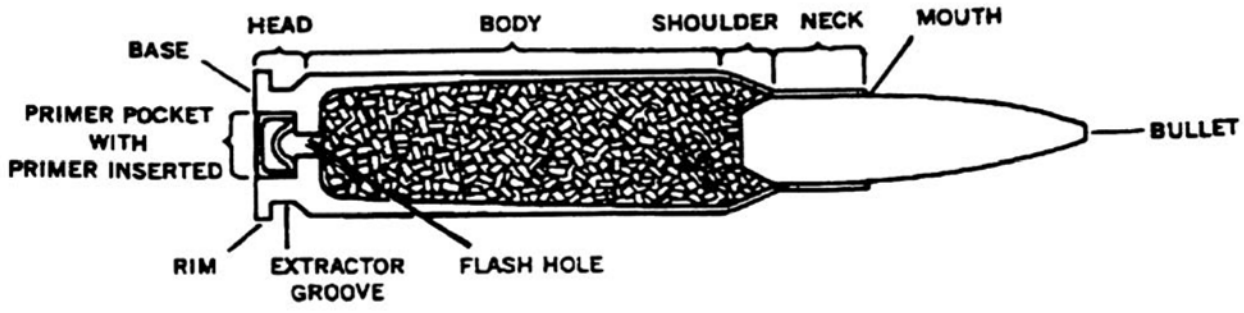


Figure 5: Components of a loaded rifle cartridge.

POWDER: The substance that ignites in the cartridge and propels the bullet.

POWDER CHARGE: The amount of powder loaded into a case. Also called load.

PRIMER: The small cap containing a powder charge used to ignite the main powder charge in the case.

PRIMER PLUG AND SLEEVE: The devices that hold the primer in place while it is being seated in the primer pocket.

PRIMER-POCKET SWAGING: The smoothing out of the crimped primer pocket found in military cases.

PRIMING: Installation of a new primer into case.

RAM: The stout steel rod running through the center of a press that holds the shell holder and drives the case into the press.

RELOADING PRESS: The tool which performs the major tasks of reloading and into which are fitted the reloading dies and shell holder (Figure 6).

RESIZE: To restore a fired case to its approximate original size.

ROUND: Military term for a single cartridge.



***Figure 6**: The reloading press performs the major tasks when reloading ammo.*

SEATER DIE: The die that seats the bullet into the mouth of the powder-charged case, and crimps the case when necessary.

SEATING DEPTH: The depth to which a bullet is seated below the case mouth.

SHELL HOLDER: The device that holds the case in proper alignment while it is being driven into the die.

SPENT PRIMER: A primer that has been fired.

SPITZER: Bullet design feature. A bullet with a pointed nose.

SWAGE: To form an object, such as a bullet, by forcing it into or through a die.

THROAT: The area of the bore immediately ahead of the chamber that tapers to the point where the rifling starts. Also called the leade.

TRAJECTORY: The path of the projectile in flight.

TWIST: The angle of the rifling in relation to the axis of the bore. It is usually measured by length of barrel required to make one complete turn.

VELOCITY: The speed at which a projectile travels. Velocity is usually measured in feet per second (fps) at a given range.

WAD: A disc of paper, felt, cork, plastic, or other material used for various purposes, primarily in shotshells, but occasionally in rifle or pistol cartridges.

WAD COLUMN: The specific combination of overpowder and filler wads used in a particular shotshell.

WADCUTTER: A cylindrical, sharp-shouldered bullet, designed to cut a clean, round hole in a paper target.

WCF: Winchester Center Fire.

WEB: That part of a cartridge case between the bottom of the primer pocket and the interior of the case. The web is pierced by the flash hole.

WILDCAT: A cartridge case formed by altering an existing case to make a shape of case that is not available from the large ammunition companies; a nonstandard case.

WORK-HARDENED: Repeated stresses of handloading cause brass to become hard and brittle, resulting in cracks.

ZERO: In shooting terminology, the range at which a firearm will hit the point of aim.

RELOADING EQUIPMENT

Reloading dies, as shown in Figure 7, are the key tools to reloading and should be of the finest possible quality. Dies are screwed into the top of the reloading press, as illustrated in Figure 6, where they will perform 3 functions:

- Resize the fired case
- Eject the fired primer
- Seat the bullet

A two-die set of reloading dies is designed for reloading bottleneck type cases only. One die is called a full-length sizer die. It resizes the fired case to its approximate original dimensions, ejects the fired primer, and expands the neck of the case to receive the bullet. The second die, called the seater die, is used to seat the bullet and, when desired, to crimp the case neck around the bullet.

When reloading straight-wall type rifle and pistol cases, a three-die set is normally used. The first die is the sizer die and is used to resize the fired case down to its approximate original dimensions. The second die, the expander-decapping die, ejects the fired primer and slightly expands the case mouth to receive the bullet. In some brands of three-die sets, decapping is done in the sizer die. The third die, the seater die, seats and crimps the bullet.

Reloading Scale. The scale, as shown in Figure 8, is used to weigh powder charges accurately. A good scale should be accurate, dependable, and easy to use. Inexpensive powder measures may be used if moderate and reduced loads are used. However, if the handloader is loading near maximum, a powder scale is recommended to ensure safety.



***Figure 7**: Reloading dies are the key tools for reloading centerfire ammunition.*



***Figure 8**: An accurate scale is a must for reloading.*

Powder Measure. With a good powder measure it is necessary to weigh only the first charge on the scale, thus eliminating the need to weigh powder for each case. The measure then performs two powder-charging tasks in one fast, simple operation: it throws consistently accurate charges, within a fraction of a grain, and dispenses powder swiftly and directly into the case.

Powder Funnel. When powder charging just a few cases, powder can be poured from the powder scale pan through a plastic funnel and into the cases without spilling.

Case Lube Kit. A good case lube kit, as shown in Figure 9, will include a case lube pad, resizing lubricant, and a case neck brush for proper lubrication of cases before resizing.

Burring Tool. This tool, shown in Figure 10, removes burrs and bevels from case mouths, inside and out, for ease of bullet seating.

Brass Cases, Primers, Powder, and Bullets. In reloading, these are commonly called components. Customers may ask for your help in choosing these items.

Reloading Manual. A good reloading manual, such as Speer's, Hornady's, or Lyman's, is a must before you begin reloading. It gives powder charge tables, bullet weights to use, and other vital reloading information.



Figure 9: A case lube kit is necessary for all rifle cartridges.



Figure 10: One burring tool can be used for all calibers.

A Place to Reload. The type of work bench you will need for reloading will depend primarily upon the type of reloading press you buy. Some presses require work benches built like battleships due to the tremendous stress they put upon the bench. However, other presses place so little stress on the bench; they require no more than a sturdy table or a simple bench.

SELF-TEST QUESTIONS

Please check your answers on page 17.

1. ***True or False*. Reloading ammunition should be done only in an emergency; factory cartridges are always better.**
2. **Name two benefits the gunsmith can derive from selling reloading supplies in his or her shop.**
3. **What is the military term for a single-rifle cartridge?**
4. ***True or False*. You can reload ammo for about one-fourth the price of factory ammo.**

Basic Reloading

The six basic steps of reloading centerfire rifle ammunition are shown in Figure 11. Let's examine each step in detail.

STEP 1

Clean and Inspect the Case. Cases that have been rued must be wiped clean with a cloth immediately to prevent dirt scratches. This will also extend the life of your cases and dies. Also, each case must be inspected for flaws before reloading (Figure 12).

Inspect Necks for Cracks and Splits. The most common flaws in fired cases are cracked or split necks. Sometimes these flaws are hard to see with the naked eye, so the insides and the outsides of case necks should be examined carefully. Even a tiny crack in the case neck means that the case will not hold a bullet tightly, and such cases must be discarded. Cases fired just once seldom show signs of neck splits, but after many firings they begin to appear. Much depends upon the age of the brass case, its heat treatment, the pressure in the chamber, and the chamber neck diameter in your gun.

Inspect for Head Separation. Another thing to look for is partial head separations, which usually occur about ¼" above the case head. A head separation, though rare, is very dangerous. Unlike a cracked neck, which only allows powder gas to escape at the front of the chamber, a separated head may let this gas leak out into the gun action, causing damage to the gun and possible injury to the shooter. A head separation may be due to extreme pressures, a defect in the gun, poor brass, or old brass that has been fired too often. It may also be due to a poorly made reloading press or die, or a misfit between the die and the gun chamber.

Inspect for Overall Length. Besides freedom from flaws, cases should be inspected for overall length. If the case neck is too long, it will project into the throat of the barrel, squeezing the bullet between it and the rifling, causing a dangerous rise in pressure. Cases must be the same overall length to allow for bullet crimping.

Measuring Case Length. Case length gauges can be used for this, but the RCBS Trim Die is worthwhile using because it performs two jobs: it can be used to check case length; and it provides an efficient way to trim those that are too long. To use the trim die, screw it into the press until the shell holder touches the bottom of the die when the ram is at the top of its

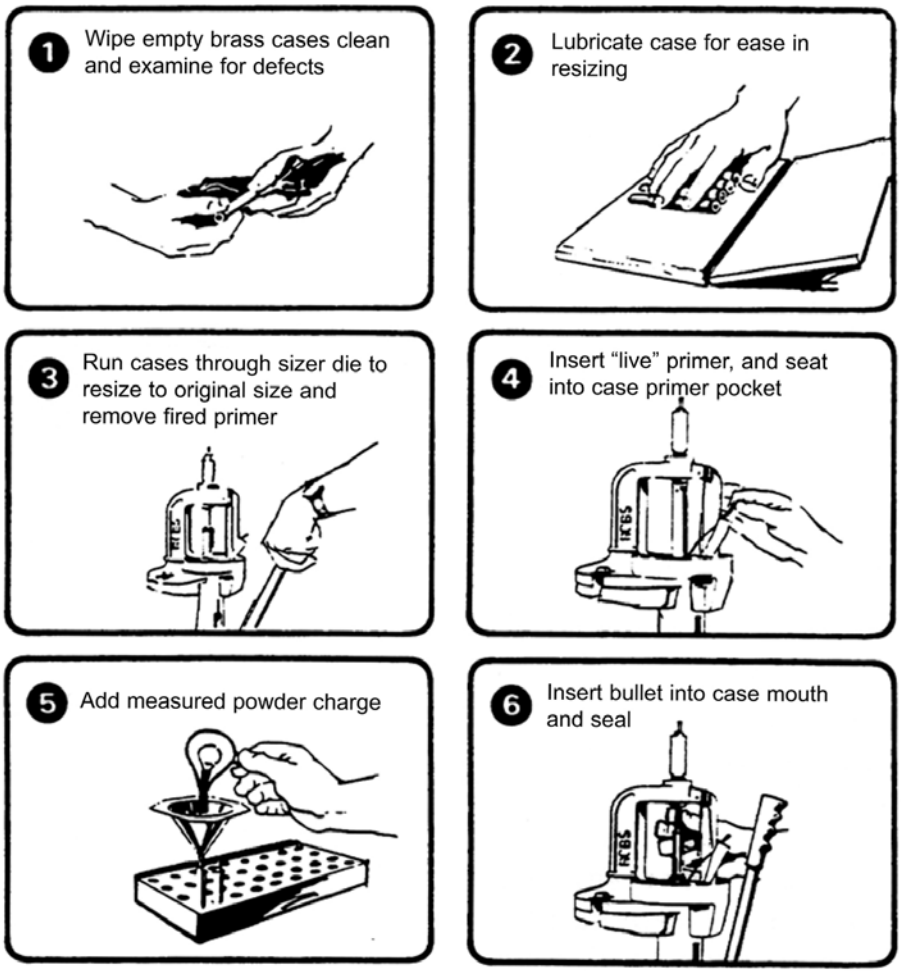


Figure 11: The six basic steps to reloading.

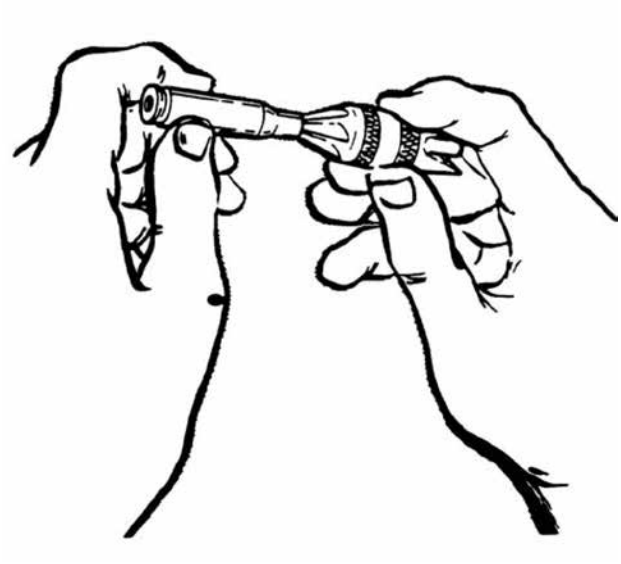


***Figure 12**: Bevel and deburr the case.*

stroke. Then place a case in the shell holder and run it into the die. If the case neck sticks out above the top of the die, file it off with a smooth-cut file.

Bevel and Deburr the Case. For easier resizing and bullet seating, the mouths of all cases should be chamfered (beveled), and all trimmed cases should be deburred. To chamfer, insert the pointed end of a burring tool into the case mouth and twist slightly without making a knife-edge. To remove burrs left by trimming, place the other end of the tool over the case mouth and twist (Figure 12). You are now ready to lubricate the case.

STEP 2

Lubricate the Case. Lubricating cases before reloading is a vitally important step that should never be overlooked if you want to avoid unnecessary resizing problems. Many reloaders neglect case lubrication, mainly because it is so simple, it does not seem important.

To lubricate cases properly, first start with a proper lubricant. Ordinary oils do not have enough body to stay on the case where needed; others have too much body or are too gummy. RCBS developed a special resizing lubricant for this purpose. A 2 oz. tube will lubricate hundreds of cases. To use, spread the lubricant evenly over the case lube pad, then rub it in until the oil is no longer standing on the pad surface.

Lubrication is needed mainly on the body of the case, about ½"-¾" from the base, as shown in Figure 13. To lube a case, roll it lightly across the pad, using your fingers to lubricate the case neck with lubricant picked up from the pad. It is vitally important that you lubricate the case evenly, without lubricating the shoulder of the case. A properly lubed case should feel, but not look, oily. If you overlubricate the case, oil will be trapped between the case and reloading die, causing oil dents when the case is sized. However, underlubrication may cause the base portion of the case to stick in the die. RCBS Stuck Case Remover may be used to remove it. The use of properly lubricated, good brass cases can prevent such sticking.

Lubricate Insides of Case Necks. The next step, seldom mentioned in reloading books and articles, is lubricating the inside of the case neck, as shown in Figure 14, on next page. This prevents the case from dragging in the die when the neck is expanded after sizing.

Equally important, lubricating the inside of the case neck removes the gritty primer and burned powder residue from the neck. After years of experimentation, RCBS developed the RCBS Case Neck Brush for lubricating the insides of the case necks. Roll the brush lightly across the lube pad so that it picks up only a trace of lubricant. After brushing out three or four necks, relubricate the brush. This helps to get rid of the grit and prevent getting too much lube inside the case neck. Your case is now properly lubricated and ready to be resized and decapped.

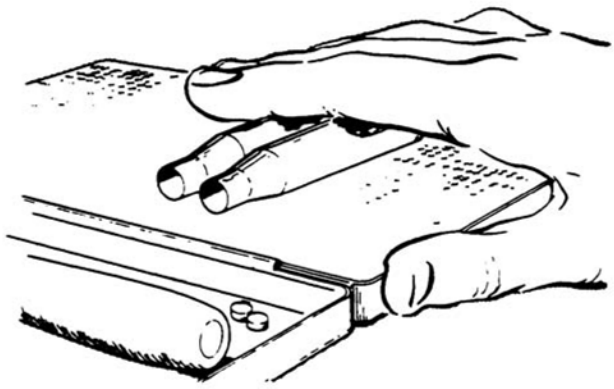


***Figure 13**: Lubricate the outside of the case.*

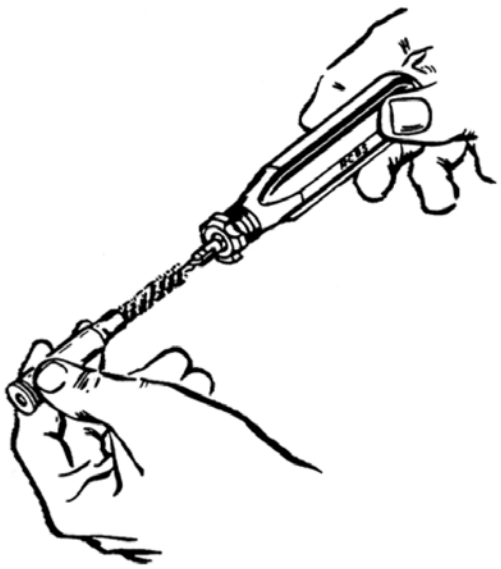


Figure 14: Be sure to lubricate inside the case necks.

STEP 3

RESIZE AND DECAP THE CASE. When a cartridge is fired, the brass case containing the powder expands to the dimension of the rifle chamber. Before reloading, the fired case must be resized to its approximate original dimensions to make sure it fits the gun chamber. Also, because all rifle chambers are not identical, cases fired in one rifle may not fit another, unless it is resized to a standard diameter acceptable in all rifles.

Refer to Figure 15. For full-length resizing, push the press handle all the way down to the end of its stroke; then screw the sizer die into the threaded die station at the top of the press until the bottom of the die (A) firmly touches the shell holder (B). Now, raise the press handle very slightly, screw the sizer die down approximately one-eighth of a turn, and set the large lock ring (C). The bottom of the expander ball (E) should be $^{3}/_{16}$" inside the die, and the decapping pin (D) should extend $^{1}/_{8}$" out of the die—just enough to knock the fired primer out of the case. If the pin extends too far out of the die, the expander ball will strike the inside bottom of the case and bend the rod. The decapping pin (D) and expander ball of the die shown (E) are adjusted by turning the expander-decapping rod (F), and locked in place by tightening the lock ring (G). Other die adjust differently. Refer to the instructions that came with the dies that you use.

When the sizer die is properly adjusted, insert a lubricated case into the shell holder and slowly push the press handle down. As the case is forced up into the die, the case will be resized and the fired primer will be knocked out, as shown in Figure 16.

STEP 4

Prime the Case. If commercial cases rather than military cases are used, the case can be primed as it is withdrawn from the sizer die. Before doing this, refer to Figure 16 and make sure you have the correct size primer plug and sleeve in the primer arm.

With the case still in the sizer die, insert a primer — anvil up — in the primer arm sleeve, then push the primer arm all the way into the slot of the shell holder arm. Now, gently raise the press handle to lower the case onto the primer, seating it to the bottom of the primer pocket. It should seat easily; if not, remove the case and see if the primer is nicked or dented. If so, discard the case. Primer pockets should be cleaned out regularly with primer pocket cleaner or a knife, being careful not to scratch the surface.

After the primer is seated, lower the press handle just enough to let the primer arm snap out of the slot. If it is lowered too far, the decapping pin in the die will punch the new primer back out. Next, raise the handle and remove the case from the shell holder. Do not leave a case fully inserted into a die for extended periods of time, since pressure may build up on the case sides, making it difficult to remove from the die. To prevent this, withdraw the case at least ½" out of the die.

Do not try to force a case that does not go into the die fairly easily. Excessive force may cause the case to stick in the die. This can be caused by a case that may not have been properly lubricated or by using the wrong die.

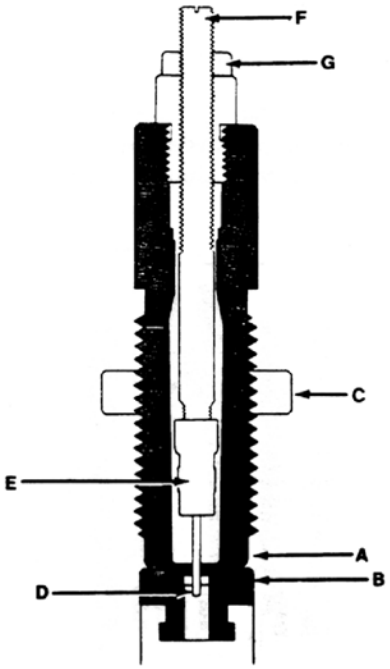


Figure 15: Cross section of a resizing/decapping die.

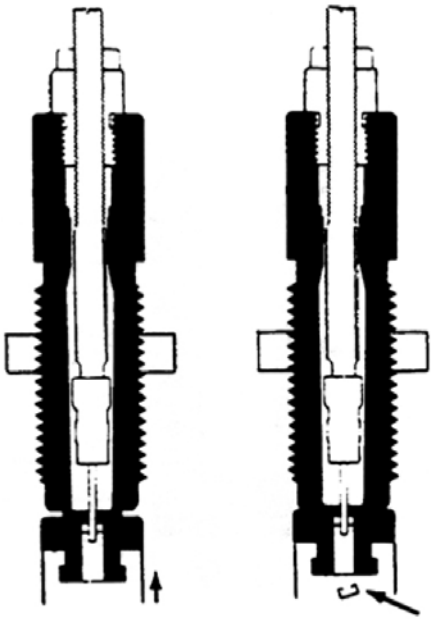


Figure 16: Removing the primer from the fired case.

Loading the Powder Charge. The first step in loading the powder charge is to decide whether to throw your charges with a powder measure or to weigh them individually on a scale (Figure 17). A measure is much faster and easier to use than a scale, but a scale is necessary to set the measure.

It is necessary to be systematic in charging cases to get only one charge of powder in each case. Most reloaders either make or buy a reloading block to hold and keep track of charged cases. Place uncharged cases on the left side of the block; then as they are charged with powder, put them in the holes on the right side of the block. After all of your cases are charged, look into each one to make sure that each case has only one powder charge.

STEP 6

Seat the Bullet. After the cases are charged, the bullets can be seated. To start this operation, unscrew the sizer die from the press and push the press handle down as far as it will go. Then screw the seater die into the press until it touches the shell holder. Now unscrew the die 3/4-1 turn and set the large lock ring. This will adjust the die to seat bullets without crimping them.

STEP 5

The Powder Charge. After priming, the case is ready for the powder. To determine the weight of the powder charge, consult a good reloading handbook and use the recommended charges with caution. Start with the lowest suggested powder charge in the handbook and work up. For example: load six rounds with the light charge; a couple with the medium charge; then if you want maximum velocity, load a couple more with the maximum charge. To identify each charge, mark the case base and bullet tips with nail polish, once for light charges, twice for medium charges, and three times for heavy charges. Test-fire each load in that order. Usually, a charge a bit under maximum will give nearly the same velocity as maximum, with considerably better case and barrel life, and perhaps better accuracy as well.

The weight of the bullet is just as important as the powder charge. The heavier the bullet, the more resistance there is to the expansion of the powder gases. Therefore, a maximum charge with a 150-grain bullet will be dangerously high with a 180-grain bullet. When loading to the limit, even such things as the bullet's core and jacket hardness, or the length of it that bears on the rifling make a difference — another reason for staying under the maximum.

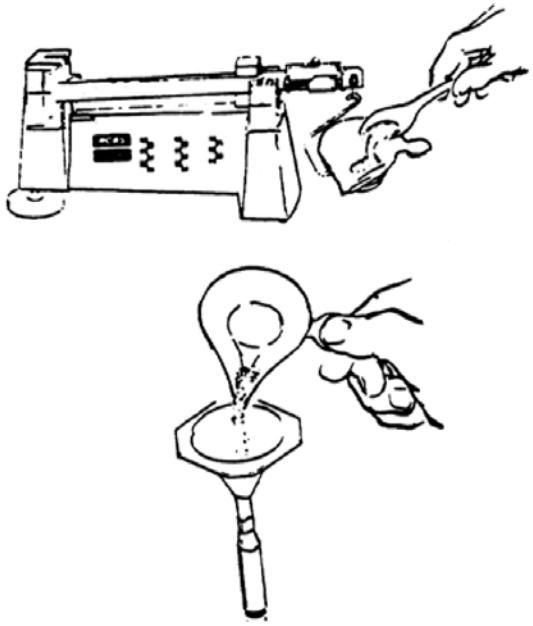


Figure 17: Loading the powder charge.

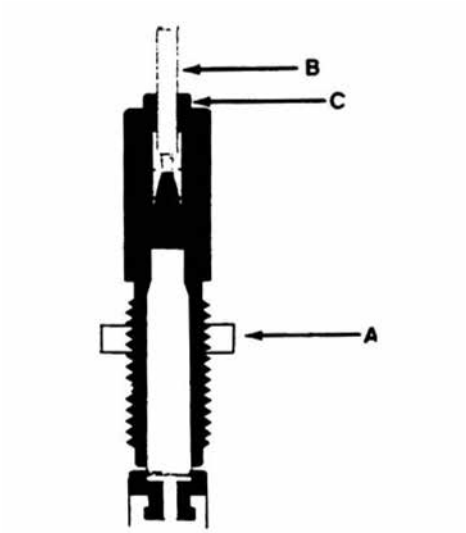


Figure 18: Seat the bullet. To make adjustments to the seating die, see text.

Adjusting for Bullet Seating Depth. Once the bullet has been seated, the seating depth must be determined (Figure 18). To determine the seating depth, first unscrew the seater plug (B) so it will not touch the bullet before the case is all the way into the die. Then insert a charged cartridge into the shell holder and place a bullet into the mouth of the case. Lower the press handle to run the case and bullet up into the die. Now screw the seater plug down until you feel it touch the bullet. Lower the case and screw the die in until the bullet is seated. If the bullet is not seated deeply enough, continue to screw down the seater plug until the desired depth is reached. Tighten the small lock ring (C).

If the bullet is not seated deeply enough, it can be adjusted. However, if it is seated too deeply on the first try, it may be hard to get back out of the case. If this happens, a bullet puller may be required to remove it. Always adjust the seater plug for minimum depth. It may help to remember that since the plug has 28 threads to the inch, screwing it down one turn will seat the bullet $^{1}/_{28}$" deeper.

After seating the bullets, the first batch of reloaded cartridges are ready to be fired.

RELOADING HANDGUN AMMO

Pistol or handgun ammo is reloaded in almost the same manner as rifle ammunition, except that a three-die set and a slightly different technique are used to resize and expand straight-sided pistol cases.

With the three-die set, the first die is used only to resize the case. The second die expands the case to avoid unnecessary resizing of the case mouth after expansion. The third die seats and crimps the bullet. Decapping is performed by either the first or second die, depending on the manufacturer.

Bottleneck pistol cases such as the .30 Mauser require a two-die set, and certain pistol calibers require a four-die set. Check a reloading equipment catalog for a list of calibers.

SELF-TEST QUESTIONS

Please check your answers on page 17.

5. **When using the resizing die on a cartridge case, what should you do if the case does not go into the die easily?**
6. **Name two operations that occur when using the resizing die.**
7. ***True or False*. The outside of cartridge cases should always be lubricated before putting them through the resizing die, but the inside of the case mouth should never be lubricated.**
8. **Which die is used to seat the bullet to its final depth in the case prior to firing?**

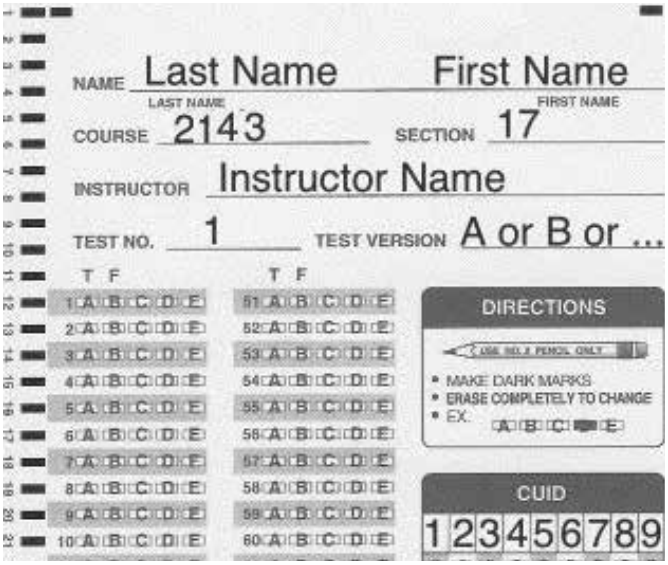
Answers to Self-Test Questions

1. False.
2. Gunsmiths and shop owners can make good profits from selling reloading tools and components, and may attract more customers by stocking such items.
3. Round.
4. True. In most cases, you can reload four rounds of ammo for the cost of one factory round.
5. Stop immediately. The case may not have been properly lubricated, or you may be using the wrong die.
6. The case will be resized to its approximate original dimensions and the fired primer will be knocked out.
7. False.
8. The cartridge-seating die.

Lesson Questions

THIS IS LESSON NUMBER 2200.

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. **What is the normal markup on reloading tools and components?**
   a. 10 to 15 percent.
   b. 25 to 50 percent.
   c. 50 to 60 percent.
   d. 60 to 75 percent.

2. **Which one of the four parts of a loaded cartridge is the most expensive?**
   a. Primer.
   b. Bullet.
   c. Powder.
   d. Brass case.

3. **Which one of the following is the best reason for reloading ammunition?**
   a. Economy.
   b. Safety.
   c. Greater power.
   d. No special permit is required.

4. **Which of the following statements is true concerning reloaded ammunition?**
   a. Handloaded ammo always has less power than its commercial counterparts.
   b. Handloaded ammo is never as safe as commercial cartridges.
   c. Handloaded cartridges adapted to an individual rifle will always be found to be less accurate than the average commercial cartridge.
   d. Handloaded cartridges adapted to an individual rifle will be found more accurate than the average commercial cartridge

5. **Decapping is the procedure of removing:**
   a. The bullet.
   b. The primer.
   c. The powder.
   d. A stuck case.

6. **What is the name given to the approximate diameter of a bullet or gun bore?**
   a. Rifling.
   b. Caliber.
   c. Leade.
   d. Muzzle.

7. **What is the name given when a cartridge experiences a delayed ignition?**
   a. Double action.
   b. Out of timing.
   c. Hangfire.
   d. Single action.

8. **What is the name of the reloading tool that performs the major tasks or reloading and into which are fitted the reloading dies and shell holder?**

   a. Reloading press.

   b. Resizing die.

   c. Deburring tool.

   d. Lubricant pad.

9. **Which of the following operations are performed by reloading dies?**

   a. Expands the fired case, installs a new primer, and loosens the bullet in the case mouth.

   b. Resizes the fired case, ejects the fired primer, and seats the bullet.

   c. Inserts new primer, shortens the brass case, and crimps the bullet into place.

   d. Lubricates, inspects, and deburrs the fired cartridge case.

10. **What is the common name given to the brass cases, primers, powder, and bullets that make up a ready-to-fire cartridge?**

    a. Components.

    b. Reloading tools.

    c. Reloading accessories.

    d. Percussion caps.