AoSHQ Gun Thread

Reloading 101

February 2023

So we've been talking a lot about making your own ammunition lately and I thought I'd put together an introduction to reloading. For that, we'll need some specialized equipment and tools, and due to the amount of information and complexity of the process, I am going to spread the material over several weeks. Sound good? Let's go shopping, shall we?

Not so fast, buckaroos! First, a couple of housekeeping items.

As we begin discussing reloading, I am going to ask you NOT to list powder charge weights in the comments. This is for both liability and safety reasons. If I see a charge weight listed I will delete the comment. No exceptions. You may list a powder type you're using and/or a targeted velocity, and then refer the reloader to a published reloading manual to determine the necessary charge weight on their own. I do not want your typo to become someone else's problem. m'kay?

I am going to write this for the benefit of a new reloader. Please keep this in mind as you comment and make suggestions. We have a lot of experienced reloaders who comment regularly, so I know we can look forward to a lot of good tips and ideas, but let's please just keep things simple and basic and geared to the beginner for now.

Everyone who reloads has their favorite equipment brands and suppliers, and I am no exception. When I recommend a specific item, you can be assured of two things; I have no financial interest in the product or a particular supplier, and I have personally used the item, or something very similar in cases where models or styles have changed, and am satisfied with it. Please keep in mind for the new reloader there is a bewildering array of products offered and the whole process can be a little intimidating, so again, let's not get too far ahead of ourselves. Before fights start over who makes the best gear, let's just acknowledge that it pretty much all works and no one is insulting your grandaddy by recommending brand X when he was a brand Y guy.

Part 1: Reloading for Retards - Buying the Stuff

As I've mentioned in recent weeks, reloading can be a fun and rewarding hobby unto itself, as well as providing a shooter with high quality ammunition when commercially made ammo is unavailable. This week, we'll cover the basic equipment and tools necessary, and their function. In later weeks we'll discuss how to set it all up and use it to produce ammunition.

Reloading Supplies List

Item	Price Range	Product	Brownells/Sinclair #	Manufacturer	Mfg Part	2019 Retail	2023 Retail
Equipment & Tools							
Reloading Manual	$21 - $32	Cartridge Reloading	100-042-555WB	Hornady	99241	$ 32	$ 43
Single Stage Press	$80 - $250	Redding Big Boss II Reloading Press	749-008-146WS	Redding	97000	192	286
.38 Special Die Set	$80 - $200	Carbide Die Set .38/.357	749-006-627WS	Redding	88282	88	121
Shellholder (press)	$10 - $15	Redding Shellholder #12	749-001-103WS	Redding	11012	12	13
Hand Primer	$20 - $120	Sinclair Hand Priming Tool	749-007-603WS	Sinclair	PT2000	120	120
Primer Tray	$5 - $10	RCBS Primer Tray	749-000-903WS	RCBS	9480	6	7
Shellholder (priming tool)	$5 - $10	Stainless Shellholder	749-101-027WS	Sinclair	105001	7	7
Powder Measure	$50 - $500	Model 10x Powder Measure	100-010-787WS	Redding	03400	190	272
Powder Funnel	$5 - $20	RCBS Powder Funnel	100-010-213WS	RCBS	9087	6	7
Powder Scale	$30 - $150	Redding #2 Master Scale	749-007-126WS	Redding	2000	98	125
Powder Trickler	$20 - $30	Redding Powder Trickler	749-003-092WS	Redding	05000	27	27
Dial calipers 6"	$27 - $250	Dial Calipers	749-013-842WB	Hornady	50075	63	63
Case Gauge	$20 - $50	38 Special Cartridge Gauge	749-016-801WS	Hornady	380702	20	22
Ammunition Boxes	$4 - $6	MTM Ammo Boxes	749-000-248WS	MTM	P100324	5	5
Cartridge Tray	$8 - $10	Reloading Tray	749-013-957WS	Frankford	393939	9	10
Total	*$400 - $1,600*					$ 875	$ 1,128
Components							
Cases	$15 - $35	Starline .38 Special - 100 ct	749-002-215WS	Starline	1200	$ 17	$ 23
Primers	$30 - $35	Federal Small Pistol Primers - 1000 ct	749-004-461WS	Federal	100	$ 33	$ 100
Bullets	$30 - $60	Berry's RN 158gr Plated - 250 ct	100-029-051WB	Berry's	84525	$ 32	$ 42
Powder	$18 - $25	Winchester W231 - 1#	100-008-772WS	Winchester	2311	$ 24	$ 43

The list (see attached) represents what I think are the basic items needed to produce excellent quality handloads. Some items may not be absolutely essential at first but make the overall process easier and/or safer so I have included them. Beginning on the left we have the item description and a general price range to expect at retail. Moving to the right, you will see an example of what I either now have on my reloading bench, or what I would buy today if I had to start over. In making the recommendations I used Brownells/Sinclair Internationalas a supplier and included their part numbers. You will also note many of the items may be listed as out of stock, attesting to their popularity. Since there are many suppliers, I have also included the manufacturer's part number if you want to shop around which is always a good idea.

You will note right away that I do not generally recommend the least expensive items available. As with many other endeavors, I have found over years of reloading that the least expensive isn't always the best deal, and sometimes the most expensive doesn't work much better. I am usually about somewhere in the middle with an emphasis on good quality and an expectation for years of trouble-free use. Note the range of prices for specific items in the 2nd column. Most of this gear will last forever with minimal care and all of it should fit into a medium size storage tub if space is a consideration for you.

Review of Equipment and Tools

Reloading Manual
This is the very first thing you buy, and you will almost assuredly develop a reloading library over time. I recommend the Hornady manual initially because the loads are conservative and it's hard to get into trouble using them. There is an excellent section at the beginning covering each step of the process in detail. Many, many others exist and you will very likely end up with several, and you can't really go wrong with any of them.

Single Stage Press
There are three basic styles of reloading presses. Single stage, progressive and turret styles. Single stage presses are the most basic and what I use for everything. Progressive presses are much more complicated and produce ammo much more quickly, but I don't think they're the best choice for novice reloaders. Turret presses are a sort-of hybrid of the two. I choose single stage presses because they are simple and afford what I believe is the greatest degree of control over each step of the process. They can also handle rifle cartridges should you want to reload those too.

Die Set
In order to make ammunition you need to prepare the case dimensionally, add a primer and powder and seat a bullet. The set contains three dies that perform these functions. A sizing die to punch out the used primer and return the case to spec after it's been fired, a neck sizing die to flare the case mouth to accept the bullet, and a seating die to seat and crimp the bullet in place. Do yourself an enormous favor and buy the more expensive carbide dies so you do not have to fool around with lubing cases. Note - I prefer to use a separate de-capping die to remove the used primer, but that's just a matter of preference.

Press Shellholder
A small caliber specific part that holds the case in the press

Hand Primer
I'm old and prefer to seat primers using a hand tool. The process gives you a feel for the force required to seat the primer ensuring a uniform depth, and the process also provides an opportunity to inspect the cases for problems as you go along.

Primer Tray
Holds the primers while you work.

Hand Primer Shellholder
A small caliber specific part that holds a case in the hand primer. Some hand primers are universal and do not need this part, but the Sinclair model does.

Powder Measure
This is what dispenses the powder, and is not the place to try and economize. A quality measure will produce consistent results with only requiring periodic sampling necessary, while a lesser-quality measures throw variable and inconsistent charges and are a complete pain in the ass to use. Trust me.

Powder Funnel
Small funnel to get the powder into the cases.

Powder Scale
Consistency is key, remember? You need to have an absolutely accurate scale, so you shouldn't try to save money here, either. I have small digital jeweler's scales and large, very expensive digital lab scales, but what I actually use is a basic beam scale. Digital scales work based on magnetic fields which can be affected by things like household wiring and fluorescent lighting, and "drift" considerably. The small digital jeweler's scales actually aren't too bad for making a quick QA check as you go along, but anytime precision is key, use a beam scale.

Powder Trickler
Accessory to trickle tiny amounts of powder into a pan on a scale to achieve a desired weight. This is optional for handgun loads where it's usually easier to simply dump incorrect sample loads during your periodic QA checks.

Dial Calipers
I have digital calipers and I have dial calipers. I prefer dial calipers mainly because they don't run on batteries, but some others don't like them because it takes a small effort to learn to read the dial. I assume you learned how to tell time on a clock with hands, and reading dial calipers is not much different than that. You can spend a ton of money on these, and a cheap pair will be frustrating to use and give inaccurate results. A nice Starrett, Mitutoyo or Brown & Sharpe set can be found on ebay for around $100. Look for 6" length and graduation of .001".

Case Gauge
Helpful in setting up dies and checking finished rounds dimensionally making sure they are within SAAMI specification for the caliber.

Ammo Boxes
Small caliber specific plastic boxes to store and transport your finished ammo.

Cartridge Trays
Holds your cartridges during the various stages of assembly.

A Word on Reloading Kits

There is an alternative to the a la carte method of buying the gear necessary to reload, and that is to buy a kit. Most manufacturers offer them, and the individual items are usually discounted from full retail when purchased separately. They really aren't a bad option and they're certainly more economical, but you will probably soon begin to add items for convenience. If economics are a concern, or you're not quite ready to take the full plunge, then a kit might be a good option for you. One important point about kits - they do not come with dies and shell holders which must be added to your order and increase the cost.

Reloading 101- Part Dos: Gear Setup

This week we're going to start setting up some of the shiny new reloading gear we discussed last week. But before we do, a couple more housekeeping items. As a reminder, please do not list specific load powder charge weights when discussing reloading. If you like, you can mention the powder you're using and the velocity, but unlike the food thread, let's keep the specific recipes to yourself. Thanks.

Next, throughout this series, I am going to discuss reloading for the .38 Special. It's an easy cartridge to work with and generally forgiving for the new reloader. However, the concepts discussed here are applicable to any straight-walled handgun cartridge. We will save rifle cartridge reloading for another time. 'Kay?

Finally, I'd like to reiterate this material is intended for the novice reloader. We're fortunate to have reloaders here with years of experience, but for now let's keep the information basic.

One of the first considerations is where to set up your reloading operation. I know benchrest shooters who reload in their vehicles at the range, and others with enormous setups occupying large spaces at their home. Let's assume you will at least be indoors and after that, all that's really required is a modest amount of workspace if you're using a basic single-stage press. What makes a good reloading location? I'd say there are a few key elements. A quiet place to work undisturbed and uninterrupted, in a comfortable and climate-controlled area. You will need a reasonably solid bench or countertop workspace about 36 to 48 inches wide. This is just a approximation and you may find you need slightly more or slightly less space, depending on how you like to work. If you have a basement area where you can spread out that's great, but I want to assure those in a smaller home, an apartment or condo for example, can reload just as effectively as everyone else. A kitchen counter will work fine. For those in that situation, I will give you an idea below for keeping your reloading setup easy to breakdown and store in a medium size storage tub.

Tips for selecting and reloading in your work area:

- locate the bench away from direct air flow from forced air vents, ceiling fans, etc.
- store powder and primers in original containers in a cool, stable environment.
- whenever possible, choose a quiet area, free from foot traffic and other distractions.
- plan your reloading session so you can complete different steps entirely, with logical break points.
- never, ever, ever have more than one type of powder on the bench at a time.
- always check your work. If something looks or feels funny, stop and investigate.

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The Press

I'm going with the assumption you have purchased a single stage reloading press like the one shown above. You will note that it's a sturdy piece of steel designed to be bolted to the edge of a workbench. I'm lucky to have a nice, but by no means expansive, countertop workspace in our laundry room. It's in a quiet part of the basement without distraction, and WeaselWoman was nice enough to get all of her stupid laundry shit out of the way and allow me to take over what's supposed to be a folding area. I did not want to drill mounting holes in the countertop, so I mounted my press(es) on a short double thickness of 1"x 6" pine board and use two 4" C clamps to fix the assembly into place on the countertop. Just countersink the bolt heads so the board rests flush, and it's every bit as solid as if it were bolted directly to the countertop. When configured in this manner, the gear can be easily stored away between reloading sessions. The important point is to mount the press to the board or directly to a bench in a way so the ram function of the press is not impeded, so play around with the setup and operation before you start drilling holes!

Press setup on kitchen counter

Press setup alt view - note bolts

Countersunk holes on bottom of base

Your press is the primary tool on your bench. I'm right-handed so I have my press on the right side of the workspace. The press is just that; a device with a mechanical ram that moves up and down when the handle is pulled. It doesn't do much by itself without reloading dies, which screw into the top of the press and perform different functions. Brass cartridge cases are shaped and resized under pressure produced by the ram and die, and in order to achieve the necessary small tolerances they need to be setup carefully. You will check the die function with precision measuring tools such as the calipers and case gauge included on last week's shopping list.

Reloading Dies - What the heck are they and why do I need them?

Reloading dies size and shape the brass cartridge and are caliber specific so, for example, you cannot reload .45 ACP cartridges with dies made for the .38 Special. This means you need separate dies for each caliber you plan on reloading. In order for a new or used case to be reloaded, it first needs to be sized to certain specifications for the cartridge. These specifications are maintained by SAAMI https://saami.org the organization that makes sure a specific cartridge fits properly into the specific chamber designed to fire it. An extensive catalog of cartridge specifications are maintained online and it's a great resource.

General Die Setup and Adjustment

Most dies simply screw into the top of the press. Hornady presses use an additional sleeve that locks into the press that makes changing dies a little quicker, but they all work basically the same way.

NOTE: Dies are shipped from the manufacturer with a coating of something as a rust inhibitor which should be removed before they are used the first time. Simply take apart the dies and spray with a cleaning solvent; Ballistol, WD-40, Hoppes 9 - whatever you have handy, and wipe clean. It's not a bad idea to keep them very lightly oiled if you are in a high humidity location. Just a light spray is all you need, which can be removed before you use them again with a chamber mop.

To setup a die for the first time, perform the following steps:

- insert appropriate caliber press shellholder into the top of the ram. It just snaps into place.
- without a cartridge in place, lower the handle to raise the press ram to it's uppermost position.
- screw the die body into the press, so the bottom of the die just touches, or is very slightly above the top of the shellholder.
- screw the locking ring on the die body down until it rests on the top of the press and tighten the set screw.
- as you begin work, you may find small adjustments are necessary - simply loosen the locking ring, adjust the die, and tighten the ring and set screw.
- sometimes when the locking ring is set it makes the die difficult to remove from the press. A few whacks on the locking ring with a rubber mallet will usually do the trick.
- once properly set, you should not usually need to make additional adjustments. Simply screw in the die until it's stopped by the locking ring. Specific considerations for individual die setup are discussed below.

A properly set die will perform its function at the top of the ram stroke, just as the lever begins to cam over and stop, and without a great amount of force. This is an important point. An improperly set die will return inconsistent results due to the application of variable force, and possibly damage the case. As you gain experience, you will notice many steps are done based on the feel of the amount of force required to complete them. Anytime anything changes, STOP WORKING, and investigate. Each step should be completed smoothly and without a huge effort. If you find yourself needing to use a lot of muscle, then something isn't working right and needs to be corrected.

A good video on die setup is HERE. A couple of points - the guy in the video has various interpretations of the word "cannelure" (can-ne-lure), and also doesn't seem to embrace the use of the die locking ring. Other than that, it's a fairly decent look at the process of setting up the 3 dies in your set. The press he is using is slightly different design, but the die setup instructions all still apply. There are a bazillion videos on reloading, so look around if this guy bugs you. If you find yourself actually doing any of this and have questions, please feel free to email Gun Thread technical support who will be happy to help!

You'll recall we talked about the dies and the functions they perform in the reloading process. Let's review them in a little more detail now, including ways the setup differs among the three dies.

Sizing Die

When a cartridge is fired, it expands against the chamber wall to seal the breech, then snaps back a little but not quite all the way. Depending on the chamber, the fired case may be several thousandths of an inch (.00X") larger in diameter than it was before firing. The sizing die simply returns the case to the correct pre-fired diameter. You will notice a pin sticking out beneath the sizing die. That's the de-capping pin and it punches out the used primer. In a new or unprimed case the pin is just along for the ride. The screw and smaller locking ring on the very top of the die are used to replace or make adjustments if needed to the de-capping pin depth which should be set to just pop out the used primer. To setup a sizing die just follow the steps above.

Expander Die

The second, or expander die is used to very slightly flare the mouth of the case to accept the bullet. Set up the die as described earlier so the bottom of the die is barely touching or just above the shellholder. Next, adjust the expander plug inside the die using the smaller screw and lock ring on the top of the die. When properly adjusted, the expander die will flare the case mouth by a few thousandths of an inch to accept the bullet. It's a barely perceptible amount to the naked eye, but it allows the bullet to begin the seating process without being shaved by the edge of the case mouth. Use caution to avoid oversizing the case which can lead to reduced case life.

Seating and Crimping Die

The third die in the set performs two operations. It seats the bullet to the desired depth and applies a slight crimp to the case mouth to hold the bullet in place. There are two steps to setting up a seating/crimp die. First, back the seating stem screw on the top of the die counterclockwise, or up, most of the way and then screw in the die body into the press until the bottom is a couple of turns above the shellholder. Next, place a dummy (unprimed and without powder!) sized and expanded case into the shellholder and place a bullet on top. Now cycle the press and advance the seating stem by small increments until the bullet is seated to the desired depth (more on this later) checking the overall length with calipers or using a case gage. Now back out the seating stem several full turns.

Leaving the cartridge on the ram in the full up position, screw in the die until you begin to feel the resistance of the cartridge. Lower the ram and advance the die in small increments, raising the ram after each adjustment and checking until the desired crimp is achieved. Bullets with a cannelure (groove) will require more downward adjustment to achieve a "roll" crimp, where the case mouth is very slightly curved into the cannelure. Cartridges which headspace on the case mouth (.45ACP for example) require less downward adjustment of the die body to achieve a "taper" crimp. Do not roll crimp jacketed bullets without a cannelure as you may damage the jacket, and again, do not roll crimp any cartridge that headspaces on the mouth of the cartridge, taper crimp these instead. Now lower the locking ring and tighten the set screw on the die body.

Finally, you will need to reset the seating stem. With the dummy cartridge on the ram in the full up position, lower the seating stem screw until you feel it stop against the top of the bullet and simply tighten the upper locking ring. The die is now configured to seat and crimp in a single step.

We'll discuss the various measurements as we begin the step-by-step reloading process. For now, we simply want to have the dies configured approximately. We will discuss making small final adjustments later.

Reloading 101 Pt. 3: Working with Powder

For those who need to catch up, we've been discussing reloading and spreading the material over a few weeks. So far, we have reviewed essential gear and how to begin setting it up.

As a reminder, please do not list specific load powder charge weights when discussing reloading, and please remember this material is intended for the novice reloader, and for now let's keep the information basic for now. Thanks.

Moving right along in our reloading series, it's time to unbox the powder dispenser and scale, and this isn't a particularly difficult procedure. So open the boxes, and take out the powder dispenser and scales, and put them on your bench. The End. Seriously, a few words on the gear; you recall from the shopping list I recommended investing in a better than average powder dispenser and scales, and the reason is simple. While you can reload with satisfactory results using much less expensive equipment, using it can be tedious and frustrating. You want to make the reloading process as smooth and uncomplicated as possible, and a goofy powder dispenser is a pain in the ass to use. And it doesn't get better the longer you sit at the bench fighting with it. Same with scales. Nothing will make you less confident in your work than a powder scale that seems to be wandering all over the place, so if at all possible, this isn't the place to economize.

Powder Dispenser
These all work about the same way with the difference mostly being in the quality of the components. A micrometer of some sort is moved in and out creating a volumetrically variable chamber which fills with powder from a larger hopper above each time the lever is cycled. The setup really only involves putting the parts together and practicing a bit to develop a technique for operating the dispenser the very same way each time and using as close as possible to the same speed and pressure on the lever as you dispense a charge. At the beginning of a reloading session I always run through several test charges, measuring each until I am getting acceptably consistent results. It's also helpful to keep the main powder chamber at least approximately half full. I've found the charges begin to vary as the powder level gets close to running out. Finally, it's not a good idea to store powder in the dispenser between reloading sessions. I dump any unused powder back into the original container when I'm done for the day.

One note: For some powder dispensers, the micrometer size varies depending on whether it's designed for loading handgun loads where smaller charge weights are used, or rifle loads where larger charge weights are needed. Be sure to look at the range of performance for your particular dispenser to make sure it's appropriate for your intended use.

VIDEO: Powder Measure setup

VIDEO: Using a Powder Measure

Scales

Powder scales come in all shapes, sizes and prices. You can spend a lot of money on a scale. I have small inexpensive digital jeweler's scales which honestly aren't too bad for a quick check, and very elaborate and expensive laboratory balances which can be fussy and subject to electromagnetic interference from household wiring and fluorescent lighting fixtures. What I use is an old-fashioned beam scale and I have collected a few from various manufacturers. There are all sorts of integrated dispensers and scale combinations which many people like, but what I use to produce my match ammunition is a plain old reloading beam scale. A couple of tips; calibrate your scales before each reloading session using a check weight, and I find it very helpful to add about a pound of stick-on lead wheel weights to the underside of the scale body when you first setting it up. This helps dampen tiny vibrations and keep the scale from skittering all over the place on the bench as you work.

VIDEO: Redding beam scale review

VIDEO: How to zero and read a beam scale

Reloading 101 - Part 4 - Components

So now let's have a look at the components you will need to produce your own reloads. There are many online retailers to choose from, and reloading suppliers are generally well represented at gun shows. I generally shop online because the selection is better and because I hate crowds, so I'll link a few of my favorite suppliers here.

Midsouth Shooters Supply

Powder Valley

Brownells/Sinclair International

Graf & Sons

Berry's Mfg.

There are many, many more and I'm probably leaving off some of the good ones. Do you have a favorite not listed here?

Also keep in mind when sourcing components that a hazmat fee of $29 will apply to shipments of powder and primers, in addition to the normal shipping charges, but the two items can be combined in a single order to save some money. Another idea to consider is going in together with a couple reloading buddies when possible, to spread the charges out a little.

Review Material: The basic unit of measure in reloading is the grain (gr), and one grain is equal to 1/7,000th of a pound. Most decent reloading scales will measure accurately to the 1/10th of a grain.</i>

There are four parts to a cartridge; the case, the bullet, the powder and the primer. Let's review each of these.

Cartridge Cases

Metallic cartridge cases can be made from several different types of material. Most commonly brass, but sometimes you will see them made from steel, aluminum and other materials such as nickel. Brass is an alloy of copper and zinc, and is ideal for use in cases because it is soft and easily shaped under pressure, both during the loading process and during firing. As noted before, the cartridge brass is shaped by the sizing die, and when fired, expands to seal the breech of the chamber. Without getting too far into the metallurgical weeds, brass gets harder when worked repeatedly and will eventually split or crack unless stress is relieved at the molecular level through the process of annealing. We won't worry about annealing handgun cases since the brass is inexpensive enough to replace as it wears out. Just remember it is important to inspect your brass for cracks and splits as you go along.

Reloaders are notorious scavengers, and will frequently be seen scrounging brass at the range whenever possible. New brass can be purchased from any reloading supplier, and every reloader has their favorite whether based on price or other qualitative factors. For precision match loads, it is important to use the best and most consistent brass possible. When I'm reloading handgun cartridges for plinking, I'll use whatever I have handy. If I want a little more accurate handloads I will make sure the brass is all from the same manufacturer and has the same headstamp. The headstamp is simply a name or other manufacturer's mark stamped into the case head along with the caliber identification. I like Starline brass for handguns because it's of reasonably decent quality, it's inexpensive, and is usually readily available. For my rifle match loads I use Lapua brass exclusively.

Bullets

There are a zillion different types and styles of bullets. Maybe more than a zillion. Important considerations for the new reloader, after choosing the right caliber, are the materials used and the design application.

Typical materials are plain lead, lead which is fully or partially jacketed by copper, and plated bullets. Lead bullets are very economical and can even be made at home as part of the reloading process, or simply sourced from a retailer. Lead bullets usually require the application of a special anti-fouling bullet lube during the seating process and can still sometimes cause a lead buildup inside the barrel. Jacketed bullets offer the convenience of not requiring lubrication, but are more expensive due to a more complex manufacturing process. Plated bullets offer the advantages of jacketed bullets at a significantly reduced cost, but cannot be used at higher muzzle velocities. Common shapes for general purpose shooting are the wadcutter, semi-wadcutter and round nose. Wadcutter bullets are flat and seated flush with the case mouth and are designed for making clean holes in paper targets. Round nose bullets should be familiar to everyone, and semi-wadcutters are a cross between the two. Berry's Manufacturing is a producer of jacketed bullets that I use a lot. A good choice for the beginning reloader would be a jacketed or plated semi-wadcutter.

Powder

There are hundreds of formulations of gunpowder, a fact which kind of surprised me when I started reloading. Until then it wasn't something I'd thought a great deal about, but come on - hundreds? There are countless combinations of size, shape and chemical composition, each designed to produce a specific result. The type we are interested in for metallic cartridge reloading is smokeless powder.

The common types (shapes) of smokeless powder are flake, ball and extruded. You will note the example shown above is a flake powder. The different shapes result in variable surface area affecting the burn rate and brisance, or the speed at which the burning powder achieves peak pressure. Smokeless powder is not an explosive, but instead is technically classified as a flammable solid which burns very quickly. It's the resulting gas expansion which sends a bullet down the barrel. Magnum powders burn slowly while other calibers burn more quickly, relatively speaking. The amount of powder shown above is my standard .38 Special load. It doesn't take much!

One major caution about powder. The names can be deceptively similar and inadvertently confusing them at the reloading bench can have catastrophic results. Consult your reloading manual for the appropriate powders for your caliber and bullet weight combination, and be very careful to match the name exactly. Some powders will work well in a a variety of calibers; Bullseye and W231 come to mind as examples, but always confirm using data from one or more published sources.

Here is an article on gunpowder and how it works.

Primers

Primers contain a tiny amount of explosive between the cup and a small metal anvil inside. The hammer strike sets off the primer sending flame through the flash hole and igniting the powder. Primers will not explode from normal handling, but there are glorious stories of reloaders having a stack of primers explode in a chain reaction on a progressive press. You do not want this to happen to you. Store them safely in the original packaging, don't be a retard when working with them, and you'll be fine.

The size choices are easy - they come in large and small with variations in composition for rifle, regular handgun and magnum applications. Your reloading manual will tell you which size you need for the cartridge you're working with. The more expensive "match" primers are exactly the same as standard primers, they're simply made by the most experienced production line workers.

Reloading 101 Pt. 5: Assembly!!

There really isn't much to say about the assembly process, and it's probably simpler than you would expect once you correctly setup the dies. Size and prime the case, add the powder and seat the bullet. That's really about it. What I'd like to do in this section is to offer a few tips and things I've learned over the years.

- Buy a reloading manual and read the damn thing. The first section of any manual will contain the step-by-step reloading process (with pictures!) followed by suggested load information by caliber.
- Confirm any new load from one or more published sources and be skeptical of anything you read on the internet.
- Setup your reloading bench away from noise and distraction. Do not try and watch TV or engage in conversation while you are reloading. Work with ONLY one powder on your bench at a time.
- When things are set up correctly, each step is completed smoothly and without exerting a large amount of force on any of the tools. If you notice a change in the physical effort required to complete a step, stop and investigate.
- Work in batches. I will size 50 or 100 cases, then prime them, then add powder and finally seat the bullets.
- Practice making several dummy rounds until each die is properly adjusted, and critical dimensions are verified, before you begin making loaded ammunition.
- Keep a book of reloading notes. Powder charge, primer, bullet, expected velocity and later performance notes.
- Always note the caliber, date, powder type, charge weight and bullet weight on a note in your ammo storage box to identify the load

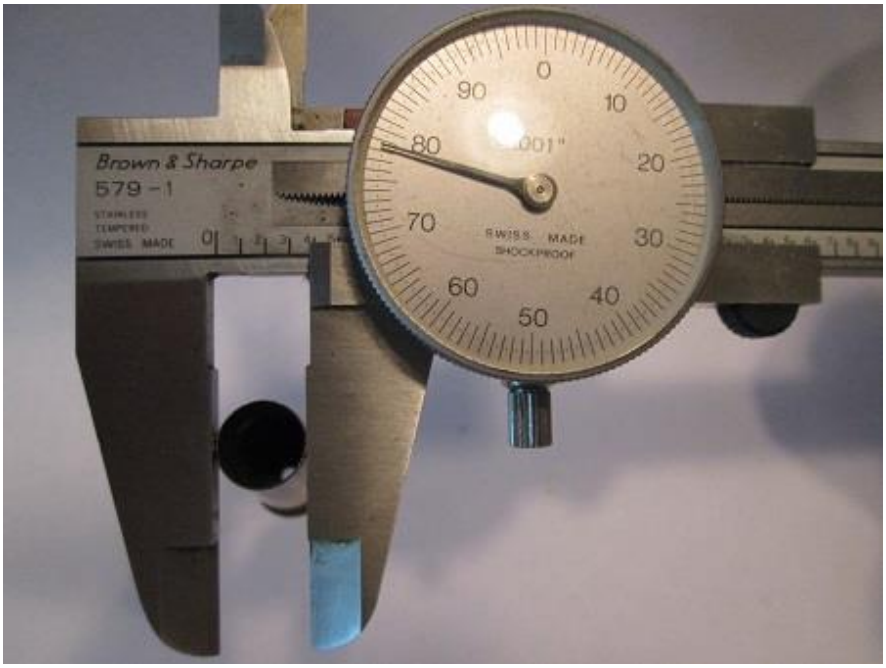
Sizing and De-priming

The sizing step sets the case to the proper dimension and pops out the spent primer. It's also an opportunity to inspect the brass prior to loading. Look for cracks and splits in the brass or any other abnormality, including a flattening of the old primer which indicates excessive pressure.

Gun Thread Reloading Test: Who can spot the problem with this fired case?

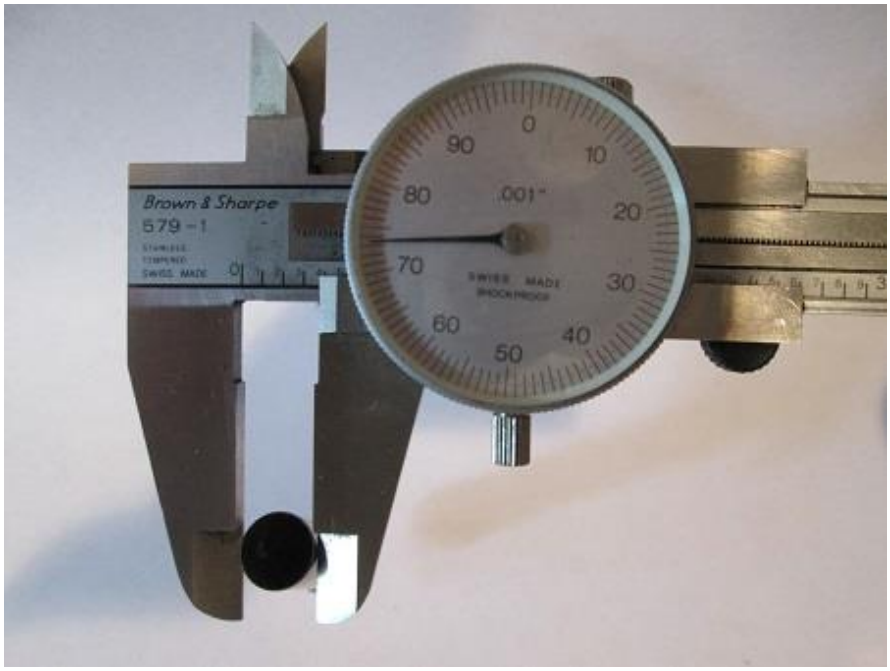
Simply place a cartridge into the shellholder and cycle the press. The amount of sizing will vary based on the chamber, but a change of .003" - .008" is about normal. You will feel a slight resistance as the case enters the die and the ram reaches its uppermost position as the handle begins to cam over. Repeat until the desired number of cases are sized and de-primed.

Fired unsized case:



After firing and before sizing -.3785

After running through the sizing die we get:



After sizing - .3735

Expander Die

The expansion step very slightly flares the case mouth to accept the bullet. Avoid oversizing as this leads to premature case wear and failure. When cycling the press on the expansion die you will feel about the same resistance as in the earlier sizing step as the ram reaches its uppermost position. Adjust the expander plug up or down until a bullet will just begin to seat in the case mouth without force. Repeat until the desired number of cases are processed.

Priming

Confirm the size and type of primer to be used and inspect the primer pocket for excessive carbon buildup or other abnormalities. Loosening of the primer pocket is a sign of overpressure. The cycling of the priming tool should be accomplished smoothly with a slight resistance as the primer is firmly seated. When properly seated the primer will sit even with, or very slightly below, the case head. Repeat until the desired number of cases have been primed.

Powder

Double check that you are using the correct powder. Never work with more than one powder on the bench.

Run several charges through the powder dispenser, checking each on your scale until the amounts dispensed are consistent. The cycling of the dispenser arm should be smoothly performed at the same speed each time. I dispense powder into a pan about every 10th cartridge and check the weight for consistency. If a variance is noted, investigate back to your last weight QA check. I prefer to dispense powder into 50 cartridges, and then seat the bullets all at once.

Bullet Seating

Visually inspect the powder levels of all cartridges in the reloading block. This is your last chance to avoid a squib load or worse, a double charge. It is a good idea to make a number of dummy rounds (no powder or primer) as you setup the die until you are satisfied with the seating depth and crimp. Again, the press should cycle with a very slight resistance as the bullet is seated and crimped into place. You can use commercial ammunition as examples. The now completed round should drop freely into the cartridge case gage and not stick out either end.

After Shooting

One thing we haven't discussed until now is case cleaning. The brass cartridges become dirty with powder residue and must be cleaned. There are different ways to accomplish this, and I use a vibrating tumbler filled with crushed walnut media. I have never seen the reason to spend a ton of money on the process and am satisfied with just getting the grime off of the brass, not making it look brand new. I de-prime my brass first, then tumble for an hour or so. Care must be used to inspect each case after tumbling for walnut grains stuck in the flash hole.

The tumblers retail around $75 - $100. One tip - the crushed walnut must be changed periodically. You can extend its life by removing crud from the bowl if you toss in a dryer sheet with the brass which collects a lot of the gunpowder residue. PRO TIP: Source the crushed walnut media from a pet supply place, not from a gun supply place. You'll get an enormous bag at a fraction of the cost.

Do you like shiny things? If you're really, really serious about clean brass, here's an informative article on using stainless steel pins as a cleaning media.

Congratulations! You've just freed yourself from the tyranny of Big Ammo by undertaking an enjoyable and productive hobby. Please use common sense. If something doesn't feel right, it probably isn't, and should be investigated until you understand what is going on. Do not replicate any loads until you have independently verified the powder type and charge weight in a published source. Trust me, there is always a bigger idiot out there somewhere, and you do not want to find them discussing their "secret" formula on the internet. If you run into problems or have any questions, feel free to drop me a line.

Reloading Supplies List

Item	Price Range	Product	Brownells/Sinclair #	Manufacturer	Mfg Part	2019 Retail	2023 Retail
Equipment & Tools							
Reloading Manual	$21- $32	Cartridge Reloading	100-042-555WB	Hornady	99241	$ 32	$ 43
Single Stage Press	$80 - $250	Redding Big Boss II Reloading Press	749-008-146WS	Redding	97000	192	286
.38 Special Die Set	$80 - $200	Carbide Die Set .38/.357	749-006-627WS	Redding	88282	88	121
Shellholder (press)	$10 - $15	Redding Shellholder #12	749-001-103WS	Redding	11012	12	13
Hand Primer	$20 - $120	Sinclair Hand Priming Tool	749-007-603WS	Sinclair	PT2000	120	120
Primer Tray	$5 - $10	RCBS Primer Tray	749-000-903WS	RCBS	9480	6	7
Shellholder (priming tool)	$5 - $10	Stainless Shellholder	749-101-027WS	Sinclair	105001	7	7
Powder Measure	$50 - $500	Model 10x Powder Measure	100-010-787WS	Redding	03400	190	272
Powder Funnel	$5 - $20	RCBS Powder Funnel	100-010-213WS	RCBS	9087	6	7
Powder Scale	$30 - $150	Redding #2 Master Scale	749-007-126WS	Redding	2000	98	125
Powder Trickler	$20 - $30	Redding Powder Trickler	749-003-092WS	Redding	05000	27	27
Dial calipers 6"	$27 - $250	Dial Calipers	749-013-842WB	Hornady	50075	63	63
Case Gauge	$20 - $50	38 Special Cartridge Gauge	749-016-801WS	Hornady	380702	20	22
Ammunition Boxes	$4 - $6	MTM Ammo Boxes	749-000-248WS	MTM	P100324	5	5
Cartridge Tray	$8 - $10	Reloading Tray	749-013-957WS	Frankford	393939	9	10
Total	*$400 - $1,600*					$ 875	$ 1,128
Components							
Cases	$15 - $35	Starline .38 Special - 100 ct	749-002-215WS	Starline	1200	$ 17	$ 23
Primers	$30 - $35	Federal Small Pistol Primers - 1000 ct	749-004-461WS	Federal	100	$ 33	$ 100
Bullets	$30 - $60	Berry's RN 158gr Plated - 250 ct	100-029-051WB	Berry's	84525	$ 32	$ 42
Powder	$18 - $25	Winchester W231 - 1#	100-008-772WS	Winchester	2311	$ 24	$ 43